

VERIFICATION REPORT 21222967

Niksar Hydroelectric Power Plant

Turkey



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Summary:

TÜV Rheinland Energie und Umwelt GmbH was assigned to perform verification of the second monitoring period for the VCS project activity Niksar HPP, against the verification criteria set under the VCS standard v.3.3, VCS Program Guide v3.4 and all other relevant requirements and considering the reasonable materiality threshold of 5% (as defined in ISO 14064 - 3)

The Niksar HPP is a hydroelectric power plant on the Kelkit Stream within the jurisdiction of Niksar town, with installed capacity of 40.16 MWe, expected average annual electricity generation of 215,203 MWh and estimated annual GHG emission reductions of ca. 114,752 tCO₂.

The verification services are requested by PP and cover the first monitoring period from 24/05/2012 until 31/07/2013, for the registered VCS project activity Niksar HPP. The verification is performed in accordance to the VCS requirements as specified within the VCS standard v.3.3, VCS Program Guide v3.4.

The verification is performed in 3 main steps, namely

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

Finally based on the provided documentation and site inspection, TÜV Rheinland Energie und Umwelt GmbH issues a positive verification opinion on the Niksar HPP, confirming that for the monitoring period from 24/05/2012 to 31/07/2013, GHG emission reduction of 141,729 tCO₂ are realised from the aforementioned project activity.

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1 INTRODUCTION

1.1 Objective

As per VCS Standard v3, 'verification is the periodic ex-post independent assessment by a validation/verification body of the GHG emission reductions and removals that have occurred as a result of the project during the monitoring period, conducted in accordance with the VCS rules.' The Niksar HPP has been developed as VCS project activity, and contributes to the global GHG emission reductions since 24/05/2012. As part of the VCS procedure, the project underwent the VCS Validation, which assured projects additionality and the potential annual emission reductions of 11,4752 tCO₂. Besides, it was confirmed that the project is implemented as described in the VCS PD and the suggested monitoring plan is plausible.

The verification of 1st monitoring period comprises of qualitative and quantitative evaluation of the emission reduction generated in the period from 24/05/2012 to 31/07/2013.

1.2 Scope and Criteria

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

Therefore, the verification of the 1st monitoring period for the Niksar HPP is performed by implementing the VCS Standard v3.3, VCS Program Guide v3.4, where the ER calculation and verification are based on the approved CDM Methodology ACM0002 v13.0.0 and the recommended methodological tools.

In the process of verification of 1st monitoring period, the VVB proved the accurate implementation of the project and analysed the provided monitoring report and ER calculation spreadsheets, on hand of supporting documents, such as Niksar HPP PDD, ER and baseline calculations, monitoring plan, VCS Validation Report, records on electricity generation and self-consumption as well as records on water level, certificates on calibration of metering devices, etc.

1.3 Level of assurance

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

The final verification is based on the latest monitoring report for the 1st monitoring period v1.1, dated 29/08/2013, supporting documents disclosed to the auditor, own background research and investigations and information collected through performing interviews during on-site assessment. The correctness of the verification conclusion is guaranteed throughout the credibility of the above mentioned sources of information.

The Verification Statement (see section 6) is made to a reasonable assurance level, and a materiality threshold of 5% is applied for identification of material omissions as required by VCS v3.3 paragraph 5.3.1 item 4. In general it shall be adhered to the procedures as defined in ISO 14064-3.

1.4 Summary Description of the Project

Niksar HPP is planned and implemented, by Niksar Enerji Üretim Ltd. Şti., as hydroelectricity power plant on the Kelkit stream, at the Niksar town of Tokat province, with geographic coordinates

- Weir (Akıncı Weir) 40°26'37.98"N 37° 4'47.72"E
- Powerhouse 40°29'27.38"N 36°58'34.79"E

The Project Activity was planned as part of the Kelkit stream master plan developed by the General Directorate of State Hydraulic Works (DSI), which was proposed as a cascade type energy harvesting development between Çamlığöze and Hasan Uğurlu dams, including five run-of-river type HPPs. The Niksar HPP was seen as the 4th unit of the cascade.

The project consists of following main units:

- Weir structure, which forms a reservoir, with area of ca. 164,710 m² by a water level of 365m
- System of open cannels
- a forebay from which water is loaded to 2 penstocks
- a powerhouse station with 2 turbines, 20.08 MWe each, and total installed capacity of 40.16 MWe.

As identified in the FSR, based on water availability, water velocity and the project technical design, the Niksar HPP was foreseen to generate 247,650 MWh of electricity per year. However, in the VCS PD the annual electricity generation is indicated as 215,203 MWh. It is enlightened that the 13% production loss is due to the upstream government owned dams (Kılıçkaya Dam - 124 MW and Çamlığöze Dam - 33MW) and the specific seasonal and topographic conditions. Based on Turkey's Combined Margin Emission Factor ($EF_{CM} = 0.5332 \text{ tCO}_2\text{e/MWh}$), which was based on ex-ante calculations and was proven to be reasonable and conservative during VCS validation, the expected annual GHG Emission reductions generated by the project activity are estimated to 114,753 tCO₂e/year

Table 1: Project milestones

Date	Event	Reference
24/03/2006	Main water Usage agreement signed	Water Usage Agreement
21/09/2006	Production License number EÜ/921-1/722 issued to Selen Elektrik previous title holder of the project	EMRA License number EÜ/921-1/722
22/11/2007	EIA process not needed certification presented by the Ministry of Environment and Forestry (name changed as Ministry of Environment and Urban Planning)	The EIA certification
01/04/2009	Feasibility Study Report (FSR)	FSR Prepared by third party Su Yapı
19/06/2009	Approval Letter for the revised Feasibility Study	DSI Official Letter
28/10/2009	Final amendment made to the water usage agreement due to title of the owner changed to Niksar Enerji Üretim Ltd. Şti.	Second Amendment to water usage agreement
02/11/2009	Grid connection and Usage Agreement with TEIAS	TEIAS Agreement relevant pages
11/11/2009	Final Amendment made and the title of the owner changed to Niksar Enerji Üretim Ltd. Şti.	EMRA license number EÜ/2303-1/1559

15/12/2009	EPC Contract Signed. Considered as the investment decision date.	EPC Contract relevant Pages
16/12/2009	Loan agreement signed	Loan agreement
02/02/2010	Construction Start Date	Correspondence of EPC contract parties.
24/02/2010	The Electro Mechanical Equipment Purchase Contract Signed	EME Contract signed between EPC contractee and Voith Siemens Turbine Manufacturer
09/03/2010	Forest Authority issued forest permit so that the land use can be changed and project can be implemented	Forestry Permit Letter issued by Forest Authority
23/05/2012	Government Acceptance for the second unit to become operational	Provisional Acceptance Protocol for unit 2
24/05/2012	The date when the first amounts of electricity is exported to the host country grid.	OSF Data Form
08/06/2012	Government Acceptance for the first unit to become operational	Provisional Acceptance Protocol for unit 1

Beside the project milestones summarised in Table 1, following dates (Table 2) deem important for the 1st monitoring period.

Table 2: Significant dates to project's monitoring

Date	Milestone	Reference
24.05.2012	Date of commissioning of the Second unit of the Niksar HPP, which is considered as project start date therefore - start of the 1 st monitoring period	OSF Data Form
06.06.2012	Date of commissioning of the first unit of the Niksar HPP	OSF Data Form
10/04/2012	Calibration date of meters (Main Meter 1-S.n. 53088751, Main Meter 2-S.n. 53088754 and the control meter-1-S.n. 53088752, control meter-2-S.n.: 53088753)	Calibration Test reports
21/05/2013	Periodic calibration of metering devices (Main Meter 1-S.n. 53088751, Main Meter 2-S.n. 53088754 and the control meter-1-S.n. 53088752, control meter-2-S.n.: 53088753)	Calibration Test reports
18.04.2013	Issuance of the Final Validation Report	Final Validation Report
31.07.2013	End of the first monitoring period	
13.05.2022	End of first crediting period	

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

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

The core validation consisted of the following phases:

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

2.2 Validation Findings

2.2.1 Gap Validation

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

2.2.2 Methodology Deviations

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

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

- ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, v13.0.0
- “Tool for the demonstration and assessment of additionality” v06.0.0
- “Tool to calculate the emission factor for an electricity system” v02.2.1

2.2.3 Project Description Deviations

In the course of VCS verification, it was determined that the project activity is implemented as described in the validated VCS PD for Niksar HPP. The verification team witnessed that the power plant is operational and generates electricity by using both generation units with total installed capacity of 40.16 MWe.

2.2.4 New Project Activity Instances

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

2.3 Validation Conclusion

The validation of the GHG assertion is conducted in accordance with the requirements of the VCS standard v3.3, the standard ISO 14064-3 and the approved UNFCCC methodology ACM0002, v13.0.0 to a reasonable level of assurance by applying a materiality threshold of 5%. In the course of the validation process, the VCS PD, substantiations and any additional supportive documents are reviewed and reflected in Chapter 2.2 in the validation report issued on 18/04/2013, where the GHG assertions, indicated in the VCS PD v2.1 issued on 18/04/2013 indicate average annual achievable GHG emission reductions of 114,753 t CO₂e per annum.

The validation team came to the conclusion that based on their 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.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification is based on the Monitoring Report v1.1 and the validated project design document, including baseline calculations and the monitoring plan. These documents are reviewed against VCS Version 3 requirements, stipulated in the VCS Standard v3.3 and the VCS Program Guide v3.4. TÜV Rheinland Energie und Umwelt GmbH has, based on the recommendations in the "Validation and Verification Manual", employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The essential components of the verification process for the relevant monitoring period, 24/05/2012 – 31/07/2013 are specified as:

- desk review of the 1st monitoring report and supporting documents
- on-site visit and follow-up interviews,
- resolution of outstanding issues, and
- issuance of the final verification report and opinion

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

3.2 Document Review

In the course of the verification of GHG emission reductions generated by Niksar HPP during the 1st monitoring period from 24/05/2012 until 31/07/2013, bundle of documents, incl. methodologies, methodological tools, protocols, reports, official letters, etc., have been provided to the verification team. Furthermore, confidential information, such as contracts and agreements, was disclosed to the last as well. Full list of documents reviewed in the verification process is outlined below

Table 3: List of official documents, supportive workbooks and other evidences reviewed in the course of the verification of the 1st monitoring period of Niksar HPP VCS Project.

Ref Nr & Document/Name	Comment
/1/ VCS Guidance - Validation and Verification	The manual is followed strictly in order to fulfil the VCS

	Manual v3.0	requirements for the verification of GHG emission reductions generated by the Niksar HPP
/2/	VCS Program Guide, v3.4	The latest available version of the VCS Program Guide, released on 04/10/2012, which is to be obeyed
/3/	VCS Standard, v3.3	The latest available version of the VCS Standard, released on 04/10/2012, which is to be obeyed
/4/	EB67 ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", v13.0.0.	The CDM approved consolidated baseline and monitoring methodology applied for the development of the Niksar HPP VCS project activity, where the indicated version is the latest available at the time of validation
/5/	EB63 Annex 19 "Tool to calculate the emission factor for an electricity system", v03	The CDM methodological tool applied for the estimation of the expected GHG emission reductions generated by the Niksar HPP, here the indicated version is the latest available at the time of validation
/6/	VCS Project Description for Niksar Hydro Electricity Power Plant, v2.1	The final VCS PD, which was issued on 18/04/2013 by Ekobil Çevre Hizmetleri Danışmanlık Eğt. Tar. Hayv. Mad. İnş. İth. İhr. Tur. ve Tic. Ltd. Şti..and approved by the assigned VVB.
/7/	Final VCS Validation Report for Niksar Hydroelectric Power Plant, v1.0	Final validation report was issued by the assigned VVB on 18/04/2013
/8/	VCS Monitoring Report for Nixer Hydroelectric Power Plant / Monitoring period 24/05/2012 – 31/07/2013, v1.0	Draft monitoring report for the 1 st monitoring period, which was issued on 19/08/2013
/9/	NiksarTUV-RNFP(1stMRPeriod)v2.0.xlsx	Final Comprehensive Excel workbook, delivering project input data from power plant commissioning onwards, providing the raw data and illustrating their processing and quality assessment. Worksheet on ER calculations, which is used for re-calculation, are also included in the workbook. Parts of the tables are included in the Monitoring Report.
/10/	Meter Reading Protocols delivered by TEIAS by the OSF system	The meter reading protocols delivered by the TEIAS to the PP indicate the gross electricity production (EG _{gross}) and the electricity consumption (EG _{self consumption}) of the power plant for the month from May 2012 until July 2013. The protocols are dated as the beginning of the following month. The protocols are not signed since the data are retrieved via the remote metering system and the protocols are delivered to PP in electronic form. The ER calculations are based on data delivered from those monthly reports on electricity consumed from and delivered to national grid by the power plant
/11/	Workbook on Meter Readings, developed by the PP for controlling purposes	The worksheets cover the complete monitoring period from May 2012 to July 2013
/12/	PMUMForms –ControlData	Bundle of PMUM monthly reports on the electricity delivered to and consumed from the national grid for the period May 2012 – July 2013 on hour base. Used for QA/QC
/13/	Minutes of the 1 st counter test performed by the TEIAS general directorate for each	The counter Test is performed on 10/04/2012 for all installed meters, namely Actaris SL7000SL761 SN 53088752, SN

	of the electricity meters	53088753, and SN 53088754
/14/	Minutes of the 2 nd counter test performed by the TEIAS general directorate for each of the electricity meters	PP decided to perform counter tests for their meters, even though it is not required per Turkish legislation. The 2 nd test was completed on 21/05/2013
/15/	Certificate of Conformity, certificate N° CC_SL7000_012868	The certificate confirms that all involved electricity meters are compliant with IEC standards 62053-22 & 62053-23 and are to be implemented under definite conditions. The certificate is required since the metering devices are imported and it is required to prove that they are in compliancy with the Turkish national regulations. The active energy tests are completed on 29/09/2010 with satisfactory results.
/16/	Measuring Instrument National Type Approval Certificate	A certificate issued by the Ministry of Industry and trade / general directorate of measurement and standard on 20/04/2011 to certify that the 4 meters comply with the regulations of the host country. The certificate is required since the metering devices are imported.
/17/	Single line wiring diagram for Niksar HPP Transformer Substation	Part of the signed agreement between TEIAS and the PP, used to prove technical implementation and the incorporation of the transmission lines/meter.
/18/	First reading and meter changing protocol	The switch of main and back-up meter for the transmission line 2 was required, since some malfunctions of the meter Actaris SL7000SL763 was realized. Therefore the meter Actaris SL7000SL764 was assigned as main meter for the transmission line 2
/19/	Attendance list to the monitoring trainings	Training on monitoring procedure for the involved personal was performed on 16/08/2013. The training was required in order to satisfy the FAR indicated in the Validation report v1.0
/20/	VCS Monitoring Report for Niksar Hydroelectric Power Plant / Monitoring period 24/05/2012 – 31/07/2013, v1.1	Final version of the monitoring report for the 1 st monitoring period, which was issued on 29/08/2013
/21/	Upstream of weir reservoir layout plan	The layout indicates the area of the formed reservoir at 2 levels – the normal operation level = 365 m elevation and the level at which the water would spill over the weir structure = 367 elevation.

3.3 Interviews

In the course of the site inspection, the verification team carried out interviews with plant manager, carbon consultant, and the chief technician.

Table 4: People involved in the verification process

Participant	Position	Institution
Dr. Aslı Sezer Özçelik	Consultant	Ekobil Ltd

Tekin Erdem	Operation/Plant Manager	Niksar Energy
Murat F. Özçelik	Consultant	Ekobil Ltd
Murat Çubuk	Chief technician	Niksar Energy
Denitsa Gaydarova-Itrib	VVB	TÜV Rheinland GmbH

The signed list of participants is included as *Annex C – List of participants to the Site assessment on 27/08/2013*.

3.4 Site Inspections

The obligatory site visit took place from 25/08/2013 to 27/08/2013 in Sivas, Turkey and on the project site Niksar HPP. The objective of the on-site visit is to confirm that project is managed and operates in accordance to the registered VCS PD v2.1 /6/. Furthermore, validity and authenticity of delivered supporting documents as well as consistency of the monitoring and reporting with the established procedures and the validated monitoring plan suggested in the VCS PD v2.1 /6/ is confirmed. The site visit was carried out by means of interviews with the persons indicated in section 3.3, document review as indicated in section 3.2 and monitoring system check.

3.5 Resolution of Any Material Discrepancy

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

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

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

- Implementation status of the project activity

Niksar HPP was commissioned on 24/05/2012, as indicated in the VCS PD v2.1 /6/ and the VCS Final Validation Report /7/. The power plant encompasses 2 turbines with total installed capacity of 40.16MW. During the site visit, the turbine nameplates (see Figure 1) were perceived and the installed capacity was approved.

Figure 1: Nameplates of the turbines installed at the Niksar HPP, indicating the total installed capacity of the power plant (pictures are taking during the verification site visit on 27/08/2013)



Furthermore it was observed and substantiated by the Single Line Written Diagram for Niksar HPP Transformer Station /17/, that the electricity generated by each turbine is conveyed via separate transmission lines to the transformer station, and eventually recorded by separate metering devices.

The verification team confirmed that the project is implemented without any deviations from the VCS PD v2.1 /6/ and as certified by the VVB within the Validation report v1.0 /7/ from April 2013

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

The final monitoring report /20/ follows the monitoring plan for Niksar HPP VCS project activity, which is presented VCS PD v4.1 /6/ and is in compliance with the approved methodology ACM0002 v13.0.0 /4/. During the verification process the suggested plan is proved to be applicable and credible for the 1st (current) monitoring period.

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

Since the metering devices are imported, the certificate of Conformity /15/ issued by the ITRON France on 30/09/2010 and the Measuring Instrument National Type Approval Certificate /16/, issued by the Ministry of Industry and Trade/ General Directorate on Measurement and Standards on 20/04/2011, were required in order to confirm that the devices are in compliance with the national requirements on electricity metering devices, namely IEC 22/62053-23 and IEC 22/62053-22. All devices passed the test. Furthermore, the Measuring Instrument National Type Approval Certificate /16/ clearly states that its validity is until 28/03/2017.

In addition, the PP disclosed the Minutes of the 1st Counter Test /13/ and the Minutes of the 2nd Counter Test /14/ to the VVB. It was furthermore discussed, that the Grid owner is willing to perform the calibration tests for the metering devices on an annual basis.

Table 5: Electricity metering equipment for Niksar HPP

Location	Meter Name	Brand and Model	Serial Number	Class
Niksar HPP Control room	Transmission line 1 Main	Actaris SL7000 SL761	53088751	Active: 0.2S Reactive: 2.0
	Transmission line 1 Back-up	Actaris SL7000 SL761	53088752	Active: 0.2S Reactive: 2.0
Niksar HPP Control room	Transmission line 2 Main	Actaris SL7000 SL761	53088754	Active: 0.2S Reactive: 2.0
	Transmission line 2 Back-up	Actaris SL7000 SL761	53088753	Active: 0.2S Reactive: 2.0

As it could be perceived from the table above and was determined during the site visit, the labelling of metering devices for the transmission line 2 were changed, so that the meter with SN 53088754, which was initially determined as back-up meter, is now seen as the main meter.

During the site visit, VVB observed that in addition to the meter reading reports delivered by TEIAS /10/, PP has developed its controlling system. It consist of excel workbook /11/, where the meter readings for each meter has been recorded per months, and the deviations are indicated. Nevertheless, for the determination of the baseline emission reductions (ER_{BL}) generated by Niksar HPP for the current monitoring period, carbon consultant implemented the official meter reading reports by TEIAS /10/. This correspond to the indicated 'Description of measurement methods and procedures to be applied' under the monitoring plan suggested in validated VCS PD v2.1 /6/.

Furthermore, as declared in the Niksar HPP VCS PD v2.1 /6/ and in compliancy with the implemented approved CDM methodology and methodological tools, diesel fuel consumption of the Niksar HPP is not to be monitored during the crediting period.

Nevertheless, 2 further parameters are identified to be subject to monitoring, namely the installed capacity of the power plant and the area of the reservoir formed by the Niksar HPP weir structure. The monitoring process for those parameters was discussed in details with the plant manager as well.

During the site visit on 27/08/2013, VVB observed that both turbines have been installed and in operation. The total installed capacity of the power plant was determined by turbines' nameplates (see Figure 1). Furthermore the plant manager declared that these units shall not be exchanged during the crediting period, i.e. the witnessed total installed capacity of 40.16 MWe shall not be altered during the operational lifetime of the power plant.

Furthermore, VVB questioned the area of the reservoir formed by the weir structure, and witnessed that the reservoir area covers 164,710 m² by the water level of 365 elm, which is the normal operational level. Plant manager explained that by the water level of 366 elm, which is the maximum operational level, an alarm would be activated and the emergency gates opened, i.e. power plant could not operate above this water level. It was also added that above 367 m water elevation, the water would spill over the structures

Therefore and because of the local topography, it was determined that the area of the reservoir could not exceed the 241,128 m², as could be perceived from the Upstream of weir reservoir layout plan /21/. The power density (PD) of Niksar HPP at the critical water elevation (367 m) is determined to be 166 W/m², which is definitely higher than the benchmark (10 W/m²) on emissions from the reservoir of Hydro power plants suggested by the CDM methodology ACM0002 v13.0.0

As revealed in the VCS monitoring report, Carbon consultant requested alteration of the monitoring plan for the following monitoring periods, where the previously discussed parameters (A_{pj} & Cap_{pj}) would not be subject to monitoring. VVB assessed the deviation suggestion in depth and requested further supportive information. Eventually, based on the conversation with plant manager, his comprehensive enlightenment, arguments and written supportive information, such as the Reservoir Layout Plan /21/ and Feasibility Study Report, VVB deems the suggested deviation of the monitoring plan for the future monitoring period, reasonable and credible.

Finally, VVB observed that for the 1st monitoring period (24/05/2012 – 31/07/2013) the validated monitoring plan, as per VCS PD for Niksar HPP v2.1 /6/ has been followed accordingly. Furthermore, alteration of the monitoring plan for Niksar HPP for the following monitoring periods was considered and accepted so that the parameters A_{PJ} (reservoir area) and Cap_{PJ} (Installed capacity of the hydropower plants after the implementation of the Project Activity) were removed from the monitoring plan.

- Any remaining issues from previous validation or verification.

The Niksar HPP is observed to operate as enlightened in the validated Niksar HPP VCS PD v2.1 /6/. As pointed out in the Final VCS Validation Report for Niksar Hydroelectric Power Plant, v1.0 /7/, PP was requested to deal with a FAR (forward action request), related to the monitoring procedure.

During the monitoring period VVB observed that PP took acknowledgement of the FAR and provided sufficient trainings on VER monitoring issues to the VER team, so that their responsibility and understanding would be improved. The attendance list to the monitoring trainings /19/ was provided to the VVB. In addition, Mr Murat Çubuk, the Chief technician, confirmed that the training took place and revealed that it was beneficial for him. He showed that the provided templates for monitoring procedure have been used.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

- Baseline emissions

The Monitoring Plan describes how the requirements related to the data acquisition and storage are being met. As described in the validated Monitoring Report /20/ and physically observed by the VVB during the on-site visit, 4 bi-directional meters (see Table 5), i.e. 2 main and 2 back-up meters, were installed at Niksar HPP transmission substation to measure electricity exported to and imported from the national grid. As denoted in Table 5, generated electricity is delivered to the transmission substation by 2 transmission lines, where each line ends with 1 main and 1 back-up (control) meter



Figure 2: Main meter SN° 830887851 for transmission line 1 (TR1 right meter) and the main meter SN° 830887854 for transmission line 2 (TR2 left meter)

The accuracy of the meters is 0.2 % (CLASS 02S) as required by national legislation ("Elektrik Piyasasında Kullanılacak Sayaclar Hakkında Teblig" (Communiqué for Metering Devices to be used in the Electricity Market). Based on the disclosed meter relevant documents, i.e. Certificate of Conformity /15/ and the Measuring Instrument National Type Approval Certificate /16/, and the observations during the site visit, VVB confirmed that the implemented measuring equipment corresponds to the one listed in the

VCS PD /6/ and is in compliance with the Turkish national law. In addition, the provided Minutes of the 1st and the 2nd counter test /13/ & /14/ for the upper mentioned electricity meters, evidence the calibration process. It is worth mentioning that the PP requested annual calibration of the devices in order to assure the quality of data required for the ER calculation, namely the gross electricity generation and the self-consumption. The only entity which has the right to calibrate, maintain, exchange or decide on the metering devices is the TEIAS (Turkish Electricity Transmission Company) or any subcontractor appointed by TEIAS.

The process of calculation of emission reductions was thoroughly discussed during the site visit with the carbon consultant, the plant manager and the chief technician. Therefore, VVB confirmed that the main source of data for determining project's baseline emissions is the official meter reading protocols /10/ delivered by TEIAS on a monthly basis, which corresponds to the validated VCS PD /6/. Plant manager clarified that TEIAS retrieved those data by a remote system, named OSF and send the protocols per e-mail. The meter reading protocols contain information on gross electricity (EG_{gross}) delivered to the Turkish national grid and electricity obtained from the grid ($EG_{self\ consumption}$) on a hour basis. Thus, carbon consultant developed a monitoring workbook /9/, where the monthly net electricity generation is determined, so that

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

The workbook was carefully studied by the VVB, and the enclosed calculation re-computed. Following the requirements of the methodology ACM0002 v13.0.0 and using the combined margin emission factor for the system, which was determined ex-ante during projects validation, i.e. $EF_{CM} = 0.5332\ tCO_2/MWh$, as illustrated in Table 6

Table 6: Baseline emission reductions from Niksar HPP

Period	$EG_{net} = EG_{gross} - EG_{self\ consumption}$	BL (tCO_2)
24/05/2012 – 31/12/2012	113,954	60,764
01/01/2013 – 31/07/2013	151,838	80,965
TOTAL	265,793	141,729

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

- Project emissions

As discussed in the previous sections and indicated in the VCS PD /6/, the area of reservoir area is also subject to monitoring. VVB confirmed that the approved monitoring plan was followed by the carbon consultant in order to determine the area of reservoir. Therefore VVB witnessed that the maximum operational water level for the monitoring period did not exceed the elevation of 365 m. During the site visit, it was discussed with the plant manager, that the maximum water level, before spilling over the weir structure, is 367 m. The corresponding reservoir area and power density are shown in Table 7 (below).

Table 7: Power Density of Niksar HPP

Water elevation (m)	Reservoir area (m ²)	PD (W/m ²)
165	164,710	ca. 243
167	241,128	Ca. 166 ¹

The reservoir area is based on Upstream of weir reservoir layout plan /21/ which was developed by the design team and provided to the VVB in order to substantiate the area calculations. In addition, verification team witnessed that the determination of power density of the reservoir area is performed accurately and in accordance to the approved methodology ACM0002 v13.0.0.

Within the VCS Monitoring Report /20/ Carbon consultant declared that Niksar HPP generates no project emissions, i.e.

$$PE_{hp}=0 \text{ tCO}_2$$

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

$$ER = BL - PE_{hp} - LE = \mathbf{141,729 \text{ tCO}_2}$$

In conclusion, all calculations made in the monitoring workbook /9/ have been verified through re-computation by the Verification Team. The data used in the spreadsheet was tracked back to its origin at a coverage rate of 100% using the monthly TEIAS records. The consistency of all values and monthly generation amounts has been verified. The monthly generation data was again checked for consistency by cross checking with daily production records of several months, where hourly records are taken by the plant operating staff and by cross check to the PMUM database.

¹ The PD corresponds to maximum water elevation in the reservoir. Thus, it is the lowest possible PD for the project activity by the described project design

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

The monitoring procedure follows strictly the CDM methodology ACM0002 ver13.0.0 and the validated monitoring plan included in VCS PD /6/. Emission reduction calculations are based on the net electricity generation records delivered by the TEİAŞ to the PM via e-mail /10/. In order to ensure data accuracy and reliability, the values implied for the emission reduction calculation are compared to ones obtained from other unbiased source. Hence the net and gross electricity generation is determined as sum of the 2 main TEİAŞ meters at Niksar HPP transformer station, as well as from the TEİAŞ back-up meters. In addition the readings are also compared to the PMUM database. The PM presented quality management system /11/, i.e. an excel workbook for recording of the electricity generation by various source and evaluating their accuracy.

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

4.4 Management and Operational System

VVB scrutinized the monitoring plan used for determining the emission reduction by the project and confirmed that it is based on the approved methodology ACM0002 and follows strictly the VCS requirements. The aim of the plan is to maintain credible and transparent measurement and collection of data for precise calculation of emission reduction during the crediting period.

The validated monitoring plan includes 4 parameters for the calculation of the emission reduction, namely the electricity gross production (EG_{gross}), the electricity self-consumption ($EG_{self\ consumption}$), the total installed capacity (Cap_{pp}) and reservoir area (A_{pp}). The first 2 parameters are continuously monitored by two independent metering devices for each transmission line at the transformer substation.

TEİAŞ is the responsible party for recording the electricity generation, ensuring the accuracy of the meter readings and uploading the data to the PMUM database. The TEİAŞ records provide the data for the monthly invoicing and are accessible via the official PMUM website. It should be considered that the PMUM data reflect the transmission line losses and could be ca. 5% lower than the TEİAŞ data.

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

- TEİAŞ remotely reads the metering devices and thus monitors the electricity generation and consumption on a continuous basis.
- TEİAŞ sends monthly records of the electricity generation and consumption data by email to the PP. The document is valid without a signature.
- The PP cross-checks the records against their own daily readings, stores the records electronically and backs them up on a hard drive as well as on a CD.
- The PP forwards the electronic copies to the carbon consultant for the purpose of emission reduction calculations.
- The carbon consultant transfers the data into the monitoring workbook.

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

5 VERIFICATION CONCLUSION

The verification team of TÜV Rheinland Energie und Umwelt GmbH performed the verification for the Niksar HPP in Turkey against the VCS Standard v3.3 and UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The verification team concluded that the project as described in the VCS Monitoring Report v1.2 /20/ meets all relevant requirements of the above-defined criteria. TÜV Rheinland Energie und Umwelt GmbH therefore issues a positive verification opinion.

The verified emission reductions during the concerned monitoring period (24/05/2012 – 31/07/2013) are displayed as follows:

GHG Emission Reductions	tCO ₂
Baseline Emissions	141,729
Project Emissions	0
Leakage	0
Total GHG emission reductions or removals	141,729

And allocated as

Vintage	GHG Emission Reductions (tCO ₂)
24/05/2012 to 31/12/2012	60,764
01/01/2013 to 31/07/2013	80,965
Total	141,729

6 VERIFICATION STATEMENT

Niksar Enerji Üretim Ltd. Şti.
Çetin Emeç Bulvarı 1364. Sok. No:4 Balgat
ANKARA/ Turkey

03/09/2013

RE: Verification Statement – Niksar Hydroelectric Power Plant, Turkey under VCS, 1st monitoring period from 24/05/2012 to 31/07/2013

Niksar Enerji Üretim Ltd. Şti. with registered office at Çetin Emeç Bulvarı 1364. Sok. No:4 Balgat, ANKARA/ Turkey, has engaged TÜV Rheinland Energie und Umwelt GmbH to review and verify the VCS Monitoring Report for the 1st monitoring period from 24/05/2012 to 31/07/2013 for Niksar HPP VCS project activity and all assertions related to the GHG project against the latest VCS version 3 requirements.

The verification of the Emission Reductions generated from the VCS project activity for the indicated period is conducted in accordance to the VCS standard v3.3, VCS Program Guide v3.4, the standard ISO 14064-3 and the approved CDM methodology ACM0002 v13.0.0 and methodological tools to a reasonable level of assurance by applying a materiality threshold of 5%. The project information has been verified and the VCS Verification Report “VERIFICATION REPORT 21222967 – Niksar Hydroelectric Power Plant Turkey” issued on 03/09/2013. The Verification Report includes all relevant information and evidence acquired during the Verification process.

Based on the on-site inspection and review of all available documentation, the validation team comes to the conclusion that the assertions are made in accordance with the requirements of the VCS program and are material correct and fairly represent the required parameters without material discrepancies. The Emission Reductions claimed for the 1st monitoring period (24/05/2012 – 31/07/2013) of the first crediting period, are verified to be 141,729 tCO₂, which is allocated as following:

- 60,764 tCO₂ from 24/05/2012 to 31/12/2012;
- 80,965 tCO₂ from 01/01/2013 to 31/07/2013

Cologne, 03/09/2013

Denitsa Gaydarova-Itrib

ANNEX A

Table 8: Verification protocol

 TÜVRheinland® Precisely Right.	Quality Management Process Description					Number: QMA 2.533.A03	
	Annex 3: Verification requirements Based on the VCS Standard, version 3.3 (published 4 Oct 2012)					Version: 2	
						Valid as of: 14.01.2013	
						Created by: Wollenweber	
						Approved by: N. Heidelmann	
Checklist question	Ref.	MoV[1]			Findings, comments, references, data sources	Draft conclusion	Final conclusion
DR	I	FA					
1. Implementation							
1.1 Have all physical features proposed in the registered PDD been implemented at the project site?		x		x	yes, during the site visit VVB observed that the project operates as described in the registered VCS PD and the monitoring report	ok	OK
1.2 Has the project activity been operated in accordance with the project scenario described in the registered PDD and relevant guidance?		x			yes, 2 generation units, turbines, are generating electricity. Initially, as also explained in the PDD only the 2nd turbine was operational, and the 1st one started operating in June.	ok	OK
1.3 If the project activity is implemented on a number of different locations, has the Monitoring report provided the verifiable starting dates for each site?		x		x	Observed during site visit project consists of 1 project location but 2 operational units.	ok	OK
2. Monitoring plan and methodology							
2.1 Is the monitoring plan established in accordance with the monitoring methodology?					yes, the monitoring plan complies with the approved methodology and is consistent with the monitoring plan suggested in hte PDD	Ok	OK
2.2 In case the implemented monitoring plan defers from the monitoring methodology, has any requests for revision to or deviation from the monitoring methodology been officially communicated to the CDM EB (if applicable methodology is subject to EB approval)?					N.A. - see 2.1. - monitoring plan is corresponding to the one indicated in the VCS PD	Ok	OK
2.2.1 Have the above changes to the monitoring plan been approved by the CDM EB?					N.A.	Ok	OK
3. Monitoring and the monitoring plan							
3.1 Is monitoring established in full compliance with the monitoring plan, contained in the registered PDD (or new monitoring plan approved by the applicable standard)					yes	ok	OK

Monitoring period					24/05/2012 - 31/07/2013		
Parameters					EG_gross; EG_self.consump; Cap & Area_reservoir		
Meter Ser.-No., physical location, transcription					4 meters (Actaris SL 7000 SL761), located in power plant S.Nr: 53088751; 53088752; 53088753; 53088754		
3.2 Are all baseline emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?					yes		
EF(combined)					EF_CM is not monitored, since the EF is calculated as ex-ante		
EG(PP-gross) and EG(PP-selfconsumption) See parameters in section 4					data in EG_gross and EG_self.consump are retrieved in accordance to the monitoring plan, approved during project's validation, which is compliance with the applied approved CDM methodology	Ok	OK
3.2.1 Was the monitoring equipment for baseline emission parameters controlled and monitoring results recorded as per approved frequency? On-site implementation of data transfer & management					yes, the metering devices were controlled during the site visit. It was determined that the metering equipment corresponds to the one indicated in the VCS PD. The monitoring data are collected and perceived as described in the VCS PD. In addition the carbon consultant developed a monitoring manual, which was introduced to the PP and is used for data collection and processing.	Ok	OK
3.2.2 Was the monitoring equipment for baseline emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan? Calibration certificates for all meters					the electricity metering devices were installed and calibrated by the authorized company and in compliance with the national legislation, i.e. communiqué for Metering Devices to be used in the Electricity Market. Calibration certificates were provided to the VVB. Per legislation, calibration is valid for 10 years, if no malfunction recorded. However for this project, PP decided to perform calibration annually	ok	OK
3.3 Are all project emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions? FC(iy) and A(PJ) see below parameters					yes, project emission parameters, Area of reservoir, has been monitored in accordance to the applied CDM methodology and as described in the validated VCS PD	OK	OK
3.3.1 Was the monitoring equipment for project					the Area of reservoir is monitored based on	OK	OK

emission parameters controlled and monitoring results recorded as per approved frequency? <i>Transcription procedure on site</i>					water level of the reservoir. In addition, pictures of the reservoir area have been taken.		
3.3.2 Was the monitoring equipment for project emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan? <i>E.g. name plates of turbines, google earth image</i>					no calibration required.	OK	OK
3.4 Are all leakage emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?					N.A.	N.A.	OK
3.4.1 Was the monitoring equipment for leakage emission parameters controlled and monitoring results recorded as per approved frequency?					N.A.	N.A.	OK
3.4.2 Was the monitoring equipment for leakage emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?					N.A.	N.A.	OK
3.5 Were all monitoring parameters available and verifiable through the whole monitoring period?					yes, the monitoring parameters were monitored as per monitoring plan. VVB witnessed row EG data. The collection of data is sufficiently explained and the quality of data guaranteed. The parameters were verifiable at any time of the monitoring period.	ok	OK
3.5.1 In case, only partial monitoring data is available and PP(s) provide estimations or assumptions for the rest of data, was it possible to verify those estimations and assumptions? Reference: < http://cdm.unfccc.int/EB/026/eb26rep.pdf >, §109(b)					N.A.	N.A.	OK
3.6 Was management and operation system established and operated in accordance with the monitoring plan?					yes, in addition a monitoring manual was also set up by the carbon consultant, a workshop was provided to the relevant people.	ok	OK
3.7 Was it possible to verify that involved management and operation personnel is fully aware of the responsibilities and perform all operations according to the registered monitoring plan and internally developed manuals?					the employees involved in the monitoring of carbon project are observed to be aware of their responsibilities and duties. It has been already mentioned that a monitoring manual has been developed and introduced to the monitoring team. Improvement of the manuals as well as periodic workshops are foreseen.	to be prove on site	OK

4. Parameters							
4.1 Monitored parameter							
Title:					total gross electricity generation of the power plant (line 1&2)		
Units:					EG_gross;		
Estimated value (ex-ante):					MWh		
Measured value (ex-post):					yes	ok	OK
Monitored parameter							
Title:					Electricity consumed by the power plant from the Turkish national grid		
Units:					EG_self.consump		
Estimated value (ex-ante):					MWh		
Measured value (ex-post):					yes	ok	OK
Monitored parameter							
Title:					total installed capacity of the project		
Units:					Cap		
Estimated value (ex-ante):					MW		
Measured value (ex-post):					yes	ok	OK
4.2 Default parameter							
Title:					Combined margin Emission factor for Turkey		
Indication:					EF _{CM}		
Unit					T CO ₂ /MWh		
Default/Used value:					0.5332	ok	OK
5. Calculations							
5.1 Have all the calculations related to the baseline emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?							
Validated EF(CM) XXX					Yes, the baseline emissions are calculated accordingly using the net electricity generation and the combined margin emission factor	ok	OK
5.2 Have all the calculations related to the project emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?					Yes, the calculations of project emissions in the case include only possible emissions from the resulting reservoir area, which finally is determined to be small enough, so that PE = 0	ok	OK
5.3 Have all the calculations related to the leakage emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?					N.A.	N.A.	OK

ANNEX B

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

CAR	CL	Observation (CAR/CL)	Doc Reference No.	Summary of project owner response	Validation team comments	Validation team conclusion
x		Please revise the description in order to illustrate the real situation. The project is operational and therefore relevant information and data are to be included.	VCS MR 1.1	Monitoring Report is revised accordingly	ok	Closed

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

Nikşar HPP

Monitoring Period
24/05/2012 to 31/07/2013
VCS Verification



On-Site-Assessment
Date: 27.8.2013

LIST OF PARTICIPANTS

KATILIMCI LİSTESİ

[illegible]