

DARICA-1 99 MW HYDRO POWER PLANT, TURKEY



Document Prepared By TÜV NORD CERT GmbH

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Summary:

- “DARICA-1 99 MW Hydro Power Plant, Turkey” is a hydropower plant with total installed capacity of 112.42 MW consisting of two turbines each with an installed capacity of 56.21 MW and two synchronous generators with a total rated output of 112 MVA. The project is expected to generate 410,000 MWh per year and to export electricity to the rapidly growing Turkish energy market.
- This is the 3rd periodic verification for this project and the purpose is to ensure that the project is still operating in accordance with the project description and monitoring report.
- The method for the verification consists of document review, interview of relevant entities and on-site assessment by following the criteria required by the VCS standard version 03.3 and the applied CDM methodology ACM0002 Version 7.
- 3 CARs and 4 CLs have been raised.
- From the result of this 3rd periodic verification, the verifier team confirms that the project has achieved emission reductions as mentioned in the reporting period from 1st January 2012 to 31st December 2012.

Abbreviations

BAU	Business as usual
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
CL	Clarification Request
DWRM	Department of Water Resources Management
DNA	Designated National Authority
EB	CDM Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MR	Monitoring Report
PO	Project Owner, in this report means Yapısan Elektrik Üretim Anonim Şirketi
PMUM	Piyasa Mali Uzlaştırma Merkezi (Market Financial Reconciliation Center)
PDD	Project Design Document
QC/QA	Quality control/Quality assurance
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCS	VCS - Project Description
VCU	Voluntary Carbon Unit
VVM	Validation and Verification Manual

Table of Contents

1	INTRODUCTION	5
1.1	Objective	5
1.2	Scope and Criteria.....	6
1.3	Appointment of team members and technical reviewer.....	6
1.4	Level of assurance	7
1.5	Summary Description of the Project.....	7
2	VALIDATION PROCESS, FINDINGS AND CONCLUSION	10
2.1	Validation Process	10
2.2	Validation Findings	10
2.2.1	Gap Validation	10
2.2.2	Methodology Deviations.....	10
2.2.3	Project Description Deviations	10
2.2.4	New Project Activity Instances.....	10
2.3	Validation Conclusion.....	10
3	VERIFICATION PROCESS.....	10
3.1	Method and Criteria.....	10
3.2	Document Review.....	11
3.3	Interviews.....	11
3.4	Site Inspections	12
3.5	Resolution of Any Material Discrepancy	13
4	VERIFICATION FINDINGS	14
4.1	Project Implementation Status	14
4.2	Accuracy of GHG Emission Reduction or Removal Calculations.....	18
4.3	Quality of Evidence to Determine GHG Emission Reductions or Removals.....	23
4.4	Management and Operational System.....	23
5	VERIFICATION CONCLUSION	25
6	REFERENCES	27

1 INTRODUCTION

EcoSecurities has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project:

“DARICA-1 99 MW Hydro Power Plant, Turkey”

with regard to the relevant requirements of the Voluntary Carbon Standard 2011^{/VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 1st January 2012 to 31st December 2012 (both dates included).

The applied monitoring methodology is “Consolidated baseline methodology for grid connected electricity generation from renewable sources” (ACM0002 version 7)

1.1 Objective

The purpose of this 3rd verification is to have an independent third party assessment of the project design, in particular, the project's baseline, the additionality, the monitoring plan (MP) and the project's compliance with regards to:

- The requirements of VCS version 3.3 program guidelines;
- “Consolidated baseline methodology for grid connected electricity generation from renewable sources” (ACM0002 version 7)
- other relevant rules, including the host country, Turkey;
- legislation and sustainability criteria

The verification has been carried out with the purpose of independent checking of objective evidence, as follows:

- to verify that the project is implemented as described in the registered project design document and supplement PD documents;
- to assess the implementation of the monitoring plan (MP) content in the VCS-PD;
- to assess the project's compliance with other relevant rules, including the host country (Turkey) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCUs) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCUs) without any double counting; and to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

The verification is to ensure that the implementation of the project is compliant with the regulations and to ensure that the amount of emissions reductions claimed for is correct.

1.2 Scope and Criteria

The scope of the verification covers review of the PDD and the Monitoring Report as required by the Policy Announcement from VCS Association. The verification scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan based on "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002 version 7), which is included in the VCS PD, Monitoring report and other relevant supporting documents.

The items covered in the verification are described below:

- VCS version 3.3 and Project Country Criteria
- Project Description
- Project Baseline
- Monitoring Plan
- Calculation of GHG Emissions
- Background investigation and follow up interviews
- Draft verification report with CARs, CLs & FARs, if any

The information included in the Project Description, Monitoring Report and supporting documents were reviewed against the requirements and criteria mentioned above. The TÜV NORD CERT GmbH JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks for project implementation and the generation of VERs. The verification is based on the information made available to TÜV NORD JI/CDM CP on the contract conditions and supporting documents made available to the DOE. This includes the information collected through performing interviews during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

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

1.3 Appointment of team members and technical reviewer

On the basis of a competence analysis and individual availabilities, a verification team was appointed. Furthermore the personnel for the technical review and the final approval was determined. The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 1-1 below.

Table 1-1: Involved Person

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence ³⁾	Technical competence ⁴⁾	Verification competence ⁵⁾	Host country Competence	On-site visit
☒ Mr. ☐ Ms.	Martin Saalmann	TN CERT Germany	TL	LA	☒	1.2	☒	☐	☒
☒ Mr. ☐ Ms.	Soycan Inanli	TN Turkey	TM ^{A)}	T	☐		☐	☒	☒
☐ Mr. ☒ Ms.	Christina Stöhr	TN CERT Germany	TR ^{B)}	LA	☒	1.2	☒	☐	-
☒ Mr. ☐ Ms.	Rainer Winter	TN CERT Germany	FA ^{B)}	SA	☒	1.2	☒	☐	-

¹⁾ TL: Team Leader; TM: Team Member, TR: Technical review; OT: Observer-Team, OR: Observer-TR; FA: Final approval

²⁾ GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ GHG auditor status (at least Assessor)

⁴⁾ As per S01-MU03 or S01-VA070-A2 (such as 1.1, 1.2, ...)

⁵⁾ In case of verification projects

^{A)} Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

^{B)} No team member

1.4 Level of assurance

The verification has been planned and organized to achieve a

- ☒ reasonable level of assurance
☐ limited level of assurance.

1.5 Summary Description of the Project

Yapısan Elektrik Üretim Anonim Şirketi is the project developer, owner and operator, and is responsible for gathering the Monitoring Data. J.P. Morgan Ventures Energy Corporation is the buyer of the emission reductions and is responsible for writing the Monitoring Report and submitting to the DOE^{/IM01/IM02/}.

The purpose of the Project is to export the generated electricity to the national grid, thereby contributing to the Turkey's electricity demand and rapidly growing economy. Since the Project generates electricity from renewable energy resources, it makes contribution to climate protection. According to the validated PD, the Project (at 99 MW capacity) was expected to generate ca. 327,690 MWh of electricity annually, and to reduce 209,722 tonnes of CO₂ emissions per year, by supplying renewable energy that would have been supplied by the existing power grid that generates electricity predominantly from fossil fuel

powered thermal power plants. During the operation phase the capacity of the project was increased to 112.42 MW (2 x 56.21 MW turbines) and the generator capacity was increased to 112 MVA (2 x 56 MVA)^{/MES/}. Accordingly, the expected annual electricity generation was also increased to 410,000 MWh. This is accomplished with the manufacturer's assistance, by adjusting the turbines to their maximum limits^{/IM01/}.

The Project is constructed on the Melet River in the Mesudiye district, Ordu Province, 4 km Northeast of Topçam District, on the tail water downstream of the Topçam Hydroelectric Power Plant. The Melet River flows in a Northerly direction and has a length of ca. 165 km.^{/IM01/IM02/ValR/VerR/PD/}. The annual mean flow rate, fed by snow and rain water is 27 m³/sec. The region has steep topography and the altitude of the catchment area extends to 1,469 meters. The river itself falls from 650 meters to 335 meters at the Project site.

Project construction commenced in April 2007, and the first turbine began operating on 10/10/2009. On 23/12/2009, the second turbine began operating, and the Project has been operational ever since^{/VerR/FIP/}.

This third monitoring period covers the 12 months from 01/01/2012 to 31/12/2012 (both days included). The total emission reductions achieved in this period are 175,228 tons of CO_{2e}.

The on-site visit was conducted on 21st January to confirm the project location, installation and operation as per the PD. During the site visit the equipment installed and operation of the hydro power plant were checked.

The project location is confirmed in table 1-2.

Table 1-2: Project Location^{/IM01/PD/ValR/PL/}

Item	Project scope
Host country:	Turkey
Region:	Mesudiye district, Ordu province, Turkey
Project address:	Melet River in the Mesudiye District of Ordu Province (12 km Northeast of Topçam)
Latitude	40°43' 51" N
Longitude	37° 51' 30" E

The sources and green house gases (GHGs) of the project activity as illustrated in table 3 of the registered PDD regarding the CO₂ emission from grid electricity were confirmed during the onsite visit.

Essential data of the project is presented in the following Tables 1-3 and 1-4.

Table 1-3: Project Characteristics

Item	Data
Project title	DARICA-1 99 MW Hydro Power Plant, Turkey
Project owner	Yapısan Elektrik Üretim Anonim Şirketi
Any specific project categories	☐ Mega projects (> 10 ⁶ t CO _{2eq} / a) ☒ Projects (≤ 10 ⁶ t CO _{2eq} / a)
VCS MR dated	Draft: 09 January 2013 Final: 2013-01-31
Applied Methodology	"Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002 version 7),
Project starting date	10 October 2009

Crediting period	☐ Renewable Crediting Period (10 y) ☒ Fixed Crediting Period (10 y)
Start of crediting period	10 October 2009

Table 1-4: Technical data of the project^{/MES/}

Parameter / Item	Unit / Details	Value
<i>Turbine</i>		
Manufacturer	-	Voith Siemens Hydro Power Generation
Type	-	Vertical Francis Turbine
Number of units	No.	2
Capacity	MW	56.21
Rated speed	rpm	600
<i>Generator</i>		
Manufacturer	-	Voith Siemens Hydro Power Generation
Type	-	Synchronous Generator
Number of units	No.	2
Capacity	MVA	56
Power Factor	-	0.9
Frequency	Hz	50
Rated Speed	rpm	600
Number of Poles	-	10

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

N/A

2.2 Validation Findings

2.2.1 Gap Validation

N/A

2.2.2 Methodology Deviations

N/A

2.2.3 Project Description Deviations

N/A

2.2.4 New Project Activity Instances

N/A

2.3 Validation Conclusion

N/A

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification of the project consisted of the following steps:

- Contract review;
- Appointment of team members and technical reviewers;
- Desk review of the Monitoring Report^{/MR/} submitted by the client and additional supporting documents.
- Verification planning;
- On-Site assessment;
- Background investigation and follow-up interviews with personnel of the project developer and its contractors;
- Draft verification reporting;
- Resolution of corrective actions (if any);

- Final verification reporting;
- Technical review;
- Final approval of the verification

Table 3.1: Verification sequence

Topic	Time
Assignment of verification	2012-12-14
On-site visit	2013-01-21
Draft reporting finalised	2013-01-22
Final reporting finalised	2013-02-01
Technical review on final reporting finalised	2013-02-01
Final corrections and Approval	2013-02-01

The main verification steps are described below:

3.2 Document Review

The VCS PD^{/PD/}, the VCS MR^{/MR/}, the documentation of the previous verifications and supporting background documents related to the project design and baseline have been reviewed by the verification team. Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data. The references used in the course of this verification are summarized in section 6.

3.3 Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS. During verification the verification team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews were summarized in Table 3-2.

Table 3-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Mr. Osman Fırat Alkan – Plant Manager; Yapısan Elektrik Üretim Anonim Şirketi Ms. Burcu Kılıç – Project Carbon Manager; Yapısan Elektrik Üretim Anonim Şirketi	• General aspects of the project • Technical equipment and operation • Changes since implementation • Monitoring and measurement equipment • Remaining issues from validation • Calibration procedures • Quality management system • Involved personnel and responsibilities

Interviewed Persons / Entities	Interview topics
Mr. Rohit Lohia – Regional Manager India; EcoSecurities International Limited	• Training and practice of the operational personnel • Implementation of the monitoring plan • Monitoring data management • Data uncertainty and residual risks • GHG calculation • Procedural aspects of the verification • Maintenance • Environmental aspects • Editorial issues of the Monitoring Report

3.4 Site Inspections

The verification team adopted suitable methodology to ensure that the project is implemented and operated as per the registered PD and deviations shown in previous verifications. In order to verify that the project is implemented and operated as per the applicable criteria, a site visit was performed by the team members to verify the equipment and instrument installed as well as the operation and accuracy of implemented monitoring methodology. The following items were verified in detail:

- Inspection of installed electricity generation units, electrical switchgears, transformers, etc.;
- Members of operating staff were interviewed and were observed in order to verify allegiance to stated methods of operation and monitoring;
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed;
- The calibration for all metering equipment was checked;
- The monitoring processes, routines and documentations were audited to check their proper application;
- The monitoring data were checked; recording of hourly generation, aggregating of data, and monthly reports were verified;
- Maintenance procedures were verified.

The on-site visit was conducted on 21st January 2013 and held by the team leader and 1 team member. During the site visit, the verification team was able to check and verify the following records:

- Daily electricity generation report which included details of running hours, total daily generation, auxiliary consumption and cumulative generation and consumption for each month;
- Outage register containing details of forced and planned outages, root cause analysis, and corrective actions implemented;
- Register containing hourly readings from the control room;
- Maintenance check list – mechanical and electrical – daily, weekly, monthly and annually;
- Diesel consumption records and operation hours of diesel generator

The following equipments and instruments were checked:

- Turbine and Generator name plate details;
- Check and Main meters, type and serial numbers;
- Transformer details installed in the transformer yard;
- Main control room instrumentation;
- Diesel generator name plate details.

During the on-site visit, the verification team has checked the test methods and practices established for the monitoring instruments. They are in accordance to local and international requirements and as in the validated PD. This is confirmed on the basis of the first index protocol for the main and back up meters signed by both TEIAS and Yapısan Elektrik Üretim^{/FIP/}. The documents refer to the installed (calibrated) meters and are used to confirm the validity of the calibration by the manufacturer (Elster) as per the national standard.

3.5 Resolution of Any Material Discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- errors have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the next verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 4 of this report.

Table 3-4: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
2.2.1	Gap Validation	-	-	-
2.2.2	Methodology Deviation	-	-	-
4.1	Project Implementation	-	4	-
4.2	Accuracy of GHG Emission Reduction or Removal Calculations	3	-	-
4.3	Quality of Evidence	-	-	-

4.4	Management and Operational System	-	-	-
	SUM	3	4	-

Table 3-5: Revision of MR 3rd Monitoring Period

MR Version No.	Date	Remark
4.0	09 January 2013	1 st review – Initial Findings raised
5.0	31 January 2013	Technical review
6.0	31 January 2013	Final MR Version

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The DARICA-1 99 MW Hydro Power Plant commenced construction of the hydropower plant in April 2007. The project activity commenced exporting electricity to the Turkish grid on 10 October 2009 when the first turbine began operation. The second turbine commenced operation on the 23 December 2009^{/VerR/FIP/}.

This monitoring report provides an overview of the voluntary emission reductions generated by the project activity for the purpose of verification against the Voluntary Carbon Standard (VCS version 3.2), covering the monitoring period of 01 January 2012 to 31 December 2012 (inclusive of both days).

During the site visit, it was confirmed that two vertical Francis turbines with total capacity 112.42 MW and two synchronous generators with total capacity 112 MVA are installed for electricity generation.

However, changes to the key equipments since validation of the project have been observed. This mainly comprises the increase in the capacity of the turbines as well as the generators through optimisation measures^{/IM01/}. The installed capacity of 55.16 MW_e per generator is derived from the electricity generation license checked on site and submitted for verification^{/EGL/}. The actually installed apparent power, however, is 56 MVA as per the generators' nameplates^{/MES/}. Considering the power factor of 0.9 the active power amounts to 50.4 MW, which is lower than the power determined in the electricity generation license. On the basis of cross checks with the meter reading reports^{/MRR/} the verification team confirms that the 50.4 MW also matches with the actual maximum generation values per hour, which are always lower than 50.4 MW. Moreover, during interviews with the plant manager it was noticed that Yapısan Elektrik is not free to decide to run the plant at its maximum as this is decided by TEIAS according to the electricity demand and supply in the grid^{/IM01/}. The plant has regulating purposes and hence operation depends in the demand of grid electricity determined by TEIAS. It should be noted that the capacity change has already been validated and verified in the previous period. During this monitoring period the DOE confirms that the project is operated as verified in the previous verification period.

The monitoring process is in accordance with the chosen methodology. The equipment and instruments installed for monitoring of the project activity are sufficient.

The verification team has carried out interviews and reviews of records to assess if the collection of measurements is in accordance with the monitoring plan of the validated PD and the relevant VCS criteria. The measurement process/ system of the GHG emission reductions has not been changed. The two generator units are in operation and the electricity exported and imported is monitored with two bi-directional meters for each unit. Both meters are backed-up with spare meters. However, the system to gain the net electricity generation has been changed. From January to July 2012 the electricity generated was retrieved from the remote system by TEIAS. In the end of each month the project operator went to the office of TEIAS and received an originally signed hard copy. From August to December 2012 TEIAS did not provide signed hardcopies but granted access to the database of generated electricity via web interface. Consequently the plant operator delivered screenshots of monthly aggregated exports and imports per each unit from this interface. This change of the process was not under control of the plant operator but implemented by TEIAS. This system will be maintained in the future. It should be noted that the plant operator has free access to the duly sealed metering devices. Plant staff is taking notes hourly in log sheets which have been checked by the verification team. These data is aggregated monthly for cross-check purposes. The monitoring is effective and reliable.

The verification team found the following findings:

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Finding	4.1-1		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The version number of the MR template is not the latest applicable.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The monitoring report has been revised to use the latest template, MONITORING REPORT: VCS Version 3, report template version 3.2		
	☒ Changes in MR	Section(s): Complete Report Template	New version No.: 2
	☐ Changes in XLS	Worksheet(s):	New version No.:
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The monitoring report provided is now utilizing the latest applicable template version 3.2 available on the VCS website which has been checked by the verification team.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Finding	4.1-2		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Section 2.2.: The headline is wrong.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The headline has been corrected in line with the latest version of monitoring report template, version 3.2.		
	☒ Changes in MR	Section(s): 2.2	New version No.: 2
	☐ Changes in XLS	Worksheet(s):	New version No.:
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The headline is now as per the latest applicable template version. MR has been corrected.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Finding	4.1-3		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Section 4.1: Clarification is requested why the complete way of calculating the emission factor is provided.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The information on calculating the emission factor has been removed from the monitoring report as the emission factor has been fixed ex-ante. The monitoring report has been revised to include only the values of OM, BM and CM.		
	☒ Changes in MR	Section(s): 4.1	New version No.: 2
	☐ Changes in XLS	Worksheet(s):	New version No.:
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	As per the registered PD and validation report the emission factor is determined ex-ante and remains fixed during the whole crediting period. Hence, the verification team assessed the removal of all information already validated and accepted as adequate. Relevant information necessary to track the baseline emissions in now provided.		

Finding	4.1-3
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	4.1-4						
Classification	☐ CAR ☒ CL ☐ FAR						
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Section 5.2: Clarification is requested why information about the additionality is included.						
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The Monitoring report has been revised accordingly. There has been no change in the design or implementation of the project during the monitoring period, hence this section is not applicable to the current monitoring period. <table border="1"> <tr> <td>☒ Changes in MR</td> <td>Section(s): 5.2</td> <td>New version No.: 2</td> </tr> <tr> <td>☐ Changes in XLS</td> <td>Worksheet(s):</td> <td>New version No.:</td> </tr> </table>	☒ Changes in MR	Section(s): 5.2	New version No.: 2	☐ Changes in XLS	Worksheet(s):	New version No.:
☒ Changes in MR	Section(s): 5.2	New version No.: 2					
☐ Changes in XLS	Worksheet(s):	New version No.:					
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	During the verification site visit the team could confirm that the installed capacity of the turbines and generators did not change compared to the previous verification where an exhaustive assessment has been provided on the capacity change and the impact on additionality. Hence, the information previously provided about additionality is not necessary. That's why the PP correctly removed the information from the MR. The content of the MR is transparent and appropriate.						
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed						

Final Assessment

On the basis of the site visit and the reviewed project documentation it can be confirmed that the project activity is implemented in accordance to the description provided in the PD as well as in previous verifications.

All necessary monitoring instruments are in operation and found to be in good condition, accurate and reliable. Operating procedures have been implemented as described in the registered PD. The exported electricity to grid and import to the project activity were duly monitored with several possibilities to cross-check. No error reading or malfunction of the meters has been observed for this monitoring period. Overall the monitoring plan has been duly implemented and is feasible as verified during the site visit and corresponding interviews conducted.

The verification team confirms the project is operating in accordance to the registered PD and deviations assessed in subsequent verification reports.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

The formulae applied in the calculations of emission reductions are in accordance to the "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002 version 7). All aspects related to the direct and indirect GHG emissions relevant to the project have been addressed and calculations are presented in a transparent manner.

The baseline emissions were calculated appropriately and no leakage is involved. The calculations for the emission reduction of this 3rd verification period are transparently computed and presented in the spread sheet.

Assumptions are correct and appropriate; default values; correction factors are in accordance with "Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002 version 7).

The sources of project specific original data were cross-checked and found to be correct based on the evidence provided by the project proponent. The same is listed in table 6-1 of reference section of this report. The verification team has checked the underlying input values as well as the computation in the spreadsheet. The estimation of the baseline emissions is in a transparent and conservative manner.

The monitoring parameters are described as bellow:

1. The total electricity imported from the grid by the project activity for auxiliary consumption,
2. The total electricity exported to the grid generated by the project activity,
3. Net Electricity supplied by the project activity to the grid from the calculation,
4. Diesel Consumption by the Diesel Generator Set to serve the electricity needs of the plant during non-generation periods

The amount of electricity exported and imported is measured by grid electricity meters. This electricity meters continuously measures and records the generated and imported electricity^{/IM01/}. The meters installed have been checked during the on site visit. They are duly sealed by the grid operator TEIAS. Further they are installed at the grid connection point. The main meters are defined as the invoice meters.

The records by the plant operator of metered electricity is aggregated on hourly, daily, and monthly basis to cross check the records with the data supplied by TEIAS through the remote meter reading^{/MRLB/}. Additionally, PMUM, the Market Financial Reconciliation Center (Piyasa Mali Uzlaştırma Merkezi) of TEIAS publishes the electricity generation / import values in monthly reports^{/PMUM/}. These reports have been provided to the verification team and utilized for cross checks of the values stated in the monthly meter reading reports. To summarize, in total three sources of data are available. Firstly, the TEIAS data from January to July signed copies of aggregated monthly data was provided replaced by interface data, secondly, PMUM reports indicating the electricity figures on monthly basis and thirdly the manually noted records of the plant operator.

During the site visit the details of meters as provided in the monitoring report are as following:

Table 3-3: Meter details^{/CC/TRMC/}

Tag no.	Equipment Detail	Serial no.	Calibration Date	Accuracy	Calibration frequency
Main Meter unit 1	Elster A1500-W043-741-OSL-1165X-V4H00	00361509	2008-02-06	0.2s	Once in 10 years
Back-up meter unit 1	Elster A1500-W043-741-OSL-1165X-V4H00	00361510	2008-02-06	0.2s	Once in 10 years
Main Meter unit 2	Elster A1500-W043-741-OSL-1165X-V4H00	00364713	2008-04-02	0.2s	Once in 10 years
Back-up meter unit 2	Elster A1500-W043-741-OSL-1165X-V4H00	00364714	2008-04-02	0.2s	Once in 10 years

By means of interviews as well as cross checks with the verification report of the second monitoring period for the meters of unit 1 and unit 2 the verification team confirms that the above mentioned meters were installed throughout the whole monitoring period. Malfunctioning or exchange of meters could not be observed. The validity of calibration and the sound performance of the meters further substantiate the meter readings and electricity generation / consumption figures mentioned in the MR and verified in this report.

Calibration procedures and test reports of all meters covering the reported monitoring period were verified. The calibration frequencies are traceable to industry standards^{/CCI/}. The calibration frequency is not indicated in the certificate but regulated according to Article 9 (b) of the “Inspection of Measurement and Measuring Equipments Regulation”, published in Turkish Official Gazette dated 24/07/1994 and No. 22000^{/OTG/TRMC/}. The document indicates a calibration frequency of ten years for the meters which have been used in the project activity for the measuring of the electricity produced. This has been checked during the on-site visit and desk review. The calibration records of all installed meters were checked and found satisfactory. The submitted monitoring report which forms the basis of the verification was prepared by summarizing consolidated monthly data over the whole monitoring period in accordance with the monitoring plan of the registered PD.

At the site visit it was confirmed that there was no alteration or changes of the monitoring instruments and continued to be in line with the description as described in the registered PD.

During this monitoring period the project exported 273,799.39 MWh of net electricity to the Turkish grid.

It has been observed that the frequency of the monitoring parameter A_{PJ} "Once at the initial verification" is not in line with the requirements as defined in the applied methodology which requires monitoring during each verification. However, referring to section 3.2.8 of the VCS VVM Version 3.0 the verification team accepted this deviation as it does not lead to a less conservative approach for calculating possible emission reductions. The surface area at full reservoir is 114,800 m². This area leads to a power density of 878 W/m² which is far beyond the threshold of 10 W/m². Hence, the verification team accepted that the parameter A_{PJ} is not monitored annually.

Regarding the diesel consumption of the stand-by diesel generator it has been observed that it is not accurately provided. In addition, other inaccurate information is provided. Everything is summarized in the findings below:

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed: Quality of Evidence to Determine GHG Emission Reductions or Removals

Finding	4.2-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	Section 3.1.: The tables for "Data and Parameters Available at Validation" do not provide the complete information as required by the template format.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The tables for "Data and Parameters Available at Validation" have been updated to mention the complete information as required by latest monitoring report template, version 3.2		
	☒ Changes in MR	Section(s): 3.1	New version No.: 2
	☐ Changes in XLS	Worksheet(s):	New version No.:
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Ok, the MR has been updated accordingly. Missing information is added and correct.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Finding	4.2-2		
Classification	☒ CAR	☐ CL	☐ FAR

Finding	4.2-2
Description of finding Describe the finding in unambiguous style; address the context (e.g. section)	Section 3.2.: The following information is missing for the parameter EG _y : - Accuracy of meters - How imports and exports are derived. Correction is requested.
Corrective Action #1 This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.	1. The accuracy class of the meters is 0.2S. The same has been now added in the monitoring report in section 3.2 for monitoring parameter "Egy" 2. The meters used for monitoring electricity are bi-directional meters that derive imports and exports simultaneously. The same has been clarified in the revised monitoring report.
	☒ Changes in MR Section(s): 3.2 New version No.: 2
	☐ Changes in XLS Worksheet(s): New version No.:
DOE Assessment #1 The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.	1. Ok, the information has been added to the parameter. The accuracy class has been checked during the site visit and is confirmed. 2. Information is added and assessed correct.
Conclusion Tick the appropriate checkbox	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Finding	4.2-3
Classification	☒ CAR ☐ CL ☐ FAR
Description of finding Describe the finding in unambiguous style; address the context (e.g. section)	It has been observed that the diesel consumption and the operation hours of the diesel generator are not monitored accurately (This is also subject to FAR 4.1-7 from the previous verification).
Corrective Action #1 This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.	The diesel consumption has been revised in the MR and ER workbook in line with the on-site logbook and SCADA data. The hours of operation of diesel generator has been derived from SCADA and the ER calculations and the MR have been revised accordingly to reflect the correct emission reductions achieved by the project activity.
	☒ Changes in MR Section(s): 3.2, 4.2 New version No.: 2

Finding	4.2-3		
	☒ Changes in XLS	Worksheet(s): Fossil Fuel Consumption	New version No.: 2
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	In section 4.2 as well as in the ER XLS new input data has been included for diesel consumption and the operating hours of the diesel generator as per the SCADA system. The diesel consumption figure is derived from log sheets presented during the site visit. It is the basis to calculate the project emissions as per option 1. The operating hours of the diesel genset as monitored by SCADA are 37.72 hours. The Scada data has been checked during the site visit. The value provided is confirmed. Based on this value the project emissions as per option 2 were calculated. Finally, both options have been compared and the more conservative value has been taken into account, i.e. option 2. This results in 3.2 tCO₂e.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Final Assessment

The verification team had reviewed the data collected and archived for the determination of the baseline emissions and any project emissions during the monitoring period claiming the emission reductions. All data applied in the calculations have been cross checked to conclude the emission reductions are calculated correctly.

Calibration of meters, instruments and equipment used in the recording of data are verified by reviewing the records to confirm calibration are carried out on or before the expiry date of the certificates. For this period, there are no lapses in the calibration for any of the instruments.

The electricity export meters to the grid were verified and calibrated once every 10 years by the third party who is authorized from the national grid. This is in line with national regulations and hence accepted.

The data provided in the excel sheets were thoroughly verified with the archived data. The data applied in the calculations are consistent with the relevant raw data records.

The ER Excel spreadsheet contains the actual emissions reduction for this 3rd verification. The project has achieved emissions reduction for this reporting period as follows:

Emissions reduction = 175,228 t CO₂e

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

During the on-site visit, the verification team has reviewed and verified the respective documents that were used to determine the emission reductions. The records were traceable to referenced data and/ or parameters. All meter reading reports^{/IM01/} reviewed were signed by the responsible person of the project operator or received from third party like TEIAS or PMUM. The documents are archived and stored in paper form and digitally at the server of the hydropower plant and externally at the head office in Ankara^{/IM01/}. All data for the monitoring period are stored for the whole crediting period and additional 2 years after expiry. Details of the documents are listed in Table 6-1 of the verification report. Calibration reports are provided by independent third party and regulations are drawn from internet webpages of the Turkish government. Formulae utilized to calculate the emission reductions are derived from the applicable methodology available on the UNFCCC website.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed: Quality of Evidence to Determine GHG Emission Reductions or Removals

Final Assessment:

The verification team had reviewed the data collected and archived for the determination of the baseline emissions and any project emissions for the crediting period.

The documents developed to monitor and determine the emission reductions were easily traceable and referenced. The archiving and storage of data and hard copies are in secured locations. Most of the documents are provided by third party (grid operator, Turkish government etc). All documents provided are authentic and reliable. High quality of the evidence provided is ensured.

4.4 Management and Operational System

The allocation of responsibilities is documented in a written form and followed as described in the MR. This has been verified during the onsite visit^{/IM01/}. Routines for the archiving of data are defined and documented. Formulae applied in the calculations are in line with methodology and registered PDD.

The monitoring personnel at site are well trained and follow the daily routines established. This was evident during interviews with the plant manager. Day to day operation is supervised by the technically qualified site engineers to ensure round the clock operation and maintenance of the project activity^{/IM01/}.

Training is provided to the respective personnel when required. The plant operators are trained by the technology provider on the operation of the hydropower plant once.

All necessary recorded raw data were checked and confirmed during on-site visit. The personnel in charge of each shift are responsible for recording the total electricity generation, electricity export, electricity import, plant shut down times, down time, etc. ^{//M01/}.

The daily data is aggregated and monthly reports are generated. These reports are submitted to the Plant Manager for review and signed off. The raw data was reviewed for correctness and any corrective measures initiated in case of minor errors in the monitored data.

Related Findings

☒ No CARs, CLs or FARs have been identified in this context

☐ The following finding(s) have been addressed

Final Assessment

Monitoring procedure and documentations were developed, maintained and controlled to meet the standard requirements. The project activity documentation system is under supervision of the plant manager.

It could be evidenced that the monitoring system ensures tracking of generation on a continuous basis; the generation itself was carried out as a continuous (except for some planned breakdowns or outage) operation.

From the site visit and interviews conducted, it was clear that the roles and responsibilities of the team tasked with monitoring of emission reductions are well defined. The shift-in-charge records generation on a daily basis, as also keeps track of and records monthly generation and down-time details. From the interviews, it is also clear that the personnel involved in project activity are competent to carry out their respective duties.

5 VERIFICATION CONCLUSION

EcoSecurities International Limited has commissioned TÜV NORD JI/CDM Certification Program to carry out the verification of the Project *DARICA-1 99 MW Hydro Power Plant, Turkey* with regard to the requirements of VCS Version 3.2 Standard.

The project involves the installation of a 112 MW hydropower project. The purpose of the project activity is the generation of electricity which is supplied to the Turkish electricity grid. The project construction commenced in April 2007, and the first turbine began operating on 10/10/2009. On 23/12/2009, the second turbine began operating, and the Project has been operational since. The project consists of 2 turbines each of which have a capacity of 56.21 MW and two synchronous generators with a total rated output of 112 MVA.

Reporting period: From 01 January 2012 to 31st December 2012 (both days inclusive)

The verification is based on the monitoring report, the monitoring plan as set out in the validated PD, the emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

In detail the conclusions can be summarized as follows:

- all operations of the project are implemented and installed as planned and described in the registered PD version 04/18 as well as provided in subsequent verifications.
- the monitoring plan is in accordance with the applied approved methodology i. e., Consolidated baseline methodology for grid connected electricity generation from renewable sources" (ACM0002 version 7)
- the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately and according to the frequency as stated in the monitoring plan of the registered PD version 04/18.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

In the course of the verification, 3 Corrective Action Requests (CARs) and 4 Clarification Requests (CLs) were raised and closed.

As the result of this 3rd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements and in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Verified GHG emission reductions or removals in the above reporting period:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	175,231.61
Project Emissions	3.20
Leakage	0
Net GHG emission reductions or removals	175,228

Martin Saalmann, 2013-02-01



TÜV NORD JI/CDM Certification Program
Verification Team Leader

Rainer Winter, 2013-02-01



TÜV NORD JI/CDM Certification Program
Final Approval

6 REFERENCES

Table 6-1: Documents provided by the project participant

Reference	Document
/CCI/	Electricity Meters Calibration Certificates from Elster: <u>Main Meter Serial No. 361509</u> Unit 1: Order no. 53256402, calibration date 06.02.2008 <u>Back Up Meter Serial No. 361510</u> Unit 1: Order no. 53256402, calibration date 06.02.2008 <u>Main Meter Serial No. 364713</u> Unit 2: Order no. 54810002, calibration date 02.04.2008 <u>Back Up Meter Serial No. 364714</u> Unit 2: Order no. 54810002, calibration date 02.04.2008
/DCC/	Diesel Consumption Calculation Spreadsheet
/DCL/	Log Book for Diesel Consumption
/DI/	Diesel Invoice, dated 01.05.2012
/EGL/	Electricity Generation License, dated 22 June 2006, valid for 49 years
/ERC/	ER Calculation sheets Darica 3 rd Monitoring Period from 01 January 2012 to 31 December 2012 (including both dates), Version 1, dated 2013-01-11 and Version 2, dated 2013-01-29
/FIPI/	First index protocols of meter installation, dated 2009-10-10 and 2009-12-23
/LB/	Down Time Log Book during monitoring 01 January 2012 to 31 December 2012
/MES/	Main Equipment Specification • Technical Data Sheet & Nameplate of the Diesel Generator Set • Nameplate of the Synchronous Generator • Technical Data Sheet of the Francis Turbine
/MR/	Monitoring Report Version 04, Version 05 and Version 06
/MRLB/	Meter Reading Logbook maintained on site
/MRR/	Electricity Meter Reading Reports (Export and Import Reading) from December 2010 to December 2011
/OC/	Organization Chart of DARICA-1 99 MW Hydro Power Plant

Reference	Document
/OTG/	Official Gazette of Turkey dated 24/07/1994 and No. 22000
/PD/	VCS Project Description: DARICA-1 99 MW Hydro Power Plant, Turkey version 4, dated 18 th April 2009
/PHOTO/	Photographs of key equipment and nameplates etc.
/PL/	DARICA-1 99MW Hydropower Project Activity Layout (undated)
/PMUM/	Daily and Monthly Electricity Data Reading from PMUM Extracted from official PMUM website and generated by the remote meter recording during the monitoring period 01 January 2012 to 31 December 2012
/REIA/	Relieve from the Environmental Impact Assessment, dated 27 July 2007
/REMBS/	Regulation of Electricity Market Balancing and Settlement published, dated 14/04/2009 www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/26
/SCADA/	SCADA System for controlling and monitoring of the plant using relevant data
/SCRI/	Screenshots of the automatic remote system of TEIAS as basis for the ER calculation
/SLD/	DARICA-1 99MW Hydropower Project Single Line Diagram including the Metering Layout
/TRMC/	Turkish regulation regarding electricity meter calibration interval
/ValR/	Validation Report SGS, DARICA-1 99 MW Hydro Power Plant dated 06 May 2009, UK AR6 VCS2007 Validation Report
/VerR/	- Verification Report RINA, DARICA-1 99 MW Hydro Power Plant, Monitoring period: 10/10/2009 to 30/11/2010, Report No. 2010 DG 11 MD, Revision No. 1.2, dated 2011-10-20 - Verification Report TÜV NORD, DARICA-1 99 MW Hydro Power Plant, Monitoring period: 01/12/2010 to 31/12/2011, Report No. VCSVER-8000405921, Revision No. 01, dated 15/03/2012

Table 6-2: Background investigation and assessment documents

Reference	Document
/ACM0002/	Consolidated baseline methodology for grid-connected electricity generation from

Reference	Document
	renewable sources, version 7
/CPMI/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/IPCC/	2006 IPCC Guidelines for National Greenhouse Gas Inventories: General Guidance and Reporting
/ISO 14064/	Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals Greenhouse gases -- Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
/ISO14065/	Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
/PDD/	Registered PD of DARICA-1 99 MW Hydro Power Plant dated 18.04.2009
/TEF/	Tool to calculate the emission factor for an electricity system (version 2)
/VCS/	Voluntary Carbon Standard, Version 3.2
/VCS-PD-T/	VCS PD Template version 3
/VCS-MR-T/	VCS MR Template version 3.2
/VPA/	VCS Policy Announcement "Further Guidance for Projects that are Registered in Two GHG Programs"
/VRT/	VCS Verification Report Template
/VVS/	Validation and Verification Standard (Version 2)

Table 6-3: Websites used

Reference	Link	Organisation
/cd4cdm/	www.cd4cdm.org	UNEP Riso Centre
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications
/vcs/	www.v-c-s.org	VCSA

Reference	Link	Organisation
/unfccc/	http://cdm.unfccc.int	UNFCCC

Table 6-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms	Mr. Osman Fırat Alkan	Plant Manager Yapısan Elektrik Üretim Anonim Şirketi
	V	☐ Mr. ☒ Ms	Ms. Burcu Kılıç	Project Carbon Manager Yapısan Elektrik Üretim Anonim Şirketi
/IM02/	V	☒ Mr. ☐ Ms	Mr. Rohit Lohia	EcoSecurities International Limited, Regional Manager India

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)