



**Verified Carbon
Standard**

VERIFICATION REPORT OF “MURAT HEPP PROJECT”



Document Prepared by EPIC Sustainability Services Private Limited

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Summary:

Ekobil Environmental Services and Consulting Ltd. had contracted **EPIC Sustainability Services Private Limited** to conduct 3rd verification of the project registered under VCS Program titled “Murat HEPP Project” (VCS ID: 1344) on behalf of **Murat HEPP Energy Electricity Generation and Trade Inc.** (hereinafter referred to as project proponent)

The scope of the verification is the independent and objective review of the monitored GHG emission reductions applicable for the **3rd monitoring period from 01st October 2020 to 30th July 2022**. The verification process was carried out based on MR version 4.0^{5/} (dated 31st August 2023) along with the registered PD version 04^{9/} (dated 19/02/2013) and other supporting documents made available to the verification team.

The verification activity performed includes confirming the GHG statement claimed by PP for the above-mentioned monitoring period and the implementation of monitoring plan as provided in the registered PD v4.0^{9/}, which is in accordance with CDM largescale methodology **ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” v13.0^{8/}**. The proposed VCS project activity has adhered to the baseline and monitoring methodologies as per relevant requirements of VCS Standard v4.4^{1/} and VCS Program Guide v4.3^{2/}. Relevant requirements of the UNFCCC for CDM project activities, criteria for consistent project operations, monitoring and reporting have been applied for this verification process.

The project is the operation of a large-scale run-of-river hydroelectric power plant (HEPP) with an **installed capacity of 35.478 MWe** on the Göksu River flowing through Besni, Adiyaman in Turkey’s South-eastern Region. The purpose of the project activity is to generate electricity and supply it into the public grid. The project activity reduces greenhouse gases (GHGs) emissions that would have otherwise occurred in the absence of the project activity through electricity generation from conventional fossil fuel sources. The project operates with 3 horizontal axis Francis turbines & 3 generators of capacity 8.410 MWe each under Murat I HEPP and 3 horizontal axis Francis turbines & 3 generators each of capacity 3.416 MWe under Murat II HEPP.

The verification team has adopted a risk-based approach to perform this verification and in its due course has raised **04 Clarification requests (CLs)**, **02 Corrective Action requests (CARs)** and 00 Forward Action request (FAR), which are attached to this report as [Appendix III](#). The project proponent was able to give sufficient clarifications and subsequently the verification team has closed all CLs and CAR raised.

In conclusion, EPIC confirms with a reasonable level of assurance that the project is implemented in accordance with the registered PD v4.0^{9/} and MR v4.0^{5/}. Further, the verification team opines that the monitoring system is in place, the emission reductions are calculated without material errors, omissions and misrepresentations. Therefore, it is confirmed that the project activity meets the relevant VCS requirements and the estimated GHG removal from the project is real, measurable, and permanent. For the 3rd monitoring period, the project activity has produced a **net total electricity of 207,961.511 MWh** and an **emission reduction of 135,173 tCO_{2e}**.

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1 INTRODUCTION

1.1 Objective

Ekobil Environmental Services and Consulting Ltd. contracted EPIC Sustainability Services Private Limited on behalf of Murat HEPP Energy Electricity Generation and Trade Inc. (hereinafter referred to as Project Proponent) to undertake 3rd verification of the project activity titled “Murat HEPP Project” bearing VCS Project ID:1344 (hereinafter referred to as project activity) for the monitoring period 1st Oct 2020 to 30th July 2022 (hereinafter referred to as current monitoring period).

- The purpose of the verification is to perform an independent, third-party assessment of whether the project activity confirms to the qualification criteria set in the VCS Standard v4.4/^{1/} requirements to attain real, measurable, additional and permanent emission reduction. The verification statement/opinion is a written assurance that the project complies with all the applicable VCS requirements and has the ability to generate the emission reductions stated over the projects crediting period.
- To verify that the actual monitoring system and procedures are in full compliance with the system and procedures described in the MR v1.0/^{4/} dated 24/04/2023 (hereinafter referred to as initial MR) as well as with the applicable methodology.
- To verify the reported data is accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emission reduction calculation.
- To verify and certify the reported GHG emission reduction achieved by the project for the current monitoring period from 01st Oct 2020 to 30th July 2022.

1.2 Scope and Criteria

The verification scope includes an independent and objective review of the Monitoring report v1.0/^{4/}, monitoring plan of the project activity and other relevant documents. Specifically, the objectives of the verification work involve:

- To verify whether the project activity meets the requirements of VCS Standard v4.4/^{1/} including, proof of title and compliance with local laws.
- To assess whether the monitoring plan is in conformance with the applied methodology and registered PD.
- To certify that the information presented are complete, consistent, transparent and free of material error.

The Project Description and MR for the current monitoring period were reviewed against VCS Standard v4.4/^{1/}, VCS Program Guide v4.3/^{2/} and the applied CDM methodology. EPIC has performed

the verification based on a risk-based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate VCUs.

The scope of the verification was the independent and objective review and ex-post determination of the monitored reductions in GHG emissions from the project activity. The verification of this VCS project was based on the initial MR v1.0/^{4/} and supporting documents made available to the verification team. These documents were reviewed against the requirements of the VCS Standard v4.4/^{1/}, VCS Program Guide v4.3/^{2/}, the CDM Modalities and Procedures, related rules & guidance and the Validation and Verification Manul v3.2/^{7/}. The verification is not meant to provide any consulting towards the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of Assurance

In line with VCS requirements and as per ISO 14064-3:2019 Para 5.1.3, a reasonable level of assurance has been followed for the verification of the project. Based on the desired level of accuracy EPIC has established an internal quality control process and assures that the information given in the MR is materially correct and is a fair representation of the actual project details and is prepared in accordance with the VCS requirements and the applied CDM methodology for information pertaining to GHG quantification, monitoring and reporting. The process of verification is carried out as per these requirements and details are presented under 'Verification Findings' in section 4 below.

1.4 Summary Description of the Project

The project activity involves the construction of grid connected run-of-river hydroelectric power plant in the Göksu river flowing through *Besni*, Adıyaman province situated in the south-east region of Türkiye. The purpose of the project is to generate electricity and supply the same to the Turkish National Grid.

The project has installed a total of 6 units with 3 units having a capacity of 8.686 MWe each and another 3 units having a capacity of 3.577 MWe each under Murat I HEPP and Murat II HEPP respectively, This amounts to a total installed capacity of 35.478 MWe for the project activity.

The electricity produced from the project is sold to Turkish Electricity Transmission Corporation (TEIAS) by an electricity transmission line of voltage 154 kV.

During the current monitoring period from 01st Oct 2020 to 30th July 2022 (inclusive of both dates), the project has produced a net total of 207,961.511 MWh of electricity and an emission reduction of 135,173 tCO₂e. the verification team also accepts the monitoring period chosen, as this period comes under the 1st crediting period, ie, 05th Oct 2012 to 31st Sept 2022 as per registered PD v4.0/9/.

The project activity has undergone 3rd verification during the current monitoring period. The verification team had cross-checked description of project activity and implementation of monitoring plan against the registered VCS PD v4.0/9/.

On review of the MR v1.0/4/ submitted by the PP to the VVB, there were few inconsistencies and mismatch of the values of installed capacity. CL 01 was raised deeming PP to clarify the installed capacity of the generators to which the PP has revised MR to separately indicate the turbine and generator capacity under section 1.1 of MR v1.0. Further, CL 02 was raised for the lack of clarity of the total installed capacity in section 1.11 and section 1.1 of the MR v1.0, which was later clarified by the PP by indicating the individual values with correct notations in the units and the CL was closed. The capacities which were given under the above-mentioned sections of MR further caused perplexity in section 2.1 of MR deeming the verification team to raise a CL 03. This was closed subsequently when the PP clarified the issue with proper justification. These necessary corrections were incorporated into the initial MR thereby revising it to MR v4.0/5/.

A remote audit was conducted on 07th June 2023 to verify the details given in MR version 1.0/4/ and to gain further confidence that the project activity has achieved the declared GHG statement for current monitoring period. Based on the assessment, the verification team confirms that the project activity is fully functional and is implemented as described in the registered VCS PD v4.0/9/.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The EPIC verification process consists of the following phases:

- A document review of the project description and preparation of verification protocol.
- Remote audit of the project activity and interviews with project developer, project consultant; and relevant stakeholders
- Resolution of outstanding issues and the issuance of final verification report and opinion

In order to ensure transparency, a verification protocol was customised for the project according to the VCS guidelines. The protocol describes the findings, criteria (requirements), means of verification, results from the validating and how the identified criteria, have been met in a transparent manner. The verification protocol serves the following purposes:

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

This report consists of Appendix III, where findings established in the due process of verification are classified as Corrective Action Request (CAR) or Clarification Requests (CL).. If any risks to the fulfilment of project objectives were identified or there existed a non-compliance of verification protocol criteria, Corrective Action Request (CAR) was issued, where:

- mistakes have been made that directly impact on the project results; or
- verification protocol requirements have not been met; or
- there was a risk that the project would not be accepted as a VCS project or that emission reductions will not be certified.

The verification team has also raised Clarification Requests (CL), where additional information is needed to fully clarify an issue.

Resolution of Corrective Action and Clarification Requests			
Findings/Clarifications	Reference to findings/clarifications	Response from PP	Conclusion of Verification Team
Draft report of clarifications and corrective action requests by verification team	Reference to corresponding section of the PD v4.0 ^{9/}	Summary of project owner response	Verification team conclusion
If the conclusions from the draft Validation are either a CAR or CL, these should be listed in this section.	Reference to the Section of the PD v4.0 ^{9/} where the relevant CAR or CL is raised.	The responses given by the project proponents during the communications with the verification team should be summarized in this section.	This section should summarise the verification team's responses and final conclusions.

The following team members from EPIC are involved in identifying the following:

Name	Role	Components reviewed
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Ms. Priyanka M.S.	Lead Auditor	Completeness check, desk review, Remote audit, Interview with project representatives, issuance of findings, FVR preparation
Mr. Unnikannan R.V.	Trainee Auditor	Desk review, Remote audit, Interview with project representatives, FVR preparation
Mr. Karthik Lakshman	Technical Review Team	Technical review of the project
Mr. R Vijayaraghavan		

A brief Curriculum Vitae (CV) of the EPIC team members involved in this project activity are as below:

- Ms Priyanka M S holds a Bachelor of Engineering in Environmental Engineering. She has been evaluated as a Lead auditor for TA 1,2 in accordance with the accreditation procedures of EPIC.
- Unnikannan R V holds a Bachelor of Technology in Chemical Engineering. He has been evaluated as a trainee auditor in accordance with the accreditation procedures of EPIC.
- Karthik Lakshman holds a Bachelor of Engineering in Mechanical Engineering. He has been evaluated as a lead auditor for TA 1.2 in accordance with EPIC's accreditation procedure.
- R. Vijayaraghavan holds BE in Mechanical Engineering, M. Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 15 years of working experience in energy sector including 11 years as validator/verifier. He has successfully completed at least two hundred CDM, VCS, GS, GCC projects. He has been qualified as Lead Auditor for Sectoral Scope 1, 3 and 13.

Verification Timelines:

Key Milestones:	Date
Verification Agreement signed with EPIC	08 th August 2022
Desk Review	10 th May 2023 to 22 nd May 2023
NOVS form to Verra	23 rd May 2023
Audit Plan	05 th June 2023
Remote Audit	07 th June 2023
Findings issued	08 th June 2023
DVR Completion	30 th June 2023
FVR Completion	01 st September 2023

2.2 Document Review

The verification was performed primarily as a document review of the registered VCS PD v4.0^{9/} (Dated: 19/02/2013), Validation report v1.2 Aa (Dated: 23/04/2014), MR v1.0^{4/} and associated documents as stated in detail in [Appendix I](#) of this document. The assessment is carried out by the verification team using a verification protocol which includes the use of standard auditing techniques to assess the project activity. As a first step of verification assessment, the verification team reviewed the MR v1.0^{4/} (referred to as initial MR) and emission reduction spread sheet against the VCS standard requirements. Information provided in the initial MR is crosschecked with the supporting evidence submitted by PP and publicly available data from other sources. A complete list of documents and other source of information used for project verification is provided in Appendix I of this report. The initial MR v1.0^{4/} (Dated: 24/04/2023) submitted by the client and additional backgrounds documents related to the project design and the current operation of the project activity were reviewed in the verification process. As a result of review and findings, PP had submitted the revised Monitoring Report v4.0^{5/} (Dated: 31/08/2023) (referred to as final MR v4.0^{5/}).

An extensive list of other documents verified are attached as [Appendix I](#). Following are the prominent documents reviewed during the verification process.

- Emission reduction Calculation sheet
- List of Personnel
- EIA Not-Required Certificate
- Production License
- Electricity single line diagram
- Meter Change Protocol
- Maintenance records
- TEIAS OSF data of electricity
- Commissioning Certificates.

2.3 Interviews

The 3rd verification of this project activity saw a remote audit conducted on 07th June 2023 through a scheduled Zoom video conferencing. With reference to the evaluation of the PD v4.0^{9/}, MR v1.0^{4/} and associated documents, the project representatives, stakeholders, and consultancy representatives were invited to join the meeting. The following people were interviewed during the remote audit:

No.	Name	Position/Designation and Address	Details of Interview
1	Sedat Vural	Murat HEPP – Project Manager	Technical Details, electricity generation, Monitoring system, calibration frequency, Infrastructure, Wheeling Agreement, Overall Project management.
2	Halil Karabatak	Murat HEPP - Accounts	Budget and Pricing of the project

3	Dr. Aslı Sezer Özçelik (Team Leader)	Ekobil Environmental Services and Consulting Ltd	Completeness check, desk review, Interview, issuance of findings, Monitoring Report preparation. Baseline, monitoring plan, Proof of title, Technical Details, electricity generation, Monitoring system, calibration frequency, Infrastructure, Overall Project management.
4	Ayşenaz Toptaş (Consultant)		
5	Serkan Baybo (Consultant)		
6	Zeynep Artaç (Consultant)		
7	Metin Kılıç	Local Representative Sambayat village	Local stakeholder consultation, On-going communication as part of local stakeholder engagement, difficulties faced due to project (if any), complaints or concerns (if any), channel of communication with the project authorities.
8	Mehmet Ali Hizmetçi	Local Representative Basli village	
9	Bulent Güneş	Local Representative Balka village	
10	Abdurrahman Durmuş		
11	Hacı Yılmaz		
12	Abuzer Boybay	Representatives of the Feb 2023 Earthquake disaster affected families, rehabilitated at Murat HEPP Facility.	Details of original residence, Present facilities offered by PP and living conditions. The interview details is further elaborated under <u>section 4.2.2.</u>
13	Gizem Boybay		

During the interview process, the audit team had enquired if there were any expropriation matters pending to be resolved till date. To this, it was clarified by the PP that the project is established mainly where there are less population and there is little threat due to flood since the project activity does not involve a reservoir setup, which was subsequently confirmed from the review of documents like topographical map, elevation diagram and map showing the lake area. Hence the expropriation matters were resolved within the initial few years of project operation. It was observed that the stakeholders did not face any difficulties due to the project activity and instead were happy about it since the project activity:

- offered employment to the locals,
- has lent its machines and tools at different instances at no cost to local people in need,
- established roads to their villages,
- created a fish passage and periodically monitors the groundwater level,
- provides water for irrigation; enhanced agricultural activities in the last few years,
- does not negatively affect the normal daily life due to noise since the nearest village is 3 km away from the plant,
- there are no issues faced due to the water associated with HEPP except the natural flow of muddy water during rainy season which comes from the mountains.

On Feb. 27, magnitude 5.6 earthquake had hit eastern Turkey, killing at least one person and wounding dozens while causing several buildings and houses to collapse. As an extension of a helping hand, the project proponent has set up a facility at the plant and made arrangement for accommodation of 20 earthquake affected families till they are ready to move on with a normal life. Representatives from these families were present in the meeting and had a brief interaction with the audit team.

2.4 Site Visits

The VCS Standard v4.4/^{1/} under its section 4.1 and para 4.1.9, puts forward three circumstances to conduct a physical site visit at verification. As far as this project activity is concerned,:

- this is not the first verification after validation;
- there are no reassessments done for the project baseline; and.
- there were no deviations observed to be associated with the current monitoring period, Further, the project description deviation accounted and recorded in the 1st verification process does not apply to this monitoring period.

Since the project activity complies with the above mentioned three circumstances, the verification team has conducted a remote audit on 07th June 2023 through a scheduled Zoom video conferencing.

During the remote audit, operation and monitoring plan of the project activity were compared with the details and description that was given in the monitoring report. In addition to this, the technical details, present operation of the plant, environmental impact aspects, calibration of meters and level of accuracy were examined.

In summary, the remote assessment conducted as part of verification activity involved:

- 1) An assessment of the implementation and operation of the project activity as per the MR v1.0/4/
- 2) A review of information flows for generating, recording and reporting of the monitoring parameters
- 3) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the MR v1.0/4/.
- 4) A cross-check between information provided in the MR v1.0/4/ and data from other sources.
- 5) A check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the MR v1.0/4/ and the applied methodology
- 6) A review of calculations and assumptions made in determining the GHG data and ERs; and
- 7) An identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters.
- 8) An interaction with a few local stakeholders to understand their concerns regarding the project activity, if any.

2.5 Resolution of Findings

The objective of this step of the verification was to resolve any outstanding issues, such as corrective action requests and clarification requests that needed to be addressed before EPIC could issue a positive conclusion on the project design. Clarification request (CL) is raised if the project reporting lacks transparency and further information is needed to determine if there exists a material discrepancy. Corrective action request (CAR) is raised if the verification has identified a material discrepancy or non-conformance that the project proponent must address.

All the findings raised during the verification process were communicated to project proponent and the same is included in [Appendix III](#) of this report. Further, the CARs and CLs are closed by the verification team when PP revises the initial MR v1.0/4/ and/or delivers sufficient additional elucidations and evidence to address the concern raised. The findings are depicted in a tabular form along with the responses received from the PP and the opinion of the validation team on the received responses. A total of 04 CLs, 02 CARs and 00 FARs were raised during this verification process. The PP had provided sufficient clarification with respect to the issues raised by verification team and the necessary corrections were incorporated into the MR v1.0/4/ and ER sheet v1.0, thereby revising it to MR v4.0 and ER sheet v2.0. Thus, all the findings raised for this monitoring period were closed by the verification team.

2.5.1 Forward Action Requests

The verification team has not raised any FAR for the current monitoring period. Further, it was also checked if the project activity carried any FARs from the previous validation and verification activities by examining the reports corresponding to this project activity as given below:

- Validation Report dated: 23/04/2014.
- 1st Verification Report dated: 13/03/2015 and
- 2nd Verification Report dated: 24/02/2022.

Thus, it was confirmed that the project activity had no FARs raised against it during the previous validation or verification processes.

2.6 Eligibility for Validation Activities

The scope of work includes verification only. EPIC is accredited for all the VCS sectors for validation as well as verification¹. The validation/verification body has verified all of the data and information to provide reasonable assurance and to meet the materiality requirements of the project.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The verification team has checked whether the project activity had claimed credits under any other GHG programs by going through the registries of various program websites like CDM, GS, GCC, Cercarbono etc. Furthermore, the project proponent has provided a declaration/^{21/} (dated: 13/01/2011), confirming that there is no double-counting associated with project activity and it has not sought or participated in any other GHG programs.

In conclusion, the verification team confirms that this project has not participated under other GHG programs and is hence eligible for issuance of Verified Emission Reductions (VERs).

3.2 Methodology Deviations

During the current monitoring period, there were no methodology deviations applied to the project activity. However, a deviation accounted during the 1st verification process is given below which has been described by PP under section 3.1 of MR v4.0/^{5/}.

The source of the parameter “**EG_{facility}**” was given as “Monthly Meter Reading Protocols” in the registered VCS PD v4.0/^{9/}. With the legislation that came into force on 01/12/2011, TEIAS began to measure the electricity by remote means since the start of the project activity. Therefore, monthly meter reading protocols were not available and hence the source of EG_{facility} was changed to “Market Financial Settlement Centre” (PMUM). The PMUM records are the basis of the invoices made out to TEIAS and includes the exact electricity generation and traction. The project start date is 05th Oct 2012. The source

¹ <https://verra.org/validation-verification/epic-sustainability-services-pvt-ltd/>

for the cross-check of the amount of electricity produced is revised as “OSF Forms” (*Otomasyon Sistemleri Fonksiyonları* Forms—Automation Systems Functions Forms). These are prepared by TEIAS after the remote measurements and sent to the plant engineer by e-mail at the end of each month.

The deviations described above meets the criteria and specifications for permitted methodology deviations as it relates only to the procedures of monitoring and measurement and does not negatively impact the conservativeness of the quantification of GHG emission reductions. Further, this change in the source of the information has no effect on the production data since the deviation is only related to the way the meter reading information is received.

Based on the justification given above, the verification team confirms that the project remains in compliance with the VCS rules and the above listed deviation does not have any negative implications on the conservativeness of the quantification of GHG emission reductions or removals.

3.3 Project Description Deviations

During the current monitoring period, there was one project description deviations applied to the project activity. CAR 02 was raised in this context, deeming PP to include this deviation under section 3.2.2 of MR v3.0. This deviation is sated below:

The PD v4.0 has wrongly indicated the duration of first crediting period as ‘05 October 2012 to 31 September 2022’. However, the actual crediting period is from ‘05 October 2012 to 04 October 2022’, The PP has explained that the date of 31 September is a date that doesn’t exist in calendar, and this is a typo error. Hence the verification team confirmed that this is a possible typo error at the time of preparation of Project Description. The PP has stated this deviation in section 3.2.2 of MR v4.0.

- Since the above deviation has an effect only on the end date of crediting period and not on the type or scale of the project, the above mentioned deviation does not affect the applicability of the methodology.
- The stated deviation has no effect on additionality of the project activity.
- The deviation does not affect the appropriateness of the baseline scenario as it remains the same and is in line with the methodology.

In addition to the above deviation, a deviation accounted during the 1st verification process is given below which was correctly described by the PP under section 3.2.2 of the MR v4.0^{5/}:

The installed capacity of the project given in the PD v4.0^{9/} is 37.22 MWe whereas the actual realized value for the same is observed to be 35.478 MWe. This difference occurred due to the variation in design requirements of the OEM company at the time of preparing the final field application projects of Murat HEPP. Due to geographical factors of the Project site such as slope and elevation, there happened to be some amendment requirements in the capacity installed. The PP had to revise the installed capacity in FSR report and on final application of the projects. Both FSR and Project drawings had been presented

to DSI² (General Directorate of State Hydraulic Works) and had been reviewed and approved by DSI. After this approval, the PP applied to Energy Market Regulatory Authority (EMRA) for the amendment of the installed power on the license. Their request had been reviewed by EMRA³ and approved for amendment, after which the license had been updated with the actual capacity. The difference in capacities were determined before the first monitoring period and was described in detail in the 1st verification report (dated 13/03/2015) by Re-Consult Rüzgar Enerjisi Danışmanlık İç ve Dış Tic. Ltd. Şti.

The project proponent has clarified that this deviation occurred with the establishment of the project's equipment and the verification team directly cross checked the actual capacity of the units with the generators' name plate photos.

- Since the deviation has an effect only on the installed capacity of the project activity and not on the type or scale of the project, the above mentioned deviation does not affect the applicability of the methodology.
- The stated deviation in capacity is still within the prescribed range of $\pm 10\%$ as stated in para 28 of CDM TOOL 27: "Investment Analysis". In addition, it does not cross the benchmark IRR of 15% as presented in the sensitivity analysis under section 3.2.5 of the validation report dated 23/04/2014. Hence the stated deviation has no effect on additionality of the project activity.
- The deviation does not affect the appropriateness of the baseline scenario as it remains the same and is in line with the methodology.

The deviation in installed capacity has been verified by reviewing the following:

- Name plate photos of generators
- Project Description v4.0/⁹
- Validation Report
- Previous Verification Reports and
- Current Monitoring Report v4.0/⁵

This deviation was clarified with PP during the remote audit conducted on 07th June 2023. The verification team is of the opinion that the approach followed by the PP is appropriately described and justified and the project remains in compliance with the VCS rules.

Thus, the verification team concludes that the deviation does not affect the applicability of methodology or additionality or the appropriateness of baseline scenario. It is also verified that there is no overestimation in the emission reduction calculations and the project description deviation is hence valid.

² <https://www.dsi.gov.tr/>

³ <https://erranet.org/member/emra-turkiye/>

3.4 Grouped Project

The project is neither a grouped project activity nor a de-bundled part of a large scale project activity.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project activity involves the operation of a run-of-river hydroelectric power plant on the Göksu River flowing through south-eastern region of Turkey. Murat HEPP is a large scale project activity with an installed capacity of 35.478 MWe, which generates electricity and supplies it into the national grid of Turkey. The establishment of this project activity replaces the conventional fossil fuel sources for electricity generation and instead using renewable source for this purpose. This would indirectly cause the elimination of possible GHG emissions that could have happened from the fossil fuel powered electricity generation plants.

For the first crediting period, Turkey's combined margin emission factor is calculated ex-ante as 0.650 tCO₂e/MWh. As per this, the project generates a total emission reduction of 135,173 tCO₂e for a net electricity generation of 207,961.511 MWh for the current monitoring period. For the current monitoring period, the data was not consistently available on the PMUM portal and hence the PP has relied on the data from TEIAS since there is a practical difficulty for obtaining the data from PMUM website. The PMUM records are the basis of the invoices made out to TEIAS and includes the exact electricity generation and traction. The verification team has cross checked the electricity generation data entered in the MR v4.0^{5/} with that of the screenshots of monthly electricity generation for the project activity from OSF forms stamped by TEIAS.

The project boundary in the registered VCS PD v4.0⁹ is in line with the actual project boundary. The generated electricity is fed to the Turkish National Grid. The current project status is verified through photographic evidence of technology used and monitoring status, indicating the real time generation data and hence it is confirmed that the project is fully functional.

The energy meters used for the monitoring are of accuracy class of 0.2s and are sealed & calibrated by the respective state utility (TEIAS) once in 10 years. Both the meters (i.e., Main meter & Back-up meter) were replaced by new meters on 26/09/2020 by TEIAS, which had been calibrated by TEIAS prior to its installation. The steps of verification of meter change is provided under [section 4.4 \(b\)](#) of this report. The audit team has verified the calibration certificates and confirmed that the meters are calibrated in accordance with the frequency as outlined in the registered monitoring plan.

There were no material discrepancies occurred in actual monitoring system, and the monitoring plan set out in the project description and the applied methodology for this monitoring period. The implementation status of the monitoring plan and the completeness of monitoring, including the suitability of the

implemented monitoring system (i.e., process and schedule for obtaining, recording, compiling and analysing the monitored data and parameters) is in line with registered VCS PD v4.0/9.

The project has neither participated nor have been rejected under any other GHG programs since the initial validation of the project activity. The project has neither received nor sought any other form of environmental credit or has not become eligible to do so since the start of the project activity. The GHG emission reductions generated by the project has not included in any emissions trading program or any other mechanism that includes GHG allowance trading, which was verified by the audit team by checking the registries of various programs like CDM, GCC, GS, Cercarbono etc. Also, the project has implemented the activities that results in the SD contributions as described under section 1.11 in the monitoring report v4.0/5/.

The project applied largescale CDM methodology of ACM0002 v13.0/8/ and its related tools. There was a previously validated methodology deviation and a project description deviation applied to this project for the current monitoring period. These are described clearly in [section 3.2](#) and [section 3.3](#) respectively in this verification report.

There were no major breakdowns or shutdowns reported during this monitoring period, which would negatively influence the applicability of methodology or cause material errors in emission reduction calculations. The verification team enquired this with the plant manager during the remote audit held on 07th June 2023 and have later verified this by cross-checking the maintenance schedule available in the plant.

In conclusion, the verification team has verified the final VCS MR v4.0/5/ and confirmed that the procedure for monitoring plan, monitoring system, data & variables stated is consistent with the registered VCS PD v4.0/9 and confirms that the project has been implemented as described in the project description. The emission reductions achieved under this monitoring period from 01/10/2020 to 30/07/2022 is 135,173 tCO₂e.

4.2 Safeguards

4.2.1 No Net Harm

The project proponent has identified no potential negative environmental and socio-economic impacts due to the project activity for the current monitoring period. The project activity involves the generation of electricity utilizing hydro energy as a renewable resource. The audit team has orally verified the presence of fish passages in the HEPP from the village representatives present during the interview process. The project supports energy security, alternative sustainable energy and an improved local source of income, thereby contributing to have a positive impact on environment.

4.2.2 Local Stakeholder Consultation

The Local Stakeholder Consultation was conducted formally on 28th May 2010 at Yala café in Sambayat town of Adiyaman province. The announcement regarding LSC was published in the regional newspaper

Besni Ekspres on 14th and 25th May 2010. In addition to this, the PP has also invited the locals by means of public announcements along with inviting a few stakeholders to participate on behalf of the the local policy makers and NGOs. A total of 37 people had attended this meeting and the signed attendance sheet is attached as Annex 3 in the validated PD v4.0/9.

For the means of communication with the project authorities, the stakeholders said that the phone number of the plant manager is available with them and they can easily communicate by directly approaching the project site as it is not very far from their villages. The PP has stated in the MR v4.0/5/ that there were no negative opinions or comments received form stakeholders for the current monitoring period, which was verified by the audit team by means of interview process with the stakeholders. The audit team was also briefed about the aquatic ecosystem, and the active fish passage established which had no bad effects on fishes and other aquatic life thriving in the Goksu river. The stakeholders said that the noise level of the project is within the limit and does not affect the comfortable living of the local people. Stakeholders acknowledged that the implementation of the project, has helped them in many ways like providing them with employment and facilitating irrigation in the region.

During the Remote Audit conducted on 07th June 2023, the stakeholders expressed their opinion and concerns about the project in the presence of audit team and the details of interview is given under [section 2.3](#) of this verification report. Overall, the stakeholders are happy about the project activity for its benefits like creating employment opportunities for the locals and generating electricity by sustainable means.

4.3 AFOLU-Specific Safeguards

This section is not applicable as this project is a non-AFOLU project activity.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

a) Data/Parameters not monitored:

Parameter: EG_y (GWh) Ex-ante: 01 of 10	Net electricity generated and delivered to the grid by all power sources serving the system, excluding low-cost/must-run units/plants, in year y
Source of data used	Annual development of installed capacity and generation in Turkey
Value applied	From Table 10 of validated PD v4.0/9
Purpose of data	For estimated calculation of Baseline Emissions
Verification Opinion	The values are verified from Table 10 of the registered PD v4.0/9/ and found to be correctly recorded.

Parameter: FC_{i,y} (m3 / tons) Ex-ante: 02 of 10	Amount of fossil fuel consumed in the project electricity system by generation sources in year y
Source of data used	From TEIAS: Fuels consumed in thermal power plants in Turkey by the electric utilities for year y
Value applied	From Table 11 of validated PD v4.0/9
Purpose of data	For estimated calculation of Baseline emissions
Verification Opinion	The values are verified from Table 11 of the registered PD v4.0/9/ and found to be correctly recorded.

Parameter: Electricity Imports (MWh) Ex-ante: 03 of 10	Electricity transfers from connected electricity systems to the project electricity system by years (2008-2010)
Source of data used	From TEIAS: Annual development of Turkey's gross electricity generation imports, exports and demand
Value applied	From Table 10 in the registered PD v4.0/9
Purpose of data	For estimated calculation of Baseline emissions
Verification Opinion	The values are verified from Table 10 of the registered PD v4.0/9/ and found to be correctly recorded.

Parameter: Heat Value (TJ) Ex-ante: 04 of 10	Amount of heat produced by the consumption of a unit quantity of fuel types consumed in thermal power plants.
Source of data used	From TEIAS: Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities (2010).
Value applied	From Table 11 in the registered PD v4.0/9
Purpose of data	For estimated calculation of Baseline emissions
Verification Opinion	The values for various fuels are recorded in Table 11 of the registered PD v4.0/9/ and verified to be correctly recorded.

Parameter: $EF_{grid,OM,y}$ (tCO ₂ /MWh) Ex-ante: 05 of 10	Simple operating margin CO ₂ emission factor of the grid in year y
Source of data used	Calculated value as per “Tool to calculate the emission factor for an electricity system” (Version 3.0.0). Fixed on the basis of 3-year generation-weighted average based on the most recent data available at the time of PD submission (2008- 2010)
Value applied	0.657 (average of 3 years 2008, 2009 and 2010) Appendix 3 Table 8
Purpose of data	Data used for the calculation of Baseline emissions
Verification Opinion	This value is fixed ex-ante, based on 3-year (2008- 2010) generation-weighted average based on the most recent data available back at the time of PD preparation.

Parameter: $NCV_{i,y}$ (GJ/tonnes) Ex-ante: 06 of 10	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used	From TEIAS: Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities
Value applied	From Table 11 in the registered PD v4.0 ⁹
Purpose of data	For estimated calculation of Baseline emissions
Verification Opinion	The values for various fuels are recorded in Table 11 of the registered PD v4.0 ⁹ / and verified to be correctly recorded.

Parameter: $EF_{CO_2, i,y}$ (tCO ₂ /GJ) Ex-ante: 07 of 10	CO ₂ emission factor of fossil fuel type i in year y
Source of data used	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 and Annex 1 for sub bituminous of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory.
Value applied	From Table 12 of the validated PD v4.0 ⁹

Purpose of data	Data used for the calculation of Baseline emissions
Verification Opinion	The EF values of CO2 for various fuels are recorded in Table 12 of the registered PD v4.0 ^{9/} and verified to be correctly recorded.

Parameter: EF_{grid,BM,y} (tCO2/MWh) Ex-ante: 08 of 10	Build operating margin CO2 emission factor of the grid in year y
Source of data used	Calculated ex-ante and comprised capacity addition of power plants between years 2006-2010 according to the "Tool to calculate emission factor for an electricity system, version 3.0.0."
Value applied	0.643
Purpose of data	Data used for the calculation of Baseline emissions
Verification Opinion	This value is fixed ex-ante, based on 3-year generation-weighted average based on the most recent data available back at the time of PD preparation (average of 3 years 2008, 2009 and 2010). This is verified to be given in the PD v4.0 ^{9/} .and PP has correctly recorded in the current MR v4.0 ^{5/} .

Parameter: Capacity additions (GWh) Ex-ante: 09 of 10	Name of the plant; Installed capacity (MW); Fuel type; generation (GWh)
Source of data used	Turkish Statistics Law and Official Statistics Program of TEIAS Capacity additions to the grid that comprises 20% of the total generation (2006-2010) Generation units put into operation in 2006;2007;2008;2009;2010
Value applied	From Annex 3: Baseline Information
Purpose of data	For estimated calculation of Baseline emissions
Verification Opinion	The generation units put into operation was verified from the baseline information that was given under Annex 3 of the registered PD v4.0 ^{9/} .

Parameter: EF_{grid,CM,y} (tCO2/MWh)	Combined margin CO2 emission factor in year y
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Ex-ante: 10 of 10	
Source of data used	Value is calculated ex-ante and is fixed during the crediting period. Calculated data applied to the equation 5 in the validated PD v4.0 ^{9/} .
Value applied	0.650
Purpose of data	Data used for the calculation of Baseline emissions
Verification Opinion	This parameter is a crucial factor in determining the baseline emission of the project activity. The value of this parameter was calculated by bringing the weighted average of ex-ante parameters 05 and 08 given above. As per that calculation, the depicted value for this parameter is verified to be correct and applicable for the whole of 1st crediting period, to which the current monitoring period is a part. This is verified to be given in the PD v4.0^{9/}.and PP has correctly recorded this value in current MR v4.0^{5/} without any transposition errors. It is also confirmed that this value is used for the calculations in ER sheet.

b) Data/Parameters Monitored:

As per the applied methodology ACM002 v13.0^{8/}, there are only three parameters that are applicable to be monitored for this project activity. They are $EG_{\text{facility}, y}$, CAP_{PJ} and AP_{PJ} .

$EG_{\text{facility}, y}$ is the quantity of net electricity generation supplied by the project plant to the grid in year y. Under the section 'Baseline emissions' of the applied methodology, it is stated that $EG_{\text{facility}, y} = EG_{PJ, y}$ for a greenfield renewable energy power plant. Since this project complies with the above mentioned requirement, $EG_{PJ, y}$ is monitored for this project activity.

Parameter: $EG_{PJ, y}$ (MWh/yr)	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y
Ex-post: 01 of 03	
Source of data	OSF records
Value verified	207,961.511 MWh

Monitoring Equipment	Main Electricity meter (EMH LZQJ-XC, 9798700)			
	Spare Electricity meter (EMH LZQJ-XC, 9798701)			
	The previous meters were changed on 26/09/2020, which is 5 days prior to the start date of the current monitoring period. The details of the meters that were replaced (old meters) and the currently working meters (new meters) are given below:			
	Old Meters (since start of the plant operation- 05/10/2012)			
	Details	Main Meter	Spare (Control) Meter	
	Calibration Stamp Year	2012	2012	
	Brand	Elster	Elster	
	Type	A 1500	A 1500	
	Serial Number	424740	424741	
	Accuracy class	0.2S	0.2S	
	New Meters (Calibrated and installed at 12.00am on 26/09/2020)			
	Details	Main Meter	Spare (Control) Meter	
	Calibration Stamp Year	2020	2020	
	Brand	EMH	EMH	
	Type	LZQJ-XC	LZQJ-XC	
	Serial Number	9798700	9798701	
	Accuracy class	0.2S	0.2S	
	The calibrations of the electricity meters is the responsibility of TEIAS, and the project owner has no control over this process. TEIAS personnel seals the meters after installation and the necessary maintenance and calibration falls under the responsibility of TEIAS.			
	Frequency of Monitoring/Recording	Continuous monitoring and monthly recording		

Data collection Processes (from generation to reporting)	The data for calculation of this parameter is extracted from the calibrated bi-directional main meter (Serial No: 9798700). The same values are measured in a back-up meter (Serial No: 9798701). These values measured by these meters are automatically registered in the database of TEIAS and PP has no control over this measurement and recording of electricity export. $EG_{PJ,y} = EG_{\text{export},y} - EG_{\text{import},y}$ $EG_{\text{export},y}$ and $EG_{\text{import},y}$ values are measured remotely by TEIAS using the bi-directional meters installed at the powerhouse. The value for $EG_{PJ,y}$ is obtained by subtracting the imported electricity from the exported electricity.
Purpose of data	For calculation of baseline emissions.
QA/QC procedures applied	The total electricity generation, transmission loss, and the net electricity generation are also recorded in Manual Meter Reading Forms which are maintained by the project proponent.
Verification Opinion	Both the meters were changed by TEIAS on 26/09/2020. The date of change of meters and other specifications of new meter were verified from the Main Meter Change Protocol/^{11/} and Back-up Meter Change/^{12/} Protocol (SAYAÇ DEĞİŞİKLİK PROTOKOLÜ) issued by Measurement Systems Group Head Engineering, TEIAS. The other specifications and details regarding the changed meters provided in the MR v4.0/^{5/} is verified to be correct is as per the Meter Change Protocol issued by TEIAS. The verification team has checked the serial numbers and models of installed meters at the plant by verifying the photos of both meters and has confidence that it is operational. This was also verified from the PP and plant maintenance staff during the remote interview process. Default values are neither used nor are applicable for the calculation of this parameter. For the calculation of this parameter, the PP has obtained the monthly values of $EG_{\text{export},y}$ and $EG_{\text{import},y}$ from the OSF forms duly stamped and issued by TEIAS. The verification team has cross checked the monthly values for both parameters individually from the OSF forms with that of the values used by PP in ER calculation sheet and hence confirmed that there was no error of transposition occurred for this parameter. However, a few values of EG_{import} were found to be rounded down in the ER spreadsheet, which is not considered to be conservative for the ER calculation. <u>CAR 01</u> was raised in this regard and the PP has subsequently considered these values for the calculation ER. Hence, CAR 01 was closed.

	The verification team has confirmed that the spreadsheet formula used to calculate this parameter is accurate and consistent for all the 22 months in this monitoring period.
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Parameter: C_{PJ} (W) Ex-post: 02 of 03	Installed capacity of the hydropower plant after the implementation of the project activity.
Source of data	Project site-Name plates of generator units installed
Value verified	35,478,000 W
Monitoring Equipment	N/A
Frequency of Monitoring/Recording	Annually
Data collection Processes (from generation to reporting)	The installed capacity of the hydropower plant has not changed since the start of plant operation and is verified from the name plates of the generator units.
Purpose of data	To calculate power density and in turn determine the project emissions
QA/QC procedures applied	Existence of generator units in the plant and the manufacturer's specification on them is checked.
Verification Opinion	- The capacity of 3 generator units installed in Murat I is 8,410,000 W (8.410 MWe) each. - The capacity of 3 generator units installed in Murat II is 3,416,000 W (3.416 MWe) each. - Thus, the combined installed capacity of Murat I and Murat II amounts to 35,478,000 W (35.478 MWe). The installed capacity values were verified from the name plate photos of each generator units installed in the powerhouse. This parameter is used for the calculation of power density of the HEPP, which in turn determines the calculation of project emissions from this project activity.

Parameter: A_{PJ} (m ²) Ex-post: 03 of 03	Area of the single or multiple reservoirs measured in the surface of water, after the implementation of the project activity, when the reservoir is full.
Source of data	Project site

Value verified	640,471.91
Monitoring Equipment	N/A
Frequency of Monitoring/Recording	Annually
Data collection Processes (from generation to reporting)	The technical drawing of the regulator area is based on topographical surveys. The area was calculated by making coordinate readings around the border of the reservoir. Based on the technical drawing, the reservoir area is calculated by a computer program. Verification team has checked the topography map and lake area for the reservoir surface area and found to be appropriate.
Purpose of data	To calculate power density and in turn determine the project emissions.
QA/QC procedures applied	The technical drawing of the regulator area obtained from final design of the project is computerized and the potential lake area for the flood discharge (possible maximum water level) is calculated.
Verification Opinion	The PP has obtained the reservoir surface area from the technical drawing of the regulator area from topographical surveys. Based on that technical drawing, the reservoir area is calculated by a computer program and found to be 640,471.91 m². The verification team has verified the report of topographical survey conducted by Yolsu International Engineering and Consulting Services Inc.⁴ and the Lake area map prepared by Doğru Mühendislik Ltd. Sti.⁵. Thus, the verification team concludes that the surface area of the reservoir is 640,471.91 m².

c) **Assessment of Baseline Emission Calculation**

Baseline emissions are determined using the formula:

1) $BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$; Where:

- BE_y : Baseline emissions in year y (tCO₂)
- $EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
- $EF_{grid,CM,y}$: Combined margin CO₂ emissions factor in year y (tCO₂/MWh)

⁴ <http://www.yolsu.com.tr%20/%20www.yolsu.com>

⁵ <https://dogrumuhendislik.com.tr/website/>

- $EG_{PJ,y} = EG_{Facility,y}$ (Greenfield Project Activity)
- 2) $EG_{PJ,y} = EG_{export,y} - EG_{import}$, (The monthly values for both the parameters is taken from OSF forms issued by TEIAS)
 - EG_{import} , = Electricity imported from the grid
 - $EG_{export,y}$ = Electricity exported to the grid
- 3) $EF_{grid,CM,y} = 0.650$ (Ex-ante value)

The data and parameters involving in the baseline emission calculation are given above. The formulae used in the spreadsheet regarding this calculation is verified to be accurate and is as per the PD v4.0^{9/}. There are no default values applied in the calculation of Baseline emissions. The $EF_{grid,CM,y}$ is an ex-ante value calculated to be 0.650. The data for each month in ER sheet was crosschecked with the OSF form issued by TEIAS and confirmed that there are no transposition errors in the baseline emission calculation.

d) Assessment of Project Emission Calculation

The power density (PD) of project activity is calculated as:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

- $Cap_{PJ} = 35,478,000 \text{ W}$ (Described under section 4.4 (b))
- $Cap_{BL} = 0$ (Greenfield hydro power plant)
- $A_{PJ} = 640,471.91 \text{ m}^2$ (Described under section 4.4 (b))
- $A_{BL} = 0$ (Greenfield reservoir)

Thus, substituting the values in above equation, the PD of this project activity amounts to **55.39 W/m²**.

As per the methodology ACM0002 v13.0^{8/}, if the power density of the project activity is greater than 10 W/m²,

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

Therefore, the PE for this project activity is zero since the PD of this project is greater than 10 W/m².

The auxiliary generators are operational in the power plant as a backup source. But the emissions due to this is not considered as the applied methodology clearly states that *“The use of fossil fuels for the back up or emergency purposes (e.g., diesel generators) can be neglected”*.

e) Assessment of Leakage Emissions

The applied methodology states that *“The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g., extraction, processing, transport). These emissions sources are neglected.”*

Therefore, no possible emissions associated with leakage is considered for this project activity.

f) Assessment of Emission Reduction Calculation

Emission reduction achieved by this project activity is calculated as:

- $ER_y = BE_y - PE_y$
- $BE_y = EG_{PJ,y} * EF_{grid,CM,y}$
- $PE_y = 0$
- Therefore, $ER_y = BE_y = EG_{PJ,y} * EF_{grid,CM,y}$,

Thus, the value calculated for baseline emissions is provided under section 4.4 (a) of this report and is equal to the total emission reductions achieved by this project since there are no project or leakage emissions considered for this project activity.

The verification team concludes that the data and parameters, the formulae and the default values used to calculate the GHG emission reductions for the current monitoring period are appropriate and accurate. It is confirmed that the GHG emission reductions have been quantified correctly in accordance with the applied methodology ACM0002 v13.0/^{8/} and the registered PD v4.0/^{9/}.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The electricity generated is supplied to the Turkish national grid and is monitored continuously by two-way meters (One Main meter and one Back up-meter) that were sealed by TEIAS and situated inside the powerhouse. Calibration procedures and test reports of all online energy meters covering the reported monitoring period were verified for their frequency to industry standards. The old meters were replaced in the year 2020 by TEIAS. The sensitivity of the Main and Back-up meter installed in the year 2012 and 2020 is Class 002S for active energy. The meters are calibrated from their manufacturing facility well before its installation in the power plant. TEIAS is responsible for calibration and maintenance of the meters as per the registered VCS PD v4.0/^{9/}. If any major discrepancy occurs between the readings of meters, the calibration of the meter will be done without waiting for the subsequent calibration date. This will be performed by a third-party as designated by TEIAS and the PP has no control over the calibration of the meters. The calibration of the meters is done once in 10 years. According to the '*Measurement and Measuring Instruments Inspection Regulation*, Date of Official Gazette: 24.07.1994⁶', it is stated that 'the stamp has the last two digits of the year in which it was stamped. In the calculation of the periodic inspection period, the year in which it was stamped shall be taken as the basis, and no matter what date it is stamped on in the year, the year in which it is stamped is the first years.' Hence, the calibration is valid for the next 10 years from the year in which the calibration is done.

If the difference between the main meter and backup meter exceeds the maximum permissible error, the calibration is repeated. Therefore, there is no calibration delay in the current monitoring period. The

⁶ <https://urunkurallari.ticaret.gov.tr/en/sectoral-guide/measuring-instruments/legislation>

monthly generation of electricity is emailed to project owner. The net electricity produced ($EG_{PP-net,y}$) in year y is calculated by subtracting the total electricity consumed by the hydroelectric power plant ($EG_{PP-import,y}$), from the gross electricity generation ($EG_{PP-export,y}$). After obtaining the net electricity production value, the emission reductions is calculated by multiplying the net electricity with the ex-ante value of Combined Margin Emission Factor.

Details of Meters installed in the year 2012.

Function	Main Meter	Back-up Meter
Serial Number	424740	424741
Make & Country	ELSTER, Germany	ELSTER, Germany
Model	A1500	A1500
Start date of operation	05/10/2012	05/10/2012
Calibration stamp year	2012	2012
Valid Until	2022	2022
Location	Substation	Substation
Accuracy Class	0.2 S	0.2 S
Calibration Delay	NIL	NIL

Details of Meters installed in the year 2020.

Function	Main Meter	Back-up Meter
Serial Number	9798700	9798701
Make & Country	EMH, Germany	EMH, Germany
Model	LZQJ-XC	LZQJ-XC
Date of installation	26/09/2020	26/09/2020
Calibration stamp year	2020	2020
Valid Until	2030	2030
Location	Substation	Substation
Accuracy Class	0.2 S	0.2 S
Calibration Delay	NIL	NIL

The evidence used for the measurement is reliable since the calibration and reading of the meters is performed by TIEAS and PP has no involvement in it. The information flow from data generation, to recording, calculation and final transposition into the monitoring report v4.0^{/5/} was verified to be correct except for a few months under the parameter EG_{PP-import,y}. The verification team has raised CAR 01 in this regard deeming PP to correct the transposition errors occurred. The other detailed checks performed to verify the ER calculations and the evidence/sources used by the PP to determine/measure those values are described under the individual parameters under section 4.4 above.

Thus, it is confirmed that the evidence applied to verify the GHG emission reductions for this project activity is of appropriate quality and sufficient in quantity,

4.6 Non-Permanence Risk Analysis

As this project is a non-AFOLU project activity, this section is not applicable.

5 VERIFICATION OPINION

‘EPIC Sustainability Services Private Limited’ performed the 3rd verification of the GHG emission reductions achieved by the VCS project titled “Murat HEPP Project” by ‘Murat HEPP Energy Electricity Generation and Trade Inc’. The verification was carried out to independently assess whether the project confirms to the VCS qualification criteria and requirements, including the applied baseline and monitoring methodology. The verification of GHG statement of this project activity was performed in accordance with ISO 14064-2:2019 and ISO14064-3:2019 standards.

The verification was performed by applying a risk-based approach, reviewing of the PD v4.0^{/9/}, MR (v1.0^{/4/} and v4.0^{/5/}) and the subsequent follow-up interviews conducted by EPIC with sufficient evidence to determine the compliance of the stated criteria. The GHG emission calculations are documented in a complete and transparent manner. The formulae and methodologies for accounting GHG emissions are appropriate and emission factors are deemed to be of sufficient accuracy.

The monitoring plan is in line with the approved monitoring methodologies of ACM0002 v13.0^{/8/}. The plan adequately addresses all necessary information for monitoring and reporting of emissions reductions from the project activity. Responsibilities and authorities for project management, monitoring and reporting, and the data quality assurance and control procedures have been described in the final MR v4.0^{/5/}.

The verification was carried out in accordance with the requirements of the VCS Validation and Verification Manual v3.2^{/7/} and VCS Standard v4.4^{/1/}. As a result of the process, the verification team confirms the following for the current monitoring period:

- All operations of the project were implemented as described in the registered PD v4.0^{/9/},
- The monitoring plan is in accordance with the approved monitoring methodology applied by the project activity.

- The monitoring has been carried out in accordance with the monitoring plan described in MR v4.0^{5/}.
- The monitoring aspects (i.e., Additional monitoring parameters, monitoring frequency and calibration frequency) were in place and functional, with the installed equipment essential for generating emission reduction operating appropriately and the calibration of all the equipment had been carried out accordingly, and
- The GHG emission reductions achieved were calculated correctly on the basis of approved monitoring methodology.

For the current monitoring period, there was a project description deviation applied. This is recorded by PP in section 3.2.2 of MR v4.0^{5/}. The deviation, PP's response to the deviation, and VVB's evaluation of the same are indicated in [Appendix III](#) (CAR 02).

The verification team has verified that the information included in the final MR v4.0^{5/} were correct and the emission reductions achieved had been determined correctly. In our opinion, the GHG emission reductions for the monitoring period stated in the latest revised monitoring report v4.0^{5/} for the project are fairly stated.

The verification team confirms that the GHG emission reductions were calculated without material misstatements for the current monitoring period. The verification opinion is based on the reported GHG emission reductions along with the registered project baseline and monitoring documents submitted.

The verification team has a reasonable level of assurance on the quantity of GHG emission reductions achieved by the project during this verification period as provided in the project's GHG statement. Thus, the verification team confirms that the GHG emission reductions and removals achieved by 'Murat HEPP Project' for the current monitoring period from 01/10/2020 to 30/07/2022 is 135,173 tCO₂e.

Verification period: From 01st October 2020 to 30th July 2022

Verified GHG emission reductions and removals in the above verification period, broken down by calendar year:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2020 (01 Oct 2020-31 Dec 2020)	8,862	0	0	8,862
2021 (01 Jan 2021-31 Dec 2021)	63,408	0	0	63,408

2022 (01 Jan 2022- 30 July 2022)	62,903	0	0	62,903
Total	135,173	0	0	135,173

Year	<i>Ex-ante emissions reductions/re movals</i>	<i>Achieved emissions reductions/ removals</i>	<i>Percent difference</i>	<i>Justification for the difference</i>
01 st Oct 2020 to 30 th July 2022	179,215	135,173	24.57	The potential emission reduction were estimated ex-ante in 2012. Due to the, erratic climate pattern, the region has seen a declining rainfall pattern during the main rainy seasons. Due to the declining rainfall in the region and effect caused by occasional dry seasons, the Göksu River has a lower water volume than that estimated at the time of validation, and thus Murat HEPP project activity is able to generate lesser electricity than the ex-ante calculation. This has resulted in the achievement of lower emission reductions than the initial estimated values.
Total	179,215	135,173		

APPENDIX I: DOCUMENT REFERENCES

No.	Title of Document	Version	Owner/ Authority
1	VCS Standard https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf	v4.4	VERRA
2	VCS Program Guide https://verra.org/wp-content/uploads/2022/12/VCS-Program-Guide-v4.3-FINAL.pdf	v4.3	VERRA
3	VCS verification report template https://verra.org/wp-content/uploads/2022/01/VCS-Verification-Report-Template-v4.1.docx	v4.2	VERRA
4	VCS Monitoring Report (initial MR dated: 24/04/2023)	V1.0	PP
5	VCS Monitoring Report (final MR dated: 31/08/2023)	V4.0	PP
6	VCS Program Definitions https://verra.org/wp-content/uploads/2022/12/vcs-program-definitions-v4.3-final.pdf	V4.3	VERRA
7	VCS Validation and Verification Manual https://verra.org/validation-verification-manual-boosts-vcs-support-vvbs/	V3.2	VERRA
8	ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” https://cdm.unfccc.int/UserManagement/FileStorage/DYPFI935XBG274NWH608CM1KEZR0VU	V13.0	CDM
9	VCS PD for “Murat HEPP Project” (Dated: 19/02/2013) https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=14489&IDKEY=s98klasmf8jflkasf8098afnasfkj98f0a9sfsakjflsakjf8d919980331	V4.0	PP

10	VCS MR Template https://verra.org/documents/vcs-monitoring-report-template-v4-2/	V4.2	VERRA
11	Main Meter Change PROTOKOL (Dated: 26/09/2020)	N/A	TEIAS
12	Back-up Meter Change PROTOKOL (Dated: 26/09/2020)	N/A	TEIAS
13	Repair Service FORM	N/A	Third Party
14	Production Proof-2022	N/A	PP
15	Production Proof-2021	N/A	PP
16	Production Proof-2020	N/A	PP
17	Certificates and mementos received towards social activities. • ŞAMBAYAT YARD. ve DAY. DERNEĞİ TEŞEKKÜR YAZISI • Şambayat Yardımlaşma ve Dayanışma Derneği Plaket • Şambayatspor Plaket • ŞAMBAYATSPOR TEŞEKKÜR YAZISI	N/A	Sambayat Aid and Solidarity Association
18	List of company personnel for all 22 months (FİRMA PERSONEL LİSTESİ)	N/A	PP
19	List of security personnel	N/A	PP
20	Insurance for the Security personnel (SİGORTALI HİZMET LİSTESİ) Issued by: Directorate of Insurance Premiums, Ministry of Labor and Social Security	N/A	Directorate of Insurance Premiums
21	Declaration regarding 'No double Counting' (Dated: 13/01/2011)	N/A	PP

APPENDIX II: ABBREVIATIONS

Abbreviation	Expansion
BE	Baseline Emission
CAR	Corrective Action Request
CL	Clarification Request
CDM	Clean Development Mechanism
EG	Electricity Generation
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Green House Gases
LE	Leakage Emission
MR	Monitoring Report
OSF	Otomasyon Sistemleri Fonksiyonları (Automation Systems Functions)
PD v4.0	Project Description (version 4.0)
PD	Power Density
PE	Project Emission
PP	Project Proponent
QA/ QC	Quality assurance/ quality control
VCS	Verified Carbon Standard
UNFCCC	United Nations Framework for Convention on Climate Change
TEIAS	Turkish Electricity Transmission Corporation
PMUM/ MFRC	Piyasa Mali Uzlaştırma Merkezi/ Market Financial Reconciliation Center

APPENDIX III: FINDINGS

Table 1: CLs from this verification:

CL ID	01	Section no.	1.1 of MR	Date: 08/06/2023
Description of CL				
It is observed that lack of consistency in the nominal capacity of generators indicated at multiple places within section 1.1 of MR v1.0. PP to clarify the nominal capacity of the generators along with its technical specifications.				
Project Proponent's response				Date: 16/06/2023
The nominal capacity of the plant, along with the mechanical power of the turbines and the electrical power of the generators are clarified throughout the document.				
Documentation provided by project proponent				
N/A				
VVB assessment				Date: 24/06/2023
The capacities of turbines and generators are now clarified by separately indicating the electrical and mechanical power in the description given under section 1.1 of the MR v4.0.				
Table 1 indicating technical specifications is also updated accordingly and hence the responsive action is accepted by the verification team.				
Hence, CL 01 is closed.				

CL ID	02	Section no.	1.11 of MR	Date: 08/06/2023
Description of CL				
The total capacity of Murat I & Murat II is indicated as 35.478 MWe under section 1.1 of MR but the same is not consistently indicated under section 1.11 of the MR v1.0. As per the given individual capacities of 6 units, the total capacity amounts to 36.789 MWe instead of the stated installed capacity. Please clarify.				
Project Proponent's response				Date: 16/06/2023
The clarified installed power information reflects that the installed power is indeed 35.478 MWe, and 36.789 MWm respectively. The units are clarified to prevent further confusion.				
Documentation provided by project proponent				

N/A	
VVB assessment	Date: 24/06/2023
The individual capacities of generators and turbines are now distinctly indicated with the units MWe and MWm throughout the MR v4.0, thereby avoiding the confusion which existed regarding the total capacity of the plant. Thus, it is confirmed that the total capacity of Murat HEPP is 35.478 MWe. Hence, CL 02 is closed.	

CL ID	03	Section no.	2.1 of MR	Date: 08/06/2023
Description of CL				
There is a lack of clarity on the individual capacity of generators as described in CL 01. The indicated capacities are 8.686 MWe and 8.500 MWe for which, the total capacity for Murat I would amount to 26.058 MWe and 25.500 MWe respectively. Thus, it would cross the threshold value of 25 MWe for not requiring an EIA exemption certificate. Please clarify.				
Project Proponent's response				Date: 16/06/2023
The EIA status of the project is clarified in the report, as the 25 MW limit for the plant was not accurate. Murat HEPP does not have EIA exemption, but rather it has been decided that the project does warrant an EIA, as the precautions presented at the project planning stage was seen as sufficient by the provincial directorate of environment. The information in the report is revised to reflect this distinction. Furthermore, the individual capacities of the generators are clarified.				
Documentation provided by project proponent				
N/A				
VVB assessment				Date: 24/06/2023
The PP has revised the name of EIA exemption certificate to EIA not-required certificate. It has also been clarified that the precautions presented at the project planning stage was sufficed by the provincial directorate of environment. The mismatch and inconsistency regarding the electrical and mechanical power has been corrected in this section and is accepted by the verification team. Hence, CL 03 is closed.				

CL ID	04	Section no.	5.1 of MR	Date: 08/06/2023
Description of CL				

A significant variation in the electricity generation pattern has been observed with respect to the electricity produced during the months of November 2020 & November 2021 and June 2021 & June 2022. PP to clarify as to why there is a drastic change in the amount of electricity production during the similar periods of different years.	
Project Proponent's response	Date: 16/06/2023
The change in production in these instances are due to the change in rainfall and river water flow in the area. The project owner has stated that no maintenance work has occurred in these years that affected electricity generation. Please see the General Directorate of Meteorology of Turkey's Precipitation Report for 2022 linked below. The report indicates that 2021 has been a year of low precipitation in the Eastern and Southeastern Regions of Turkey, where our project in Adiyaman is located. See Graph no. 6 (pg. 8), the last two groups indicate the above mentioned regions. Graphs 17 and 19 (pages 14 and 15) detail the yearly rainfall observed in these regions.	
Documentation provided by project proponent	
https://mgm.gov.tr/FILES/arastirma/yagis-degerlendirme/2022yagisdegerlendirmesi.pdf	
VVB assessment	Date: 24/06/2023
The verification team is satisfied with the PP's response in this regard. The explanation and reason stated by PP was verified by the audit team from the precipitation report of the General Directorate of Meteorology of Turkey. Thus, it is confirmed that the variation in electricity generation pattern in few corresponding months of different years within the current monitoring period is explained as the cause of erratic rainfall occurred in and around the geographical region of project.	
Hence, CL 04 is closed.	

Table 2: CARs from this verification:

CAR ID	01	Section no.	5.1 (Table 4) of MR	Date: 08/06/2023
Description of CAR				
The PP has rounded down some of the values in 'self-electricity consumption' (import) in ER sheet which is not considered to be conservative. Please clarify the same.				
Project Proponent's response				Date: 16/06/2023
These values were rounded down because they were assumed to be negligible decimals. However, they are now taken into consideration and entered into the calculation. The report and ER Sheet is revised as requested.				
Documentation provided by project proponent				
N/A				

VVB assessment	Date: 24/06/2023
The PP has revised the emission reduction spreadsheet by including the correct values of imported electricity and the ER calculations are performed thereby. The change in values have been included under section 5.1. in MR v4.0. Hence, CAR 01 is closed.	

CAR ID	02	Section no.	3.2.2 of MR	Date: 28/08/2023
Description of CAR				
The crediting period given as per PDD is from 05 October 2012 to 31 September 2022. Whereas the crediting period indicated in MR v1.0 is from 05 October 2012 to 04 October 2022. PP to explain the reason for this deviation, and account the same in Project Description Deviation section (Section 3.2.2) of the MR.				
Project Proponent's response				Date: 31/08/2023
This deviation is a typing error detected in the validated PD v4.0. The end of the crediting period is denoted wrongfully as 31-September-2022 once in the validated PD, which is a date that does not exist. This MR notes this error in the PD and reiterated that the correct end of the crediting period is 04-Oct-2022.				
Documentation provided by project proponent				
MR v4.0				
VVB assessment				Date: 01/09/2023
The verification team confirms that the justification given by PP is reasonable and hence accepted. Section 3.2.2 of MR is updated with this deviation, hence revising the MR v3.0 to MR v4.0. The verification team confirms that the crediting period for this project activity is from 05th October 2012 to 04th October 2022. Hence, CAR 02 is closed.				