

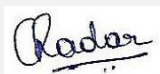


Verified Carbon Standard

MURAT HEPP



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VCS Standard Version	4.7
Client	Murat HEPP Energy Electricity Generation and Trade Inc.
Prepared by	4K Earth Science Private Limited
Approved by	Chandrakala R

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Summary:

Murat HEPP Energy Electricity Generation and Trade Inc. has commissioned “4K Earth Science Private Limited” to carry out the Crediting Period Renewal and Design Change Validation of the VCS registered project “Murat HEPP” (VCS Ref. No. 1344) in Turkey for renewal of crediting period, with regard to the relevant requirements of VCS Standard Version 4.7 /08/.

The original project involves the construction of two Greenfield run-of-river hydroelectric power plants (HEPPs), named Murat I and Murat II, located on the Göksu River in Besni, Adiyaman, within Turkey's Southeastern Anatolia Region. These plants are owned by Murat HEPP Energy Electricity Generation and Trade Inc. (referred to as the “project owner”).

In the registered Project Design Document (PDD), the total capacity of these cascade-type hydropower plants was indicated as 37.221 MW. However, during the first monitoring period, the verified total rated electric capacity was 35.478 MWe. According to the turbine generator equipment plates, Murat I has an installed capacity of 25.230 MWe, while Murat II's is 10.248 MWe, summing to an installed capacity of 35.478 MWe.

To enhance capacity, five solar PV arrays have been added. This mechanical enhancement serves as a supplementary resource during periods of insufficient water flow, primarily due to the severe drought conditions affecting the project area, which are indicative of climate change. Consequently, the project's output remains limited to the combined electric capacity of the two hydropower plants.

Murat HEPP's updated production license reflects the inclusion of a hydro project with six turbines and generators, alongside a solar power plant consisting of five solar PV arrays. Following amendments to the Electricity Market License Regulations in Turkey on March 8, 2020, provisions were established for integrating auxiliary resources into existing power plants. Consequently, Murat HEPP added 12.006 MWm of solar capacity as an auxiliary resource. This addition does not change the electric capacity of the project but does increase the mechanical capacity from 36.789 MWm to 48.795 MWm, with the solar arrays expected to generate 18,000 MWh annually.

The feasibility report for the solar PV arrays, completed on August 21, 2020, initially indicated a capacity of 10 MW, later approved for an additional 2 MW, resulting in a total of 12.006 MWm. The generation capacity for the initial 10 MW was projected at 15,000 MWh, with the 12 MW capacity estimated to produce 20% more, total of 18,000 MWh.

The solar auxiliary resource was installed within the boundaries of Murat HEPP on land unsuitable for agriculture or grazing, eliminating the need for expropriation. The commissioning of the Solar Power Unit occurred on July 20, 2023. Its generated energy is transmitted to the grid through existing meters and switchyard. Notably, this solar unit does not require a separate license from the existing EMRA license, and the electric capacity of Murat HEPP

remains unchanged. The electricity generated will be supplied to the national grid at the same tariff as hydroelectric power. Financial impacts of this integration are discussed in Section 3.5 on Additionality.

The project aims to produce approximately 150.39 GWh/year of electricity from renewable sources for the national grid in its first ten years. In the following decade, the solar power plant is expected to contribute an additional 18.00 GWh/year, bringing the total potential output to 168.39 GWh/year in favorable hydrological conditions. The average annual emissions reductions from the proposed project are estimated at 75,362 tonnes of CO₂e.

During the 2nd crediting period, the project is expected to produce 168,390 MWh electricity and an amount of 75,362 tonnes of CO₂e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 753,620 tCO₂e.

Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated verified emission reductions (VERs).

A risk-based approach has been followed to perform this validation (renewal of crediting period). In the course of the validation 8 Corrective Action Requests (CAR) and 17 Clarification Requests (CL) were raised and successfully closed out. No FAR was raised during this validation and neither there is any pending FAR from the last Verification of 1st crediting period which needs to be addressed.

The validation is based on the revised VCS PD, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

The objective of this validation (renewal of crediting period) activity is to have an independent third party for the assessment of the revised project design, estimated ER sheet and to ensure a thorough assessment of the project activity against the applicable CDM and VCS requirements. As a result of the validation, the validation team confirms that:

- The project fulfils criteria of VCS Standard Version **4.7** for the renewal of crediting period.
- The project is in line with all relevant VCS requirements.
- The project additionality is sufficiently demonstrated with respect to regulatory surplus as section 3.6.15 of VCS Standard Version 4.7.
- The validity of the original baseline scenario is sufficiently demonstrated as per section 3.6.15 of VCS Standard Version 4.7.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology ACM0002, Version 22.0.

The calculation of the Baseline emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 753,620 tCO₂e is most likely to be achieved within the 10 years of second crediting period.

The projects compliance with the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria.

The review of the project design and the subsequent follow-up interviews have provided 4KES with sufficient evidence to determine the project's fulfilment of all the above stated criteria. No restrictions or uncertainties were identified related to the validation.

CONTENTS

1	INTRODUCTION	6
1.1	Objective	6
1.2	Scope and Criteria	6
1.3	Reasonableness of Assumptions.....	7
1.4	Summary Description of the Project	7
2	VALIDATION PROCESS	8
2.1	Method and Criteria	9
2.2	Document Review.....	9
2.3	Interviews	10
2.4	Site Visits	12
2.5	Resolution of Findings.....	13
3	VALIDATION FINDINGS	13
3.1	Project Details	13
3.2	Safeguards and Stakeholder Engagement	23
3.3	Application of Methodology	38
3.4	Non-Permanence Risk Analysis	73
4	VALIDATION OPINION	73
4.1	Validation Summary	73
4.2	Validation Conclusion.....	74
	APPENDIX 1: COMMERCIAL SENSITIVE INFORMATION.....	77
	APPENDIX 2: REFERENCES	78
	APPENDIX 3: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR).....	80
	APPENDIX 4: COMPETENCE OF TEAM MEMBERS	92
	APPENDIX 5: ABBREVIATIONS	94

1 INTRODUCTION

1.1 Objective

4KES has been contracted by “Murat HEPP Energy Electricity Generation and Trade Inc.” to undertake the Crediting Period Renewal and Design Change Validation of the VCS registered project titled “Murat HEPP” (VCS ID 1344) in Turkey for renewal of crediting period, with regard to the relevant requirements of VCS Standard Version 4.7 /08/.

The purpose of this validation is to have an independent third-party assessment of whether the project activity conforms to the criteria set out in the VCS standard Version 4.7 /08/ to attain real, measurable, additional and permanent emission reductions. The validation 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 project’s crediting period.
- The validation followed the requirements of the current version of the VCS Standard Version 4.7 /08/ and VCS program guide 3.5 /07/ to ensure the quality and consistency of the validation work and the report.

1.2 Scope and Criteria

The validation scope is given as an independent and objective review of the revised project design and monitoring plan which is included in the revised VCS PD and other relevant supporting documents.

The scope of work covered in the validation is described below:

- To validate whether the project activity meets the requirements of VCS Standard Version 4.7 /08/ and VCS program guide 4.0/07/ including additionality and compliance with local laws.
- To evaluate whether the baseline and monitoring plan are in conformance with the applied methodology from the VCS approved GHG program.
- To confirm that the information presented are completed, consistent, transparent and free of omission or material error.
- Background investigation and follow up interviews.
- Issuance of draft validation report with CARs, CLs & FARs, if any.
- Final validation opinion.

The information in the revised VCS PD is reviewed against the criteria of VCS Standard 4.7 /08/, VCS program guide 4.0 /07/ and the approved baseline and monitoring CDM methodology ACM0002, Version 22.0 /06/.

4KES has performed validation based on a risk-based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Verified Carbon Units (VCUs).

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

1.3 Reasonableness of Assumptions

The validation report is based on VCS-PD, monitoring plan, supporting documents made available to the validator and information collected through performing interviews during the audit. Based on the process and procedures conducted, 4KES states with a reasonable level of assurance that information in the VCS PD:

- is materially correct and is a fair representation of the actual project details, and

- is prepared in accordance with VCS requirements and the applied CDM methodologies for information pertaining to additionality, GHG qualification, monitoring and reporting.

The validation work is carried out as per this requirement and the validation opinion is assured provided the credibility of all above. Details are presented in the Validation statement in section 4 below.

☒ Reasonable level of assurance

☐ Limited level of assurance.

1.4 Summary Description of the Project

The original project involves the construction of two Greenfield run-of-river hydroelectric power plants (HEPPs), named Murat I and Murat II, located on the Göksu River in Besni, Adıyaman, within Turkey's Southeastern Anatolia Region. These plants are owned by Murat HEPP Energy Electricity Generation and Trade Inc. (referred to as the “project owner”).

In the registered Project Design Document (PDD), the total capacity of these cascade-type hydropower plants was indicated as 37.221 MW. However, during the first monitoring period, the verified total rated electric capacity was 35.478 MWe. According to the turbine generator equipment plates, Murat I has an installed capacity of 25.230 MWe, while Murat II's is 10.248 MWe, summing to an installed capacity of 35.478 MWe.

To enhance capacity, five solar PV arrays have been added. This mechanical enhancement serves as a supplementary resource during periods of insufficient water flow, primarily due to the severe drought conditions affecting the project area, which are indicative of climate change. Consequently, the project's output remains limited to the combined electric capacity of the two hydropower plants.

Murat HEPP's updated production license reflects the inclusion of a hydro project with six turbines and generators, alongside a solar power plant consisting of five solar PV arrays. Following amendments to the Electricity Market License Regulations in Turkey on March 8, 2020, provisions were established for integrating auxiliary resources into existing power plants. Consequently, Murat HEPP added 12.006 MWm of solar capacity as an auxiliary resource. This addition does not change the electric capacity of the project but does increase the mechanical capacity from 36.789 MWm to 48.795 MWm, with the solar arrays expected to generate 18,000 MWh annually.

The feasibility report for the solar PV arrays, completed on August 21, 2020, initially indicated a capacity of 10 MW, later approved for an additional 2 MW, resulting in a total of 12.006 MWm. The generation capacity for the initial 10 MW was projected at 15,000 MWh, with the 12 MW capacity estimated to produce 20% more, total of 18,000 MWh.

The solar auxiliary resource was installed within the boundaries of Murat HEPP on land unsuitable for agriculture or grazing, eliminating the need for expropriation. The commissioning of the Solar Power Unit occurred on July 20, 2023. Its generated energy is transmitted to the grid through existing meters and switchyard. Notably, this solar unit does not require a separate license from the existing EMRA license, and the electric capacity of Murat HEPP remains unchanged. The electricity generated will be supplied to the national grid at the same tariff as hydroelectric power. Financial impacts of this integration are discussed in Section 3.5 on Additionality.

The project aims to produce approximately 150.39 GWh/year of electricity from renewable sources for the national grid in its first ten years. In the following decade, the solar power plant is expected to contribute an additional 18.00 GWh/year, bringing the total potential output to 168.39 GWh/year in favourable hydrological conditions. The average annual emissions reductions from the proposed project are estimated at 75,362 tonnes of CO₂e.

During the 2nd crediting period, the project is expected to produce 168,390 MWh electricity and an amount of 75,362 tonnes of CO₂e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 753,620 tCO₂e. The project capacity has been verified from the commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/. The project originally commissioned in 05/10/2012 and PV addition commissioned on 20/07/2023 as verified from the commissioning certificate /16/. Since this date, there has been no event that would hinder the implementation of the project, except for minor maintenance activities which has been discussed during the on-site audit with the PP's representative.

Based on the project description in the VCS PD /02/, on-site audit and document review commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/, Validation team confirm that there is no change in the project description of the project activity other than the solar addition since the registration (for 1st crediting period) of the project activity.

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation process is undertaken by validation team that involves the following:

- The desk review of documents and evidences submitted by the project proponent in context of the reference VCS rules and guidelines,
- Undertaking on-site audit, interview or interactions with the representative of the project proponent,
- Reporting audit findings with respect to clarifications and non-conformities and the closure of the findings, as appropriate and
- Preparing a draft validation report
- Resolution of outstanding issues and the issuance of final validation report and opinion

In order to ensure transparency, a validation protocol was prepared for the project according to the VVS for PAs version 02.0 validation requirements and VCS Standard version 4.7 /08/. The Clarification Requests (CL) were issued where additional information was needed to clarify issues, and Forward Action Requests (FAR) for issues relating to project implementation that required review during the second verification of the project activity.

Duration of Validation:

Contract signed	05/08/2022
On-site audit	12/09/2024
Findings raised	17/09/2024
Draft Verification Report	24/09/2024
Final Verification Report	07-05-2025

2.2 Document Review

The validation team has conducted the validation using the VCS Standard and the applied methodology ACM0002, Version 22.0 as the reference criteria. The validation team had done the completeness check of revised VCS PD submitted by the PP as per the VCS standard Version 4.7 /08/ requirements. Furthermore, a desk review was also carried out to assess the following:

- Information of project details in compliance with VCS PD template
- Appropriateness of methodology ACM0002, Version 22.0 applied to the project activity
- Compliance with relevant laws and regulations
- Correctness of application of baseline and monitoring methodology
- Demonstration of additionality
- Monitoring plan described in the revised VCS PD
- Calculation of grid emission factor, etc. where applicable.

The VCS PD version 01 dated 30/05/2024 /01/ was initially reviewed and the PP was requested to submit the revised documents along with the supporting information and documents. The revised documents and additional supporting documents were further assessed by the validation team during desk review. During the validation process, the revised VCS PD (version 1.4, dated 03/05/2025) /02/ and the supporting documents were assessed to confirm the actions taken by the PP to the CARs and CLs issued.

The validation team has reviewed the final version of the VCS PD (i.e. Version 1.4 dated 03/05/2025) to confirm that all changes agreed have been incorporated adequately.

The documents that were considered during the validation process are given in Appendix of this report.

2.3 Interviews

On-site visit has been realized on 12/09/2024 to project site. No sampling procedures were adopted. Kindly find below names of the persons interviewed.

Location	The project is located at the South Eastern Anatolian geographical region of Turkey at the Adiyaman Province. The following are the exact coordinates of the main project structures, as shown in the following Table: Location of the project as provided in PDD Diversion weir: 37° 42'37.33"N, 38° 2'49.67"E Murat I HEPP Powerhouse: 37° 36'54.17"N, 38° 5'42.90"E Murat II HEPP Powerhouse: 37° 34'12.00"N, 38° 7'0.11"E Murat Solar Power Plant 1 first units: 37° 36'56.60"N, 38° 5'45.90"E
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	Murat Solar Power Plant 1 second units: 37° 36'51.30"N, 38° 5'43.50"E Murat Solar Power Plant 2 first units: 37° 34'17.20"N, 38° 6'53.00"E Murat Solar Power Plant 2 second: 37° 34'13.80"N, 38° 7'2.60"E Murat Solar Power Plant 2 third units: 37° 34'11.60"N, 38° 6'57.60"E Below are the sampled coordinates taken during site visit <table border="1"> <tr> <th></th><th>Latitude</th><th>Longitude</th></tr> <tr> <td>Murat-1 Power House</td><td>N 37° 36'53.35596"</td><td>E 38° 5'42.60444"</td></tr> <tr> <td>Murat-2 Power House</td><td>N 37° 34'11.90856"</td><td>E 38° 6'59.68692"</td></tr> </table> The Location of the project has been checked form the web (https://www.latlong.net/) and found consistent.			Latitude	Longitude	Murat-1 Power House	N 37° 36'53.35596"	E 38° 5'42.60444"	Murat-2 Power House	N 37° 34'11.90856"	E 38° 6'59.68692"
	Latitude	Longitude									
Murat-1 Power House	N 37° 36'53.35596"	E 38° 5'42.60444"									
Murat-2 Power House	N 37° 34'11.90856"	E 38° 6'59.68692"									
Dates	12/09/2024										
Key points discussed	Name of person, interviewed	Designation, Organization									
Implementation, Monitoring, Operational data, Calibration, Data collection, QA/QC procedures, regulatory surplus, validity of the original baseline scenario, Calculation of ERs, VCS requirements, on-going mechanism, Sustainable development	Sedat Vural	Plant Manager, Murat HEPP Energy Electricity Generation and Trade Inc.									
	Abuzer Boybay	Plant Engineer, Murat HEPP Energy Electricity Generation and Trade Inc..									
	Delil Kaş	Plant Engineer, Murat HEPP Energy Electricity Generation and Trade Inc..									
	Mustafa Güneş	Technician, Murat HEPP Energy Electricity Generation and Trade Inc..									
	Mikail Aydın	Technician, Murat HEPP Energy Electricity Generation and Trade Inc..									
	Mustafa Toprak	Local, restaurant owner, Şambayat Sports Club Manager									
	Salih Turan	Balka village Resident									
	Ali Barha	Shepherd									

	Bariş Turan	Balka village Resident
	Ömer Günaydın	Balka village Resident
	Hacı Turan	Balka village Resident
	Abuzer Alıcı	Başlı village Resident
	Ökkeş Kaya	Şambayat Resident

2.4 Site Visits

On-site visit has been realized on 12/09/2024 to project site. The villages of Şambayat, Balka (next to the transmission line), Kızılcamustafa (close to the transformer station), and Başlı (3 km away) are in proximity.

In the expropriation cases, the major party is the government authority, the “Energy Market Regulatory Authority,” and the project owner is the intervener. The legal adviser to the project owner explains that a large number of expropriation cases are finalized, some of the cases that have not been finalized continue in the court of first instance, some of them are at the appeal stage, and in some cases, the plaintiffs (land owners) have been settled with the plaintiffs (land owners) and the plaintiffs have waived the lawsuit.

The receivables of the plaintiffs (landowners) have been paid in full in all of the cases that have been decided and finalized, and the plaintiffs do not have any unpaid receivables, for this reason, execution proceedings continue. A Declaration by PP lawyer has been provided to VVB and VVB also knows that this is the usual practice in Türkiye.

Mustafa Güneş, an operator at Murat 1, has been with the company for 5 years and is a local resident. He reports no complaints and is satisfied with his job, equipped with HSE gear.

Mikail Aydın, an operator at Murat 2, has worked there for 14 years, is also local, has no complaints, and is happy in his role, with the necessary HSE equipment.

The project doesn't have any negative impact on socio-economical issues. Local stakeholders reported positive interactions with the project. Abuzer Alıcı from Başlı village mentioned no complaints or water stress and noted that construction vehicles are provided to villagers. Hacı Turan from Balka village highlighted the project's assistance with earthquake relief and riverbed organization for irrigation. Mustafa Toprak from Besni, a restaurant owner and manager of Sambayat Sport Club, appreciated the project's support for local students and employment opportunities. The project employs 25 workers, including 5 locals, and Kuzey Grup Güvenlik employs 18 locals. The project has improved regional safety, reduced illegal hunting, and visible tree planting has been noted on site.

Solar equipment is present on-site as outlined in the PDD, with panels cleaned daily using 5 tons of deionized water, without any other solutions inside.

Currently, HEPP and SPP are monitored together, but a SCADA system will be implemented for separate monitoring.

The feasibility study indicates that 1 m³/s of water should be released into the riverbed. There is a minimum flow meter at the inlet of the Murat 1 riverbed, monitored remotely by the State Hydraulic Works. The water level must exceed 90 cm, and during the audit, it was recorded at 96 cm.

2.5 Resolution of Findings

As an outcome of the validation process, the team can raise different types of findings:

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met

Where a non-conformance arises the team leader shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The VCS requirements have not been met;
- There is a risk that emission reductions cannot be monitored or calculated.
- The validation process may be halted until this information has been made available to the team leader's satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

During the validation process, total 8 CAR and 17 CL were raised and resolved satisfactorily. The list of CARs/CLs/FARs raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix of this report.

2.5.1 Forward Action Requests

No FAR was raised during this validation.

3 VALIDATION FINDINGS

3.1 Project Details

Murat HEPP Energy Electricity Generation and Trade Inc. has constructed Murat HEPP (HPP) on the Göksu River, within the jurisdiction of Besni Town of Adıyaman Province. The purpose of the project is electricity production using the potential energy of Göksu River and solar components as a renewable resource. Therefore, the electricity is going to be produced without causing airborne pollutants or Green House Gas (GHG) emissions. The construction and operation of the Murat HEPP (HPP) are delaying the addition of conventional thermal power plants to the Turkish National Electricity Grid.

The capacity of Murat HEPP is 48.81 MW, (Murat-1 generators each 8,410 kW, Murat-2 generators 3416 kW each in total 25,230 kW and 10,248 kW and solar addition is 12,006 MWm. The project capacity has been verified from the commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/.

The electricity generated at Murat II HEPP is transmitted to Murat I by a 6 km long transmission line where both plants' generation is fed into the national grid at Adıyaman Çimento 154 kV interconnection point, through a 10 km long transmission line. Transmission system has been verified from the single line diagram and also from the on-site audit interview.

Based on the project description in the VCS PD /02/, on-site audit and document review commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/, Validation team confirm that there is no change in the project description of the project activity other than the solar addition since the registration (for 1st crediting period) of the project activity.

Validation team confirms that the description in the project description is accurate, complete, and provides an understanding of the nature of the project.

Item	Evidence gathering activities, evidence checked, and assessment conclusion				
	Audit type	Period	Program	Validation/verification body name	Number of years
Audit history	Validation	05 October 2012 to 04 October 2022	VCS	RINA Services S.p.A.	Ten years
	verification	05 October 2012 to 30 September 2014	VCS	Re-Consult Rüzgar Enerjisi Danışmanlık İç ve Dış Tic. Ltd. Şti.	Two years
	verification	01 October 2014 to 30 September 2020	VCS	4K Earth Science Private Limited	Six years
	verification	01 October 2020 to 04 October 2022	VCS	EPIC Sustainability Services Private Limited	Two years
	Validation	05 October 2022 to 04 October 2032	VCS	4 K Earth Sciences Ltd.	Ten Years

	Audit history has been mentioned under section 1.2 of the VCS PD /02/. Validation team has checked the same and found OK.
Sectoral scope	Project comes under Sectoral scopes: Energy industries (renewable - / non renewable sources) (Sectoral Scope 1). VVB have this sectoral scope to validate this project.
AFOLU project category, if applicable	N/A
Project activity type	The project type is grid connected electricity generation from renewable sources. The project is a non-grouped project.
General eligibility of the project to participate in the VCS Program	The Project is eligible to be a VCS Project because: VCS v.3.3 took effect on 04.10.2012. Accordingly, the Project is eligible to use this version. This is not a first time application but this is already a registered project. VCS v.3.3 requires project crediting period start date earliest to be 01.01.2002, besides, the Project must also complete the validation within two years of the Project Start Date, which is 05 October 2012. Both conditions are satisfied for the Project activity. VCS v.3.3 accepts all six Kyoto Protocol gases. The Project aims to reduce CO₂, which is one of these six Kyoto Protocol gases. VCS v.3.3 accepts all technologies supported by a VCS approved GHG program. The Project is a hydropower plant, the technology of which is included in the UNFCCC- CDM sectoral scope1. VCS v.3.3 requires the use of one of the VCS program approved project methodologies. The Project activity uses the tools and methodologies of approved by UNFCCC CDM executive board, which is a VCS approved program. The project does not benefit from any kind of Official Development Assistance. In addition to the above, the project is not a grouped project activity, nor de-bundled part of a grouped project activity Project registered before the version 4 of the VCS published, so it is still eligible.

	If one Checks the VCS Version 4.7 “APPENDIX 3 DOCUMENT HISTORY AND EFFECTIVE DATES” states : “...For projects subject to new crediting period requirements under VCS Version 4 (i.e., non-AFOLU projects and ALM projects focusing exclusively on reducing N2O, CH4 and/or fossil-derived CO2 emissions) (Section 3.8): 1) Registered projects and projects that complete validation on or before 19 March 2020 remain eligible to apply the crediting period requirements under VCS Version 3....” This statement is also valid in version 4.7 of the VCS Standard. The Project activity uses the tools and methodologies of approved by UNFCCC CDM executive board, which is a VCS approved program.
AFOLU project eligibility, if applicable	N/A
Transfer project eligibility, if applicable	The project is neither a transfer project nor a CPA, hence this section is not applicable
Project design	Single location or installation, not a Grouped project, validated during site visit
Project ownership	Ownership of the plant, equipment, and electricity generation license belongs to Murat HEPP project belongs to Murat HEPP Energy Electricity Generation and Trade Inc. (Murat HES Enerji Elektrik Üretim ve Ticaret Anonim Şirketi) and all emission reductions/removals are granted to the company. The production license and the operating certification of the company given by the Chamber of Commerce are provided to the validating VVB as proof of the Title. The project participants involved in the projects are MURAT HEPP ENERGY ELECTRICITY GENERATION AND TRADE INC and Ekobil Environmental Services and Consulting Ltd. With role of “Preparation of the Project Design Document”.
Project start date	05 October 2012, According to the VCS Version 4.7 of the Validated PDD the project start date is considered as the date electricity supplied to the Grid. Project start date i.e. 05/10/2012 is confirmed from the commissioning certificate /16/ and found OK. This was already validated during the 1st crediting period.
Project crediting period	As verified from the revised VCS PD/02/, 2 nd crediting period is from 05/10/2022 to 04/10/2032 with the length of 10 years and the start date

	of 2 nd crediting period is next date of the end date of 1 st crediting period (05/10/2012 to 04/10/2022) and hence it is acceptable. As per section 1.6 of the registered VCS PD /11/, the crediting period is renewable twice. Hence the 2 nd crediting period is accepted to the validation team.																																							
Project scale	< 300,000 tCO₂e/year (project) The emission reductions from the project are Less than or equal to 300,000 tonnes of CO₂e per year, hence the project scale comes under the category of “Project” (as per para 3.9.1 of the VCS standard Version 4.7 /08/). There is no change in the project scale since the 1st crediting period.																																							
Likelihood of achieving estimated GHG emission reduction or removals	During the 2nd crediting period, the project is expected to produce 168,390 MWh electricity and a total amount of 75,362 tonnes of CO ₂ e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 753,620 tCO ₂ e.																																							
Technologies and measures implemented by the project activity or activities	The key technical specifications of the project: <table border="1"> <thead> <tr> <th colspan="3">Main Technical Data</th><th>Value</th></tr> </thead> <tbody> <tr> <td rowspan="10">MURAT I</td><td rowspan="5">Turbines</td><td>Quantity</td><td>3</td></tr> <tr> <td>Power Capacity</td><td>8.686 kW</td></tr> <tr> <td>Flow rate</td><td>16.67 m³/s (Total: 50.00 m³/s)</td></tr> <tr> <td>Rated water head</td><td>57.00 m</td></tr> <tr> <td>Type</td><td>Horizontal axis francis</td></tr> <tr> <td rowspan="5">Generators</td><td>Quantity</td><td>3</td></tr> <tr> <td>Rated Power Capacity</td><td>8,410 kWe</td></tr> <tr> <td>Rated voltage</td><td>10,500 V</td></tr> <tr> <td>Rated current</td><td>50 Hz</td></tr> <tr> <td>Type</td><td>Horizontal axis synchronized generator</td></tr> <tr> <td rowspan="4">MURAT II</td><td rowspan="4">Turbines</td><td>Quantity</td><td>3</td></tr> <tr> <td>Power Capacity</td><td>3.577 kW</td></tr> <tr> <td>Flow rate</td><td>16.67 m³/s (Total: 50.00 m³/s)</td></tr> <tr> <td>Rated water head</td><td>23.40 m</td></tr> </tbody> </table>			Main Technical Data			Value	MURAT I	Turbines	Quantity	3	Power Capacity	8.686 kW	Flow rate	16.67 m ³ /s (Total: 50.00 m ³ /s)	Rated water head	57.00 m	Type	Horizontal axis francis	Generators	Quantity	3	Rated Power Capacity	8,410 kWe	Rated voltage	10,500 V	Rated current	50 Hz	Type	Horizontal axis synchronized generator	MURAT II	Turbines	Quantity	3	Power Capacity	3.577 kW	Flow rate	16.67 m ³ /s (Total: 50.00 m ³ /s)	Rated water head	23.40 m
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		Type	Horizontal axis francis
		Quantity	3
		Rated Power Capacity	3,416 kWe
		Rated voltage	10,500 V
		Rated current	50 Hz
		Type	Horizontal axis synchronized generator
MURAT SOLAR POWER	Solar Power Group 1	Quantity	2
		Capacity	4894,4 kWp.
		Invertor Quantity	23 Huawei sun2000-185 KTL-185 kW
		Panel Quantity	12236
		Rated voltage	400 Watt
	Solar Power Group 2	Quantity	3
		Capacity	7155,8 kWp.
		Invertor Quantity	31 Huawei sun2000-185 KTL-185 kW
		Panel Quantity	17892
		Rated voltage	400 Watt

Murat GES 12,050 kWp Site Specifications and Equipment Overview:

Murat 1 GES: The Murat 1 GES project consists of 2 areas.

Murat 1 GES Area 1 - Installed Power and Equipment:

Maximum Installed Power DC: 2867.2 kWp.

Number of Inverters: 13 units - Huawei SUN2000-185 KTL - 185 kW.

Number of Panels: 7168 units - 400 Watt - ALFA Solar brand.

Murat 1 GES Area 2 - Installed Power and Equipment:

Maximum Installed Power: 2027.2 kWp.

Maximum Installed Power AC: 1850 kWe.

Number of Inverters: 10 units - Huawei SUN2000-185 KTL - 185 kW.

Number of Panels: 5068 units - 400 Watt - ALFA Solar brand.

Total Installed Power and Equipment for Murat 1 GES Project (Both Areas):

Maximum Total Installed Power DC: 4894.4 kWp.

Maximum Total Installed Power AC: 4255 kWe.

Total Number of Inverters: 23 units - Huawei SUN2000-185 KTL - 185 kW.

Total Number of Panels: 12236 units - 400 Watt - ALFA Solar brand.

Murat 2 GES: The Murat 2 GES project consists of 3 areas.

Murat 2 GES Area 1 - Installed Power and Equipment:

Installed Power: 2968 kWp.

Installed Power AC: 2405 kWe.

Number of Inverters: 13 units - Huawei SUN2000-185 KTL - 185 kW.

Number of Panels: 7420 units - 400 Watt - ALFA Solar brand.

Murat 2 GES Area 2 - Installed Power and Equipment:

Installed Power: 3024 kWp.

Installed Power AC: 2405 kWe.

Number of Inverters: 13 units - Huawei SUN2000-185 KTL - 185 kW.

Number of Panels: 7560 units - 400 Watt - ALFA Solar brand.

Murat 2 GES Area 3 - Installed Power and Equipment:

Installed Power: 1164.8 kWp.

	Installed Power AC: 925 kWe. Number of Inverters: 5 units - Huawei SUN2000-185 KTL - 185 kW. Number of Panels: 2912 units - 400 Watt - ALFA Solar brand. Total Installed Power and Equipment for Murat 2 GES Project (All Areas): Installed Power DC: 7155.8 kWp. Installed Power AC: 5735 kWe. Total Number of Inverters: 31 units - Huawei SUN2000-185 KTL - 185 kW. Total Number of Panels: 17892 units - 400 Watt - ALFA Solar brand. Total Installed Power and Equipment for Murat 1 and Murat 2 GES Projects: Total Installed Power DC: 12,050 kWp. Total Installed Power AC: 9990 kWe. Total Number of Inverters: 54 units - Huawei SUN2000-185 KTL - 185 kW. Total Number of Panels: 30,128 units - 400 Watt - ALFA Solar brand.
Implementation schedule of the project activity or activities	05 October 2012, According to the VCS Version 4.7 of the Validated PDD the project start date is considered as the date electricity supplied to the Grid. Project start date i.e. 05/10/2012 is confirmed from the commissioning certificate /16/ and found OK. This was already validated during the 1st crediting period.
Project location	The project is located at the South Eastern Anatolian geographical region of Turkey at the Adiyaman Province. The following are the exact coordinates of the main project structures, as shown in the following Table: Location of the project as provided in PDD Diversion weir: 37° 42'37.33"N, 38° 2'49.67"E Murat I HEPP Powerhouse: 37° 36'54.17"N, 38° 5'42.90"E Murat II HEPP Powerhouse: 37° 34'12.00"N, 38° 7'0.11"E Murat Solar Power Plant 1 first units: 37° 36'56.60"N, 38° 5'45.90"E

	Murat Solar Power Plant 1 second units: 37 ° 36'51.30"N, 38 ° 5'43.50"E Murat Solar Power Plant 2 first units: 37 ° 34'17.20"N, 38 ° 6'53.00"E Murat Solar Power Plant 2 second: 37 ° 34'13.80"N, 38 ° 7'2.60"E Murat Solar Power Plant 2 third units: 37 ° 34'11.60"N, 38 ° 6'57.60"E Below are the sampled coordinates taken during site visit <table><tr><td></td><td>Latitude</td><td>Longitude</td></tr><tr><td>Murat-1 Power House</td><td>N 37 ° 36'53.35596"</td><td>E 38 ° 5'42.60444"</td></tr><tr><td>Murat-2 Power House</td><td>N 37 ° 34'11.90856"</td><td>E 38 ° 6'59.68692"</td></tr></table> The Location of the project has been checked form the web (https://www.latlong.net/) and found consistent.		Latitude	Longitude	Murat-1 Power House	N 37 ° 36'53.35596"	E 38 ° 5'42.60444"	Murat-2 Power House	N 37 ° 34'11.90856"	E 38 ° 6'59.68692"
	Latitude	Longitude								
Murat-1 Power House	N 37 ° 36'53.35596"	E 38 ° 5'42.60444"								
Murat-2 Power House	N 37 ° 34'11.90856"	E 38 ° 6'59.68692"								
Conditions prior to project initiation	The project activity is implemented in a greenfield project. In the absence of the project activity, the same amount of energy would be fed to grid by conventional sources. There was no activity at the site of the project participant prior to the implementation of this project activity. Hence pre-project scenario and baseline scenario are the same. Validation team has checked the same from the site visit observation, interviews of PP representative/Local people. There was no other hydroelectric power plant installation at the project location. Also, there was no other forms of renewable energy installations (no wind or Solar PV). The project activity does not generate greenhouse gas emissions, so it can be excluded that the implementation has been made only to generate GHG emissions with the subsequent reduction. The baseline scenario is the same as the conditions existing prior to project initiation.									
Project compliance with applicable laws, statutes and other regulatory frameworks	The project activity is in compliance with the Local Laws and regulations. EIA exemption dated 29/09/2021 for solar addition /30/ has been received for the project activity which has been checked by the validation team and found OK. Project has received the production license /20/. By obtaining this license on 29/01/2009 (which is valid for 49 years), the company has to comply with all national, regional and local rules. On 27/01/2022 license has been revised to include solar power as secondary source.									
Double counting and participation	The project is not registered with or rejected by any other GHG schemes, validation team reviewed the websites of other GHG schemes to verify the same. Declaration /22/ to this effect is also submitted by the project participant.									

under other GHG programs	
No double claiming with emissions trading programs or binding emission limits	The project is not embedded under any kind of Emission trading programs. Further the project is not generating other form of environmental credits as discussed during the on-site audit.
No double claiming with other forms of environmental credit	The project activity has not sought, received, or is planning to receive credit from another GHG-related environmental credit system. Declaration /22/ to this effect is also submitted by the project participant.
Supply chain (Scope 3) emissions double claiming	N/A
Sustainable development contributions	Sustainable development contributions from the project activity have been mentioned under section 1.18 of the VCS PD /02/ and found OK. Validation team has interviewed few stakeholders and did not find any complaint. They were having positive opinion about the project in terms of job creation for locals and other infrastructure development in the project area. It would be further verified during the verification of the project.
Additional information relevant to the project	As per the registered VCS PD /11/, the operation lifetime of the project activity is considered as 30 years which will can last till the end of the 2nd crediting period. No commercially sensitive information has been excluded from the public version of the project description as verified during the on-site audit. Validation team confirms that the description in the project description is accurate, complete, and provides an understanding of the nature of the project. Validation team has checked the VCS PD /02/ with latest version of PD template available in the VCS website /12/ and found OK.

Validation team further confirm that all the information has been correctly transferred from registered PDD /11/ to the current PDD /02/ which is filled in the latest VCS PD form available in VCS website. Validation team confirms that the transfer of information from the old form to the new form is correct and materially the same as the information in the registered VCS PD /11/.

3.2 Safeguards and Stakeholder Engagement

3.2.1 Stakeholder Engagement and Consultation

With the solar addition, the project's relationship with its neighborhood remains unchanged.

The newly installed auxiliary solar power unit is located within the project's existing boundaries, meaning there has been no further land use change or expropriation. As the primary stakeholder, the local representation of the host country's government has issued a certification stating that an Environmental Impact Assessment (EIA) is not required, following their review of the basic project description concerning the new power unit. Consequently, a formal stakeholder consultation meeting regarding the installation of the solar PV component was deemed unnecessary. Additionally, due to the COVID-19 pandemic, holding such a meeting was not permitted.

Nonetheless, with the support of village leaders, stakeholders were informed about the addition of solar PV systems, which will be confined to the project area without any need for expropriation.

Beyond communication efforts, the new solar component has generated job opportunities, including daily roles for cleaning the PV panels during the summer months. As outlined below, communication between the stakeholders and the project is ongoing and informal. This close relationship is viewed positively among neighboring communities, especially in the aftermath of the recent earthquake. During that time, the project provided construction machinery, food, and temporary housing to those affected.

3.2.1.1 Stakeholder Identification

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder identification	Prior to the project's implementation, four stakeholder categories were identified: 1) Local residents from nearby villages (Şambayat, Balka, and Başlı), with village heads (Muhtars) being key contacts; 2) Government officials overseeing permits and emission activities,

	including representatives from various ministries and local authorities; 3) International NGOs focused on voluntary carbon markets, such as WWF Turkey and Greenpeace Akdeniz; and 4) National NGOs concerned with carbon markets, including the Energy Economy Foundation and TEMA Besni. Validation team has confirmed the same from the site visit observation, Minutes of stakeholder consultation, presentation, photos and attendance sheet, PP representative and local people interviews.
Legal or customary tenure/access rights	There are no legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, Indigenous People (IPs), local communities (LCs), and customary rights holders. Validation team confirm that there is no conflict as confirmed from local people interviews.
Stakeholder diversity and changes over time	Silk Road Development Agency reports indicate that Adiyaman's economy relies heavily on agriculture, accounting for 70%. The region boasts high irrigation potential and fertile land, where crops like rose, cherry, fig, apple, and goji berry flourish alongside modern vegetable gardens. Adiyaman pistachios and grapes from Gölbaşı and Besni are gaining international recognition. The project has enhanced the local economy by creating jobs and supporting irrigation for residents. Furthermore, the agency highlights Adiyaman as a promising area for renewable energy investments, which generate employment during both construction and operation phases, while also enhancing local craftsmanship through training programs. The project has no impact on the social, economic, and cultural diversity within stakeholder. Validation team confirm the same from local people interviews.
Expected changes in well-being	According to the Project Description report presented to the MoEF to obtain the Environmental Impact Assessment Not Needed certificate, the project is not going to impact any land or aquatic ecosystems as it does not have a reservoir. The project also involves a fish passage system, and the lifeline water is followed up by the gauges installed by State Water Works. The project activity provided jobs during the construction period and is still keeps providing jobs for the local inhabitants and thus contributing to the local economy. In addition to this all the possible

	procurements are made from the local shops and this as well creates an indirect contribution to the local economy. The benefits written above will improve the wellbeing of the stakeholders. Validation team has checked the same from the site visit interviews and list of employees.
Location of stakeholders	stakeholders Group 1, is located at the vicinity of the project Site, Out of Group 2 stakeholders some are located in the nearest town (Mayorships and Governorships) and District (like State Water Works branch) and the others are located in Ankara (Capital of the host country). There is no Local Committee identified; however Individual Parties can be identified as village Heads that represent the villagers. In addition to that there is the Şambayat Assistance and Solidarity Association and Şambayat Sports Club, Located at the Şambayat Town close to Project Site. These are the civil organizations that the project had provided support as an act of Corporate social responsibility. Validation team has confirmed the same from the PP representative and Local people interviews.
Location of resources	The project site did not restrict access to any areas; however, some privately owned land within the site was expropriated in accordance with local regulations, and the landowners received fair compensation. Moreover, despite the expropriation, project governance has allowed the owners to continue farming portions of the land that are within safe limits. Validation team confirm that there is no conflict as confirmed from local people interview

3.2.1.2 Stakeholder Consultation and Ongoing Communication

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder engagement process	On 28-May-2010, a stakeholder consultation was held at Yayla Cafe in Şambayat, Besni, Adiyaman Province. Invitations were sent to stakeholders via email, fax, and mail, including a non-technical project summary in Turkish and contact details for the project consultant, Suen Ltd. Despite invitations, local government officials and international NGOs could not attend due to scheduling conflicts. The meeting was attended by 37 local residents, including three

	village heads and a local military commander. Women did not attend, likely due to cultural norms. The meeting addressed employment opportunities, with assurances that the project would prioritize local hires. There were also discussions about unresolved expropriation issues, which were expected to be resolved soon. All discussions were conducted in Turkish. The process was validated during the registration (for the 1st crediting period) of project activity in VCS. VCS validation report /11/ verified to confirm the same. The PP had invited identified stakeholders well in advance with details of venue and time of meeting. Further, it was confirmed during the assessment that the stakeholders have been provided with access to the contact details of the project participant. Also, the stakeholders are well informed about the grievance redressal procedure announced during the stakeholder consultation and can reach out to the project participant or their local representatives in case of any concern.
Consultation outcome	The overall response was positive, with attendees optimistic about the project's economic and environmental benefits.
Ongoing communication	In the host country, communication between the project management and local stakeholders is typically facilitated by providing mobile phone numbers of site managers to village heads and other local government officials. During the monitoring period, meeting participants confirmed this method of communication. Additionally, evaluation forms and a grievance notebook are maintained at the project site to gather further feedback, as was mentioned in the consultation meeting. However, local residents generally prefer to contact project management directly via phone, and their requests and complaints are addressed and resolved effectively through this direct communication. Declaration from Muhtars of nearby villages stating that “logbooks have been provided to them but yet there are no written comments in them” is provided to VVB.
Stakeholder input	One of the main topics at the meeting was related to employment opportunities for the local people. A local participant explained that

	most of the local people were unemployed and that they needed jobs more than anything else. A representative of the project participant explained that their priority is to employ local people and that they would employ as many as possible.
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3.2.1.3 Free, Prior, and Informed Consent

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Obtaining consent	The project activity is in line with host country regulations and by the Project Description document submitted to the MoEF declared that it will keep abiding by the law. Therefore, the project has the consent of the Group 2 stakeholders described in section 2.1.1. In addition to this the village heads of the nearby settlements and the nearby towns have been visited and no objections about the project have been recorded. Also, the project company prepared some brochures with the aim of raising awareness and with the intention of informing the local inhabitants about the purposes of the installation of energy production facilities throughout the country, the benefits reflected on the country and the region and the issues to be considered in the level of these facilities. These were distributed to the village residents through the mukhtars. In village squares and coffee houses, the necessary explanations were made, and questions were answered. The wishes and desires of the local people were also listened to, and they were informed that the company would do its part in matters that would benefit the development of the region. This was recorded by the minutes that were signed between the mukhtars of the villages and the project company.
Outcome of FPIC discussion	The project activity did not involve any resettlement. The project had to acquire same land from the local stakeholders. This was done within the expropriation rules of the host country and the landowners were compensated. There was no disagreement between the project and the group of stakeholders defined in section 2.1.1. this was confirmed by VVB during site visit interviews.

3.2.1.4 Grievance Redress Procedure

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Development process	Although there is a book for suggestions and complaints at the project site, the consensus between the local stakeholders and the project owner is to communicate the problems directly to the site manager
Grievance redress procedure	As described above if there is a grievance or a demand the site manager considers the situation, informs the central office of the company and provides solutions within reasonable limits. During the first crediting period there were no significant complaints and issues. The local stakeholders claim that they have received helped when there is a hardship and especially during the Earthquake period. Validation team has confirmed the same from the site visit observation and local people interviews.

3.2.1.5 Public Comments

Comments received	Actions taken by the project proponent	Evidence gathering activities, evidence checked, and assessment conclusion
Will there be enough water on the riverbed?	Yes. Lifeline Water and downstream water provision is also monitored by the State Water Works by installed gauges. In Fact, there has to be enough water on the river bed to sustain river ecosystem. In dry months, when there is not enough water the plant will not operate until there is enough water.	The feasibility study indicates that 1 m ³ /s of water should be released into the riverbed. There is a minimum flow meter at the inlet of the Murat 1 riverbed, monitored remotely by the State Hydraulic Works. The water level must exceed 90 cm, and during the audit, it was recorded at 96 cm.

Will there be local employment?	Although this concern is important and highly relevant for social sustainability of the project it does not involve any changes in its design. The construction and operation of the project requires both skilled and unskilled employment. Representatives of the project company explained that recruitment will be from local people as much as possible without any discrimination. However, when there are no skilled staff for various tasks these personnel will be recruited from elsewhere, but still from within host country.	The project employs 25 workers, including 5 locals, and Kuzey Grup Güvenlik employs 18 locals. Confirmed via social security records and site interviews.
Concerns about trees to be cut down	It is explained that neither tree cutting nor re-planting cannot be done irregularly. To be able to start construction a certain amount of fee has to be paid to ministry of Environment and Forestry to compensate trees to be cut and replanted. Then the local Forestry department coordinates the logging and re-planting processes.	The project has improved regional safety, reduced illegal hunting, and visible tree planting has been noted on site during site visit.
Please provide more information about the expropriation process	At the time of the stakeholder consultation meeting, the expropriation process was underway for some of the lands and there were some issues, that were still waiting to be resolved by the related state offices. As this procedure took time those	Lawyer declaration on Expropriation has been provide to VVB.

	people whose land were undergoing expropriation were inquisitive about the process. Even though most expropriations had been solved before the meeting, there were still a few ones awaiting the final decision of the State. The questions were mostly about technical aspects of conveyance canal. At the end of the meeting all questions were answered by representatives from project company As of today all the expropriation issues are solved and the land owners are not only fairly compensated but some have even given permission to use their lands for agriculture within the safety limits.	
Other comments	No major concerns were raised during the entire stakeholders consultation process hence there was no need to make any changes to the project design nor revisit the sustainability assessment. All questions were settled during the meeting. All stakeholders were handed out folders with project consultant Suen Ltd's telephone numbers and they were asked to get in touch with Suen Ltd. if they have any other concerns. Also, a notebook was left on project site to gather ideas or questions from all the stakeholders, including those who were not able to attend the meeting. This notebook was regularly checked however nothing was recorded up until present time.	Validation team has confirmed the same from the site visit observation and local people interviews.

Summary of alterations based on comments	The comments given did not lead to an alteration to the project design. Because, the overall feedback about the project was entirely positive. During the first crediting period the project company identified the needs of the local community and provided help and support according to their needs. Currently the project owner provides contribution to local sport teams and local community support organization.	Validation team has confirmed the same from the site visit observation and local people interviews.
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3.2.2 Respect for Human Rights and Equity

3.2.2.1 Labor and Work

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Discrimination and sexual harassment	Very low risk as any kind of such discrimination is banned by the Article 3 of the “law on human rights and equality institution of Turkey “(Law number: 6701 Acceptance date: 6/4/2016 Published in official gazette: date : 20/4/2016 issue : 29690 Published in directive: order : 5 volume : 57) Host country bans and controls SH by the above-mentioned law via the “Human Rights and Equality Institution of Turkey”. In addition Turkey protects violation of women and children by the Law No. 6284 on the Protection of the Family and Prevention of Violence against Women. Validation team confirm that there are no complaints on this issue from the site visit observation and employees interviews.
Management experience	Before being commissioned, the project is evaluated by the Ministry of Energy and Natural Resources, and the operational team's management experience and capacity are approved through a provisional acceptance document. Mr. Vural, a Mechanical Engineer with 15 years of experience, has been managing the site since the construction phase. Additionally, the project company has implemented the following quality management systems: ISO 9001:2005, ISO 14001:2015 for environmental management,

	and ISO 45001:2018 for occupational health and safety management. Certificates have been provided to VVB.
Gender equity in labor and work	The host country guaranties equal pay for equal work by the Article 23: "1. Everyone has the right to work, to free choice of employment, to work under just and favorable conditions and to protection against unemployment. 2. Everyone has the right to equal pay for equal work without discrimination of any kind." of the Constitution. Validation team confirm that there are no complaints on this issue from the site visit observation, list of employees /32/ and employees interviews.
Human trafficking, forced labor, and child labor	Human trafficking is banned by the host country REGULATION From the Ministry of Interior affairs, trough the "REGULATION ON THE FIGHT AGAINST HUMAN TRAFFICKING AND THE PROTECTION OF VICTIMS" Drudgery is prohibited by Article 18 of the Constitution, and no one can be subjected to the forced labor in the host country. The employment conditions for individuals under 18 years of age are governed by Labor Law No. 4857 and the "Regulation on the Procedures and Principles of Employment of Children and Young Workers" which is based on this law. These regulations are in place to protect the health and safety, as well as the physical, mental, moral, and social development of children and additionally, they aim to enable these individuals to continue their education and to prevent their economic exploitation. young workers. Employment conditions under 18 years of age are regulated by Labor Law No. 4857 and the "Regulation on the Procedures and Principles of Employment of Children and Young Workers" prepared based on this law. These regulations regulate the working conditions of children and young workers. to protect their health and safety, physical, mental, moral and social development, and to enable them to continue their education and to prevent their economic exploitation. Validation team confirm that there are no complaints on this issue from the site visit observation and employees interviews.

3.2.2.2 Human Rights

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Human rights	The UN proclaimed the Universal Declaration of Human Rights on December 10, 1948. This declaration is the most fundamental human rights document. The Declaration was followed by the Covenant on Economic, Social and Cultural Rights and the Covenant on Civil and Political Rights in 1966. Another important human rights treaty is the European Convention on Human Rights. The most important feature of the conventions is that they put the signatory countries under legal obligation. With the amendment of Article 90 of the Turkish Constitution, international conventions signed by Turkey have become part of national law. In order to protect human rights, 'Human Rights Provincial and District Boards' were established in 81 provinces and 800 districts in Turkey in 2000. These boards were restructured with a regulation published in the Official Gazette No. 25298 dated November 23, 2003, and the representation of civil society in the boards was strengthened. These committees work for the protection and promotion of human rights. The Boards are primarily responsible for carrying out the necessary work to prevent human rights violations and to ensure that citizens are treated with tolerance and courtesy in the practices of the administration. Validation team confirm that there are no complaints on this issue from the site visit observation and employees interviews.

3.2.2.3 Indigenous Peoples and Cultural Heritage

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Preservation and protection of cultural heritage	There are no specific indigenous tribes and relicts from indigenous people at the project vicinity.

3.2.2.4 Property Rights

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Rights to territories and resources	Host country has a strict regulation that fairly evaluates value of the land to determine the compensation fees per square meters. This is detailed under the Expropriation Law numbered 2942.
Respect for property rights	In the expropriation cases, the major party is the government authority, the “Energy Market Regulatory Authority,” and the project owner is the intervener. The legal adviser to the project owner explains that a large number of expropriation cases are finalized, some of the cases that have not been finalized continue in the court of first instance, some of them are at the appeal stage, and in some cases, the plaintiffs (land owners) have been settled with the plaintiffs (land owners) and the plaintiffs have waived the lawsuit. The receivables of the plaintiffs (landowners) have been paid in full in all of the cases that have been decided and finalized, and the plaintiffs do not have any unpaid receivables, for this reason, execution proceedings continue. On this occasion, the project owner Murat Hes Enerji Elektrik Üretim Ve Ticaret A.Ş. has not victimized any right holder, and their legal rights have not been prejudiced. In the ongoing case, the Project owner continues their out-of-court and in-court settlement negotiations with the plaintiffs at every stage and makes offers to them at every stage. In the event that the offers are not accepted by the plaintiffs, again after the lawsuit, in accordance with the court decision, the amounts deserved by the plaintiffs are to be paid in full by the project owner company. A Declaration by PP lawyer has been provided to VVB and VVB also knows that this is the usual practice in Türkiye. Validation team confirm that there are no complaints on this issue from the site visit observation and employees interviews.

3.2.2.5 Benefit Sharing

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Process used to design the benefit sharing plan	Not Applicable the project does not have an official benefit sharing arrangement
Summary of the benefit sharing plan	N/A
Approval and dissemination of benefit sharing plan	N/A

3.2.3 Risks to Local Stakeholders and the Environment

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Risks to stakeholder participation	As the stakeholders can access the site and can communicate with the site management 7/24 via the provided mobile lines. No need for mitigation.
Working conditions	High voltage and working near noisy areas, and working close to high speed running water are some risks involved in the work environment. Host country regulations enforce health and safety prioritizations in the work environment. There are warning signs at the work environments, in addition to this, employees are regularly trained regarding health, safety and environment issues. The project has an ISO 45001:2018 OHSAS Certification to manage and mitigate risks related to working conditions. The certification is valid until 2023 and is under renewal.
Safety of women and girls	This is a minor risk and female employee are highly respected and treated with positive discrimination and respect as part of the host country culture. However there are no female employee at the project site as the site is remote and difficult to access no woman have applied to any of the

	positions. But there are many women employee at the central office of the project company.
Safety of minority and marginalized groups, including children	No such risk as host country strictly bans child labor and there are no minority at the project site. Host Country is a party to ILO Convention 138 and there is no child labor involved at the project site.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	According to the Environmental and Social Impact Assessment carried out by the project proponent, no negative environmental impact has been identified from the project activity.

3.2.4 Ecosystem Health

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Impacts on biodiversity and ecosystems	As explained at the SEIA report Titled Final Project Description Report the project site is not posing any threat to the biodiversity and ecosystems. There will be enough lifeline water to support downstream life and the project will stop retaining water behind the regulator if the upstream flow drops seasonally.
Soil degradation and soil erosion	The topsoil is preserved prior to construction and replaced after construction phase. The areas with erosion or mass flow risk have been identified and best practice on slope stability have implemented.
Water consumption and stress	There is a fish passage to allow free movement of the fish species (photos provided, seen during site visit). In addition, the lifeline water will be released to the riverbed at all times. The irrigation at the downstream has been facilitated to support local economy. The feasibility study indicates that 1 m ³ /s of water should be released into the riverbed. There is a minimum flow meter at the inlet of the Murat 1 riverbed, monitored remotely by the State Hydraulic Works. The water level must exceed 90 cm, and during the audit, it was recorded at 96 cm.

	The solar panels need to be washed by de-ionized water. For this the facility has a small installation where they have the capacity to store 10 m ³ (10t) of water daily. The pannels need to be cleaned up daily for 3 months during summer season. As such the 360 m ³ of e-ionized water is being used while 180 m3 of water is returned back to the stream during de-ionization process. The source of the water is ground water that accumulates along the river bank and no chemicals are used in the process and the water returns back to the ground after the washing. The amount of water used annually totals 540 m ³ . This is a very small amount and does not effect the ecosystem functions.
Usage of fertilizers	N/A

3.2.4.1 Rare, Threatened, and Endangered species

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Species and habitat	Project activity is not affecting any rare habitat. It does not have a reservoir.
...	...

3.2.4.2 Introduction of Species

No aquatic or terrestrial species are involved as part of the project activity.

Species introduced	Evidence gathering activities, evidence checked, and assessment conclusion
N/A	

Existing invasive species	Evidence gathering activities, evidence checked, and assessment conclusion
N/A	

3.2.4.3 Ecosystem conversion

The project activity have no impact on ecosystems, and no ecosystem conversion was possible as part of the project activity.

Item	Evidence gathering activities and evidence checked
Ecosystem conversion	

3.3 Application of Methodology

3.3.1 Title and Reference

The validation team confirm that selected baseline and monitoring methodology is approved methodology and PP has correctly used it. All the applied methodology and tools are still valid.

At the time of registration, the project applied the following methodology

- ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” Version 13.0.

In the revised VCS PDD /02/, latest version of this methodology has been applied.

- ACM0002 “Grid-connected electricity generation from renewable sources” Version 22.0. It is latest version and Valid from 31/05/2024 onwards. /06/

Other guidelines and tools referenced in these methodologies are:

Tool to calculate the emission factor for an electricity system” (Version 07.0).

Tool for the demonstration and assessment of additionality” (Version 07.0.0)

Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1).

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
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The CDM approved baseline and monitoring methodology	ACM0002	Consolidated baseline methodology for grid-connected electricity generation from renewable sources”	22.0
Tool to calculate emission factor for an electricity system	TOOL07	Tool for the demonstration and assessment of additionality	07.0.0
Tool for the demonstration and assessment of additionality	TOOL01	Tool for the demonstration and assessment of additionality	07.0.0
Tool for the assessment of Crediting Period Renewal	TOOL11	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	03.0.1
Guideline	EB 48 Report Annex 11	Guidelines for the Reporting and Validation of Plant Load Factors	01

3.3.2 Applicability

Methodology ID	Applicability condition	Justification of compliance
ACM0002	This methodology is applicable to grid-connected renewable energy power generation project activities that: a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plant(s)/unit(s); d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or	The project activity involves the installation of two Greenfield run-of-river hydroelectric power plant at the Göksu River flowing through Besni, Adiyaman in Turkey's South-eastern Region, with two power houses. At this site no renewable power plant was operated prior to the implementation of the project activity. Added auxiliary solar power resource

	e) Involve a replacement of (an) existing plant(s)/unit(s). (f) Install a Greenfield power plant together with a grid-connected Greenfield pumped storage power plant. The greenfield power plant may be directly connected to the PSP or connected to the PSP through the grid.	
	<i>In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that:</i> (a) <i>Integrate BESS with a Greenfield power plant;</i> (b) <i>Integrate a BESS together with implementing a capacity addition to (an) existing solar photovoltaic¹ or wind power plant(s)/unit(s);</i> (c) <i>Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s);</i> (d) <i>Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s);</i> (e) <i>Integrate a BESS together with a Greenfield power plant that is operating in coordination with a PSP. The BESS is located at site of the greenfield renewable power plant.</i>	The project activity is the installation of a run-of-river hydro power plant. Added auxiliary solar power resource
	(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit must have started commercial operation prior	The project activity is the installation of a new hydropower plant. It is not included capacity additions, retrofits, rehabilitations or replacements of the existing plant. Added auxiliary solar power resource

	to the start of a minimum historical reference period of five years. The reference period is used for the calculation of baseline emissions and defined in the baseline emission section. Furthermore, no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	
	In case of hydro power plants, one of the following conditions shall apply: (a) <i>The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or</i> (b) <i>The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m²; or</i> (c) <i>The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m²; or</i> (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m², and all of the following conditions shall apply: (i) (ii) (iii) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m²; Water flow between	This condition is not applicable to the project activity as it does not result in a new reservoir. However, the project does involve the construction of a regulation pond with a surface of 640,471.91 m². Power density (PD) for this regulation pond is: PD= 35,478,000W/ 640,471.91 m²= 55.39 W/m² PD> 4 W/m². (see Figure 11)

	reservoirs is not used by any other hydropower unit which is not a part of the project activity; Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² are: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
	In the case of integrated hydro power projects, project participants shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.	This project activity is not an integrated hydropower plant. Added auxiliary solar power resource

	In the case of PSP, the project participants shall demonstrate in the PDD that the project is not using water which would have been used to generate electricity in the baseline.	The project is not pumped storage project (PSP). The project activity is the installation of a run-of-river hydro power plant.
	The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	It is a renewable energy project with no fuel-switch and biomass fired power plant involved. The project activity is a hydropower plant. Added auxiliary solar power resource.
	In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	This condition is not applicable to the project activity as it does not involve a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit(s).

Please also refer to the following table for the applicability criteria of the tools:

No	Applicability conditions to relevant tools	Project Activity	Criterion Met
1	Tool for the demonstration and assessment of additionality” (Version 07.0.0)		
	This tool provides for step-wise approach to demonstrate and assess additionality. These steps include: • Identification of alternatives to the project activity. • Investment analysis to determine that the proposed project activity is either:1) not the most economically or financially attractive, or 2) not economically or financially feasible, • Barrier analysis, and Common practice analysis	In the absence of the proposed project activity, plausible and credible project activities to the proposed project activity are presented. Benchmark Analysis is selected as the analysis method and the Equity IRR is selected as the financial indicator for the demonstration of the additionality of the project. Without the VER revenue, the Internal Rate of Return of the project cannot get close to the benchmark of 15,38 %, with an equity internal rate of return of 10.73%. A fluctuation of $\pm 10\%$ in the key parameters also does not make the project exceed this benchmark. It is also shown that the project activity is not a common practice.	Yes
2	Tool to calculate the emission factor for an electricity system” (Version 07.0).		
	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid. Under this tool, the emission factor for the project electricity can be calculated either for grid power plants only/or as an option can include off-grid power plants.	Although UNFCCC ACM0002 Version 22.0 refers to “Tool to calculate the emission factor for an electricity system” (Version 07.0 is used as the most recently published EFCM used this version), the host country (Turkey) published the combined margin, build margin and operational margin emission factors on an official publication dated 18.03.2024. by using “Tool to calculate the emission factor for an electricity system” (Version 07.0).	Yes
3	Assessment of the validity of the original/current baseline and update of the		

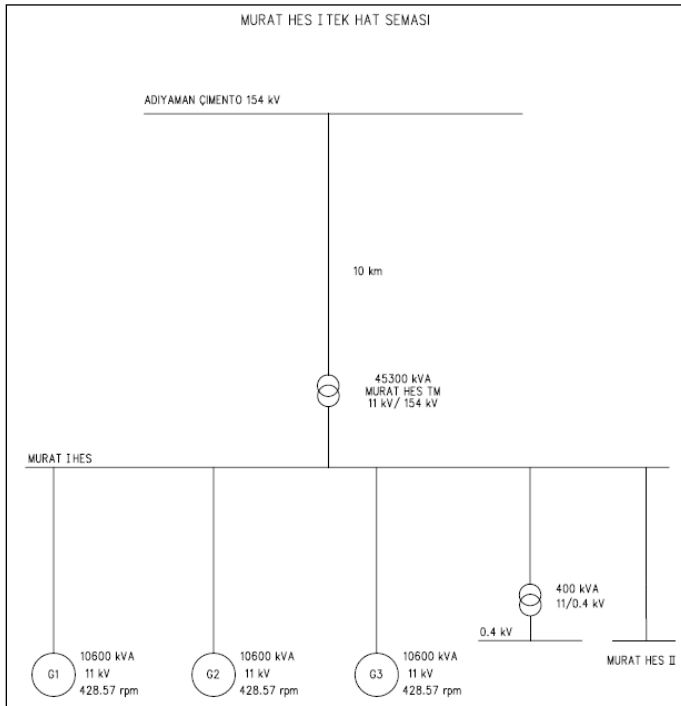
	baseline at the renewal of the crediting period” (Version 03.0.1)	
	This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49(a) of the modalities and procedures of the CDM. provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period. The current baseline scenario complies with all relevant mandatory national and or/sectoral policies. Thus, it can be concluded that the current baseline scenario is in compliance with relevant mandatory national and sectoral policies. The project received the production license from the Turkish Energy Market Regulatory Authority and this license ensures that the project complies with all national regulations. The term of the license is 49 years. There is no impact of circumstances existing at the time of requesting renewal of crediting period on the current baseline emissions for this project. The conditions used to determine the baseline emissions in the previous crediting period are still valid. The equipment and the technology of the project are still valid. Therefore this sub- step is not applicable for this project activity.	Yes

3.3.3 Project Boundary

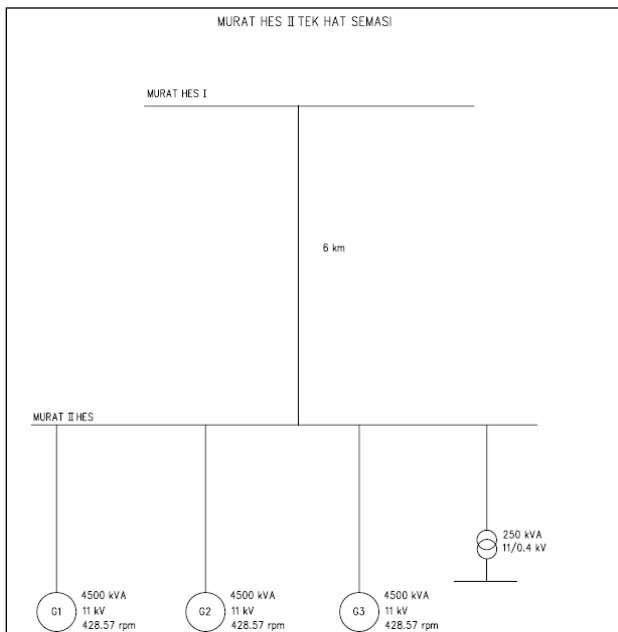
Identify As per para 20 of the applied Large-scale baseline methodology ACM0002 Version 22.0 /06/, the project boundary is defined as.

“The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to.”

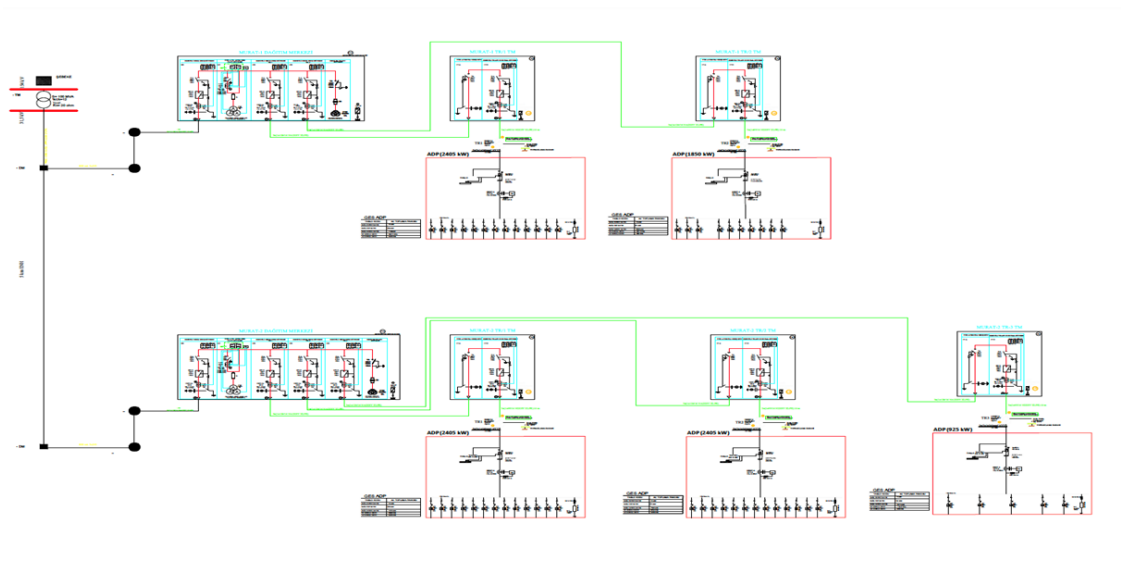
The flow diagram of the project boundary is shown below.



Murat-I Single line diagram



Murat-II Single line diagram



Murat-II Solar Components Single line diagram

The following emission sources have been considered under the project boundary which is found OK according to the on-site audit and the supportive documents.

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity hydro components	CO2	Yes	Main emission source
		CH4	No	Minor emission source
		N2O	No	Minor emission source
		Other	No	N/A
	CO2 emissions from electricity generation in fossil	CO2	Yes	Main emission source
		CH4	No	Minor emission source

Source		Gas	Included?	Justification/Explanation
Project	fuel fired power plants that are displaced due to the project activity PV Components	N ₂ O	No	Minor emission source
		Other	No	N/A
	For hydro power plants, emissions of CH ₄ from the reservoir	CO ₂	No	Minor emission source
		CH ₄	No	Conservative. The project activity does not result in a new reservoir. However, it does involve the construction of a regulation pond, with PD > 4 W/m ² . Therefore, no CH ₄ emissions are expected to occur.
		N ₂ O	No	Minor emission source
		Other	N/A	N/A
	Solar Component	CO ₂	No	No- project is not solar thermal
		CH ₄	No	N/A
		N ₂ O	No	N/A
		Other	N/A	N/A

The validation team considers that GHG emissions as a result of the implementation of the project activity which is not addressed by the applied methodology, i.e. ACM0002 Version 22.0 is deemed to contribute less than 1% of the overall expected average annual emissions reductions. Validation team confirm that project boundary and selected sources, sinks and reservoirs are justified for the project.

3.3.4 Baseline Scenario

According to VCS Standard Version 4.7 section 3.6.15 /08/, when renewal of the project crediting period, the following shall apply with respect to the renewal of the project:

“The validity of the original baseline scenario shall be demonstrated, or where invalid a new baseline scenario shall be determined.”

The validation team reviewed the updated VCS DD /02/ and evaluated whether project participants have assessed and incorporated the impact of national and/or sectoral policies and circumstances existing at the time of requesting renewal of the crediting period on the current baseline GHG emissions, without reassessing the baseline scenario. Where data and parameters used for determining the original baseline that was determined ex ante (and not monitored during the crediting period) are no longer valid,

the assessment team identified whether PP updated such data and parameters in accordance with the Methodological Tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” Version 03.0.1 /13/.

The steps from the Methodological Tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” Version 03.0.1 /13/ as per VCS Standard version 4.7 /08/ were applied to assess the continued validity of the baseline and/or the update of the baseline at the renewal of the crediting period:

Step 1: Assess the validity of the current baseline for the next crediting period

The VCS Standard version 4.7 /08/ requires assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline. The validity of the current baseline is assessed in the following sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

Validation team confirms that there have been no changes in the relevant national and/or sectoral regulations for grid connected hydro/solar power plant since the previous crediting period.

On the other hand, the baseline scenario for new grid connected hydro power projects (Greenfield), was still valid according to latest applied methodology ACM0002 Version 22.0.

Since the project activity involves the installation of two new grid-connected hydropower plants together with 12 MW auxiliary resources coming from solar PV, the baseline scenario is the same as described above

As demonstrated in the registered VCS PD /11/, The project activity is the installation of a new grid-connected renewable power plant; therefore, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

As per latest applied methodology ACM0002 Version 22.0 §§ 22, “The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.”.

Hence, the baseline for the Project remains the same as that in the registered VCS PD /11/. In the absence of project activity, the same amount of electricity would otherwise have been generated by the operation of some grid connected fossil fuel-based power plants or newly added generation sources into grid. A verifiable description of the baseline scenario has been included in the final VCS PD /02/. The information presented in the PDD has been validated by an initial document review of all data. Further confirmation has been made based on the on-site interview and a review of information from similar projects and/or technologies. The sources referenced in the VCS PD have been quoted correctly. The information was verified against credible sources, such as the following: -

1. Connection agreement with TEIAS /28/.
2. Grid emission factor for Turkey (Official data provided by Turkish Ministry of Energy and Natural Resources) /15/.

The data used for grid emission factor is the most recent data at the time of submission of VCS PD for validation which considers all the new circumstances. Validation team has checked the calculation of the

combined margin grid emission factor and confirmed that the applied value of the emission factor follows the tool /14/.

Although UNFCCC ACM0002 Version 22.0 refers to “Tool to calculate the emission factor for an electricity system” (Version 07.0), the host country (Turkey) published the combined emission factor as 0.44755 tCO₂/MWh on 18/03/2024 by using “Tool to calculate the emission factor for an electricity system” (Version 06.0) /32/. The only revision between these versions is to include monitoring requirements for parameters used to determine the emission factor of the isolated grid and Murat HEPP is not an isolated grid. Hence there is no change between version 6 to 7 which will impact the emission factor calculation relevant for the project activity. Therefore, the grid emission factor /15/ calculated for turkey is in compliance with the latest version of the “Tool to calculate the emission factor for an electricity system” (Version 07.0).

Hence, the same baseline as identified in the previous crediting period is still valid for the project. There are no new relevant national and/or sectoral policies and circumstances ever since the project was registered that have an impact on the baseline.

Thus, the baseline identified during the validation is still compliance with the relevant mandatory national and/or sectoral policies. Hence, no need to update the current baseline for the next crediting period.

Step 1.2: Assess the impact of circumstances

The Amended Electricity Market License Regulation entered into force. On March 8, 2020, amendments were made to the Electricity Market License Regulations of the host Country (Republic of Turkey). These amendments included provisions for adding auxiliary resources to existing power plants. The addition of Solar PV components complies with this regulation.

There are no new national/sectoral policies or circumstances that could affect the baseline scenario during the renewal of the crediting period. The validation team confirmed that the current baseline identified in the registered VCS PD /11/ is still valid for the second crediting period. The project participant has considered the latest available Grid Emission factor for Turkey grid /15/ at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which considers all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission.

Since, there is no change in the circumstance and hence, the circumstance will not have any impact on the current baseline emission. Hence, no need to update the current baseline for the next crediting period.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

Since, the baseline scenario identified during the validation of the project activity was electricity generation in power plants that are displaced due to the project activity. This is not applicable. Hence, no need to update the current baseline for the next crediting period. However the grid emission factor for the 2nd crediting period has changed and the latest available grid emission factor /15/ has been used.

Step 1.4: Assessment of the validity of the data and parameters

The assessment of the validity of the parameters are provided below:

Ex-ante Parameter	Value for the 1 st Crediting period	Value for the 2 nd crediting period	Assessment

EF_{grid,y} (CO ₂ emission factor of the grid electricity in year y)	0.65 tCO ₂ /MWh	0.44755 tCO ₂ /MWh	During the 1st crediting period, the value of EF_{grid,y} was calculated as 0.65 tCO₂/MWh even though this was not reported as ex-ante parameter. For 2nd crediting period, this is calculated as 0.44755 tCO₂/MWh and also reported as ex-ante parameter. Since, latest data is available (available at the time of submission of the VCS PD to the VVB for validation), the old data provided for the first crediting period is no more valid. The emission factor is calculated in compliance to latest version of the tool “Tool to calculate the emission factor for an electricity system” Version 7 /14/. Calculated ex-ante based on 25% of OM and 75% of BM values approach. Validation team has checked the calculation and found correct. Wom = 0.25 and WBm = 0.75 EF_{grid, CM,y} = 0.25 × 0.7279 + 0.75 × 0.3541 = 0,44755 tCO₂/MWh
EF_{grid,OM,y} (CO ₂ Operating Margin Emission Factor of the Grid (including import))	0.657 tCO ₂ /MWh	0.7279 tCO ₂ /MWh	During the 1st crediting period, the value of EF_{grid,OM,y} was calculated as 0.657 tCO₂/MWh. For 2nd crediting period, the value of EF_{grid,OM,y} is calculated as 0.7279 tCO₂/MWh. Since, latest data is available (available at the time of submission of the VCS PD to the VVB for validation), the old data provided for the first crediting period is no more valid. The grid emission factor has been calculated by Turkish Ministry of Energy and Natural Resources) /15/ and is the latest available data and is in compliance with the tool “Tool to calculate the emission factor for an electricity system” Version 7.
EF_{grid,BM,y} (Build margin CO ₂ emission factor)	0.643 tCO ₂ /MWh	0.3541 tCO ₂ /MWh	During the 1st crediting period, the value of EF_{grid,BM,y} was calculated as 0.643 tCO₂/MWh. For 2nd crediting period, the value of EF_{grid,BM,y} is calculated as 0.3541 tCO₂/MWh. Since, latest data is available (available at the time of submission of the

			VCS PD to the VVB for validation), the old data provided for the first crediting period is no more valid. The grid emission factor has been calculated by Turkish Ministry of Energy and Natural Resources) /15/ and is the latest available data and is in compliance with the tool “Tool to calculate the emission factor for an electricity system” Version 7.
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Step 2: Update the current baseline and the data and parameters

As determined in the step 1.4 above, the following fixed parameters needs to be updated:

1. $EF_{grid,y}$
2. $EF_{grid,OM,y}$
3. $EF_{grid,BM,y}$

Step 2.1: Update the current baseline

The baseline remains unchanged as discussed above. Only the baseline emissions have been updated for the second crediting period, without re-assessing the baseline scenario, based on the latest approved version (Version 22.0) of the applied methodology ACM0002.

The revised VCS PD/02/ provides, the updated baseline emissions for the 2nd crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The revised baseline emissions are calculated in accordance with the relevant sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

Step 2.2: Update the data and parameters

The baseline emission factor is updated as per the latest available grid emission factor /15/, available at the time of VCS PD submission for renewal of crediting period.

As determined in the Step 1.4, the following fixed parameters need to be updated:

1. $EF_{grid,y}$
2. $EF_{grid,OM,y}$
3. $EF_{grid,BM,y}$

Combined margin, Operating margin and build margin CO₂ emission factor are in compliance to the latest version of the tool “Tool to calculate the emission factor for an electricity system” Version 7 /14/.

Validation team has checked the calculation and found correct. The value is correctly applied for the emission reduction calculation.

Opinion:

The assessment team confirms:

- (a) The identified baseline scenario is justified.

(b) The approved baseline methodology has been correctly applied to identify the most plausible baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed project activity.

3.3.5 Additionality

The projects additionality has been demonstrated using the latest version of the “Tool for the demonstration and assessment of additionality” - Version 7.0.0. This tool equals “The Project test”, stated in the VCS Standard: VCS Version 3.

Below are the completed steps from the additionality tool:

Step 1: Identifying alternatives to the project activity in line with current laws and regulations.

Sub-step 1a: Alternative A, which involves implementing the project without carbon revenue, is not financially viable, as discussed in the investment analysis. Alternative B represents the baseline scenario; however, pursuing it as a VER activity is deemed unrealistic due to Turkey's anticipated increase in energy demand. To meet this demand, electricity generation must rise, making no action impractical and highlighting the need for HEPPs to produce clean energy where feasible. Alternative C is a significant option, given the high share of thermal plants in Turkey's installed capacity. Although three alternatives are considered, Alternative B is dismissed due to rising electricity demand, leading to an evaluation of Alternatives A and C.

Sub-step 1b: Regarding consistency with mandatory laws and regulations, all alternatives are assessed in this context. The analysis indicates that the proposed project is not the only compliant option among participants, thus affirming its additionality. According to methodology ACM0002 (Version 22.0), the baseline scenario is defined as Alternative 3, where electricity will be supplied by existing grid-connected power units, continuing the current situation.

Step 2: Investment analysis

Sub-step 2a- Determine appropriate analysis method.

The “Tool for the demonstration and assessment of additionality” (Version 7.0.0) recommends three analysis methods, namely simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

The proposed Project generates financial and economic benefits through the sales of electricity other than Voluntary Emissions Reduction (VCS-VER) related income. Therefore the simple cost analysis (Option I) cannot be taken.

Investment comparison analysis (Option II) is only applicable to projects where alternatives should be similar investment projects. As it was stated in Step 1, the alternative baseline scenario of the proposed project is the continuation of the current situation, where the equivalent electricity will be provided by the existing power units connected to the national grid. Among the investment comparison analysis (Option II) and the benchmark analysis (Option III), the benchmark analysis (Option III) is preferred.

Sub-step 2b- Option III. Apply benchmark analysis

The World Bank's Sustainable Development Department for Turkey has established an post-tax Equity IRR of 15% for small hydro projects as of the investment decision date for the hydro components of the power plant (January 7, 2010, at Financial Closure). For Solar PV, the benchmark is 15.38% as of the investment decision date (August 20, 2020, for the Panel Supply Contract). This accepted benchmark offers a conservative and accurate perspective for the investment analysis. Consequently, a benchmark of 15% will be used for comparison with the post-tax equity IRR in the investment analysis of the Murat HEPP project. Additionally, the "Guidelines on the Assessment of Investment Analysis" (Version 05) includes benchmarks for other countries, ranging from a high of 18% to a low of 10.5%. The World Bank's Equity IRR aligns with this range of IRRs.

While implementing the benchmark analysis, the two phases of investments are reflected as changes in total investment costs and revenue onward from the 11th year, as shown below. Please also note that the Benchmark value for the two different dates of investment are very similar if not nearly the same.

Sub-step 2c. Calculation and comparison of financial indicators

The parameters needed for calculation of key financial indicators are as follows:

Parameter	Value	Unit	Validation team remarks
Installed Power	35.478	MWe	Generator plate total values
Plant load factor	54.0	%	35.478 MWe X 8760 h = 310,787 MWh/year capacity 310,787 MWh/year capacity/168,390 MWh/year = 54% Calculated in line with EB 48 Report Annex 11, Guidelines for the Reporting and Validation of Plant Load Factors
Operational hours	4,746	hours	
Estimation of annual grid-connected power generation	168.39	GWh	Hydroelectricity 150.390 MWh (license dated 29/01/2009) Solar Power 18.000 MWh (solar portion feasibility report dated 21/08/2020 X 1.2) Hybrid 165.390 MWh (sum of the two values above)
Total Investment Cost	80,719,599	USD	Revised feasibility- JUNE 2009 ELİSS ENERJİ EPC Contract-05.10.2020 CCT Enerji consulting company contract-01.06.2021

Equity	36,018,966	USD	Loan Agreement dated 18/09/2020
Debt	44,700,632	USD	Loan Agreement dated 18/09/2020
Annual Operational Costs	949,604	USD	TABLE 9.1 FROM THE FEASIBILITY STUDY REPORT PAGE 222 Elis Energy Feasibility dated 21/08/2020
Electricity Selling Price	0.062	USD/kWh	EPIAS (https://www.epias.com.tr/tum-duyurular/piyasa-duyurulari/elektrik/kayit-ve-uzlastirma/01-07-2021-tarihinden-31-12-2030-tarihine-kadar-isletmeye-girecek-yek-belgeli-yenilenebilir-enerji-kaynaklarina-dayali-elektrik-uretim-tesisleri-icin-uygulanacak-fiyatlar-hk-4/)
VER selling Price	4	USD/tCO ₂	https://app.hubspot.com/documents/3298623/view/251152947?accessId=fd91dd
Corporate tax rate	%	20	

Validation team has checked the sources used and found available at the time of decision making (investment decision date: August 20, 2020, the Panel Supply Contract).

(i) The cash outflow and costs (investment costs & operation costs)

Total investment cost of Murat Weir and Hydroelectric Power Plant (for Murat-I and Murat-II) is 80,719,599USD and is itemized as follows;

Parameter	Value	Validation team remarks
Construction site facilities	\$312,500	Murat HEPP Revised Feasibility Study dated June 2009
Road construction	\$218,750	Murat HEPP Revised Feasibility Study dated June 2009
Diversion Weir and Intake Structure	\$8,979,360	Murat HEPP Revised Feasibility Study dated June 2009
Transmission Tunnel	\$16,198,143	Murat HEPP Revised Feasibility Study dated June 2009
Transmission Canal	\$13,734,994	Murat HEPP Revised Feasibility Study dated June 2009

Forebay	\$6,318,172	Murat HEPP Revised Feasibility Study dated June 2009
Power House	\$3,341,526	Murat HEPP Revised Feasibility Study dated June 2009
Penstock	\$1,878,284	Murat HEPP Revised Feasibility Study dated June 2009
Total Construction Cost	\$50,981,728	Murat HEPP Revised Feasibility Study dated June 2009
Turbine and Generator	\$8,460,000	Murat HEPP Revised Feasibility Study dated June 2009
Accessory Equipment	\$800,000	Murat HEPP Revised Feasibility Study dated June 2009
Other Equipment	\$400,000	Murat HEPP Revised Feasibility Study dated June 2009
Grid	\$2,000,000	Murat HEPP Revised Feasibility Study dated June 2009
Energy Transmission Line	\$1,625,000	Murat HEPP Revised Feasibility Study dated June 2009
TOTAL FACILITY COST	\$13,285,000	Murat HEPP Revised Feasibility Study dated June 2009
Unknown Construction costs (15%)	\$8,041,026	Murat HEPP Revised Feasibility Study dated June 2009
Survey and Project Cost	\$1,849,436	Murat HEPP Revised Feasibility Study dated June 2009
Expropriation	\$1,234,688	Murat HEPP Revised Feasibility Study dated June 2009
Sub Total	\$11,125,149	Murat HEPP Revised Feasibility Study dated June 2009
HEPP INVESTMENT COST	\$75,391,877	Murat HEPP Revised Feasibility Study dated June 2009
PV Panel	\$3,240,000	05.10.2020 ELISS ENERJİ EPC Contract

Construction Cost	\$2,076,000	05.10.2020 ELİSS ENERJİ EPC Contract
Consulting Fee	\$11,722	01.06.2021 (CCT Enerji consulting company)
SOLAR INVESTMENT COST AFTER THE 10th YEAR	\$5,327,722	
TOTAL INVESTMENT COST FOR AFTER THE 10th YEAR	\$80,719,599	

Validation team has checked the sources used and found available at the time of decision making.

Operational costs

The OPEX of the project (1,479,366 TL = 924,604 USD) has been taken from the table 9.1 of the feasibility report. As stated in the feasibility report 1USD equals 1,6 TL.

Solar Electricity plant operating costs of 25,000 USD has been taken from the table 9.1 of the

feasibility report prepared by ELİSS Enerji for the Solar Component.

Total Operational Cost after the addition of the Solar Component sums up to 949,604 USD.

The cash inflow or income stream

As of 01.08.2023, YEKDEM (Yenilenebilir Enerji Destekleme Mekanizması/ Renewable Energy Support Mechanism Price) for a run of River Type Hydroelectric Power Generation Plant is declared as: 168.83 (TL kr/kWh) where 1 USD equals 27.0219 TL for the same date. The price is stated on a declining basis and is equal to $168.83 / 27.02119 = 6.24$ USD¹. However, to be conservative, the price of the electricity generated in Murat HEPP has been taken as 6.2 USD cents per kWh for the calculation of sales revenues.

Depreciation

Depreciation related to the project, which has been deducted in estimating gross earnings on which tax is calculated, added back to net profits in line with the suggestion in “Tool for the demonstration and assessment of additionality”.

We have depreciated the project's assets according to the Turkish Tax Regulation².

Interest Expenses and Financial structure

In this project finance, capital structure is 55% debt and 45% equity. \$44,700,632 is used as loan to finance this Project. Loan agreement has been provided to VVB.

Financial calculation and conclusion

The Project IRR calculations were provided in a spreadsheet. The calculation was verified and found to be correct by project validation team; as well as the assumptions used in the calculation were deemed to be correct.

As is mentioned above, equity IRR has been calculated as 10.73% without considering the carbon revenue. When benchmark Equity IRR is taken as 15.38%, the Project is not financially attractive. We consider 4.00 USD VER Sales Unit Price. When we include the carbon revenues in the cash flows, equity IRR increases to nearly 11.03% The IRR even with VERs remains lower than the benchmark of 15.38%.

Based on the parameters above, the project IRRs with and without the VCS-VERs sales revenue are calculated and shown below:

	IRR
Without VCS-VERs revenues	10.73%

¹ <https://www.epias.com.tr/tum-duyurular/piyasa-duyurulari/elektrik/kayit-ve-uzlastirma/01-07-2021-tarihinden-31-12-2030-tarihine-kadar-isletmeye-girecek-yek-belgeli-yenilenebilir-enerji-kaynaklarina-dayali-elektrik-uretim-tesisleri-icin-uygulanacak-fiyatlar-hk-4/>

² http://www.alomaliye.com/aralik_06/vuk_365.pdf (item 45.1.2)

With VCS-VERs revenues	11.03%
------------------------	--------

Table 6 shows that the IRR of the total investment of the proposed project without VCS-VERs sales revenue is 10.73%, lower than the benchmark IRR of 15.38 %, which means that the proposed project activity indeed faces significant financial barriers. Therefore, the project activity is not the most economically or financially attractive choice of investment.

Sub-step 2d. Sensitivity Analysis

According to the additionality tool, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subject to reasonable variation. For the proposed project, three basic parameters have been selected as sensitive factors to check out the financial attractiveness:

- Total investment
- Annual operational costs
- Electricity selling revenue

The following table shows the variation of IRR when the three parameters fluctuate from -10% to +10%.

	-10%	-5%	0%	5%	10%
Total Investment	12.56%	11.57%	10.73%	10.00%	9.35%
Annual operational cost	10.77%	10.75%	10.73%	10.71%	10.69%
Electricity Selling Revenue	10.22%	10.48%	10.73%	10.97%	11.19%

Sensitivity analysis has been carried out for the stated costs and assumptions. It shows that under none of those scenarios that change the parameters by up to $\pm 20\%$ the IRR of the project exceeds the Benchmark.

We observe the following when we compare these values to see what it takes to achieve the benchmark value:

As stated in the Project Design Document (PDD) registered during the first crediting period, the investment cost was estimated based on the feasibility study. However, the construction contract has already been signed, and costs were expected to increase rather than decrease due to unexpected events during construction. Indeed, there have been some changes in the scheduled construction costs that occurred after the construction started, such as tunnel construction and expropriation costs.

The actual investment cost that is realized above the estimated cost due to an unaccounted for cost of a tunnel construction, and the actually decreasing nature of the electricity prices, and the drought conditions induced by climate change leading to conditions that is very likely to surpass the maximum

electricity production values also clearly suggest that the project activity is very unlikely to surpass the 15% Benchmark values.

In this renewal period, we are re-evaluating financial additionality to demonstrate that adding a solar power array has not altered the financial outlook. The investment costs are unlikely to decrease by even 1%, particularly in the inflationary post-Covid environment in the host country.

Electricity revenue can increase through higher production or increased selling prices. The production figures used in our financial analysis represent the upper limits due to water shortages and climate change. A significant increase in selling prices—around 150% per kWh—would be necessary to see any substantial revenue gain. However, recent government policies favoring nuclear energy suggest that electricity prices are more likely to decrease³. The World Bank Report⁴ notes that the electricity market price for hydropower was set at 8 cents per kWh, while the current tariff is 7.3 cents⁵ for the first ten years and 6.2⁶ cents for the next ten years.

Electricity generation is highly dependent on water flow, which is influenced by rainfall and the effects of global warming. Given Turkey's Mediterranean climate, significant annual rainfall variations lead to regional droughts, posing a major challenge for the project area. Therefore, an increase in electricity generation is improbable, as is an increase in selling prices. In fact, since April 2011, electricity prices have been declining due to the electoral process and consumer reactions to high prices, suggesting future prices will only return to pre-April 2011 levels, as used in the investment analysis.

Outcome of Step 2: The above analysis has demonstrated that the project activity is not the most economically or financially attractive choice of investment. Even if the IRR with carbon credits does not overcome the IRR benchmark, the project developer has chosen to develop the project considering carbon credits because of the social benefits that it will bring to the area. Indeed, the project owner, Mehmet Güneş, is aware of local necessities. Therefore, he decided to develop this project since the carbon revenue helps to increase the IRR.

All scenarios highly hypothetical and impossible. Validation Team has arrived at the conclusion that the project scenario is not economically feasible without benefits from carbon benefits. Based on the above discussion, it can be concluded that the assumptions used in the investment analysis are suitable and the project activity does not generate sufficient returns to be considered financially viable.

³ <http://www.epdk.gov.tr/documents/10157/beb57880-96f4-4cbf-a781-e75239c52cff>

⁴ http://www.wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2009/05/11/000333037_20090511030724/Rendered/PDF/468080PAD0P112101Official0Use0Only1.pdf

⁵ <http://www.tbmm.gov.tr/kanunlar/k6094.html>

⁶ <https://www.epias.com.tr/tum-duyurular/piyasa-duyurulari/elektrik/kayit-ve-uzlastirma/01-07-2021-tarihinden-31-12-2030-tarihine-kadar-isletmeye-girecek-yek-belgeli-yenilenebilir-enerji-kaynaklarına-dayali-elektrik-uretim-tesisleri-icin-uygulanacak-fiyatlar-hk-4/>

STEP 3 – Barrier analysis

The barrier analysis step has not been applied for the proposed project.

STEP 4 – Common practice analysis

Murat HEPP has installed power of 35.478 Mwe. In Common practice analysis the added auxiliary solar power capacity is not considered as this is not allowed to be included to the electric capacity. Project start date is November 2009. According to the latest guideline (EB 65 Report Annex 21 "Tool for the demonstration and assessment of additionality") for common practice analysis we took the following values to determine the Nall ; The project boundary is the whole country ,Turkey, within this boundary the power production units that are having installed power within the range of 17,739 MWe – 53,217 MWe (+/- 50%).

PROJECTION (2010 – 2019) REPORT⁷ pages 85-97 gives the breakdown of the Turkish Electricity Generation Plants by plant type, fuel type and ownership as of 2009 year end and there have been total 447 power production plants in Turkey.

All the plants that fall into the given interval count Nall =64 plants (the plants that are CDM registered have been excluded. And further study on these 64 plants showed us that only 15 plants are having private energy production license and using hydro power technology.

Among these 15 privately owned hydro plants 2 of them have been built by the government and then been sold out to a private company under privatization process, 6 of them have been built under Auto producer agreement and then converted to private production license, 1 of them has been developed by a government entity "State Hydraulic Works (DSI) " and then sold out to private company with a bidding process.

So; $2+6+1=9$ and $15-9=6$. Thus only 6 units among 15 units are similar to the proposed project activity MURAT HEPP, by being privately owned and having a capacity within the range of common practice analysis.

After the above given analysis we are left with $64-6=58$ of units among 64 are different than MURAT HEPP by technology, ownership, fuel type, legal origin and project development entity(government support). That is; Ndiff = 58

Applying the common practice analysis formulation which was given in the above mentioned tool as follows;

Calculate factor $F=1-Ndiff/Nall$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as

⁷ <http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf>

the proposed project activity. The proposed project activity is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:

(a) the factor F is greater than 0.2, and

(b) $N_{all} - N_{diff}$ is greater than 3.

$$F = 1 - (N_{diff} / N_{all}) \Rightarrow F = 1 - (58/64) \Rightarrow F = 1 - 0,91 \Rightarrow F = 0,09$$

0,09 is not greater than 0,2

So MURAT HEPP project is not a common practice

Validation team has checked the steps taken to demonstrate the additionality and confirm that they are followed correctly and precisely. Validation team confirm that additionality is justified for the project.

3.3.6 Quantification of GHG Emission Reductions and Carbon Dioxide Removals

Identify The emission reduction (ER_y) by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (Ly). All aspects related to the direct and indirect GHG emissions as relevant to the project activity have been addressed and are presented in a transparent manner, in line with the approved methodology.

Baseline Emission:

The project activity is the installation of a new plant, Baseline emissions include only CO₂ emissions from electricity generation from fossil fuel fired power plants that are displaced due to the project activity. The baseline emission of the project activity is estimated in accordance with applied methodology ACM 0002 (Version 22.0) /06/ as follows:

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

Where: BE_y = Baseline emissions in year y (t CO₂)

EG_{PJ,y} = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)

EF_{grid,CM,y} = Combined margin CO₂ emission factor in year y (t CO₂/MWh)

As the project is a green field project activity:

$$EG_{PJ,y} = EG_{facility,y}$$

Where: EG_{facility,y} = Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/yr)

Parameter	Source and validation
$EG_{PJ,y} = EG_{facility,y}$ (MWh)	$EG_{PJ,y}$ is estimated ex-ante as 168,390 MWh/year which is verified to be correct. This would be further verified during the verification.
$EF_{grid,CM,y}$ (tCO ₂ /MWh)	For 2nd crediting period, This is calculated as 0.44755 tCO₂/MWh. The emission factor is calculated in compliance with latest version of the tool “Tool to calculate the emission factor for an electricity system” Version 7 /14/. Calculated ex-ante based on 25% of OM and 75% of BM values approach. Validation team has checked the calculation and found correct.

Based on the above values, the baseline emission is estimated as 75,362 tCO₂/year.

Project emission:

As per para 31 of the applied methodology ACM0002 - version 22.0, the project emission of hydropower project is:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y = Project emissions in year y (tCO₂e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO₂/yr)

$PE_{GP,y}$ = Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO₂e/yr)

$PE_{HP,y}$ = Project emissions from reservoirs of hydro power plants in year y (tCO₂e/yr)

Emissions from fossil fuel combustion ($PE_{FF,y}$)

According to paragraph 33 of ACM0002 – version 22.0, for all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected. The project activity is a renewable power plant. Therefore, emission from fossil fuel combustion is zero.

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

Project emissions from the operation of dry, flash steam or binary geothermal power plants (PE_{GP,y})

This emissions only apply for geothermal project activities, so this emissions (PE_{GP,y}) is not relevant.

Therefore, the project emissions are:

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

Where:

PE_{HP,y} Project emission from reservoirs of hydropower plants in year y (tCO₂/year)

Emission from water reservoir of hydropower plant (PE_{HP,y})

As per para 37 of the applied methodology ACM0002 – version 22.0, The power density (PD) of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad \text{Equation 1}$$

Where:

PD	Power density of the project activity, in W/m ² .
Cap _{PJ}	Installed capacity of the hydro power plant after the implementation of the project activity (W).
Cap _{BL}	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.
A _{PJ}	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m ²).
A _{BL}	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m ²). For new reservoirs, this value is zero.

The added auxiliary power generation is not a Solar thermal addition. In solar thermal power plants, solar radiation is used to generate electricity in what is otherwise a conventional power plant process. Mirrors concentrate the sunlight on a radiation collector and heat up a heat-bearing medium, generally thermal oil. A turbine transforms this energy into electricity. In the case of project activity is produced by direct conversion of sunlight to electricity, and there is no fossil fuel related project emission involved.

Validation team assessment: The project activity involves the construction of a new hydropower plant with auxiliary solar panels with capacity (Cap_{PJ}) of 35,478,000 MW (As verified from commissioning certificate/16/, Name plate capacity of turbine /18/) and a new reservoir with surface (A_{PJ}) of 640,471.91 m² (As verified from doc /19/), thus $A_{BL} = 0$ and $Cap_{BL} = 0$.

$PD = 35,478,000W / 640,471.91 \text{ m}^2 = 55.39 \text{ W/m}^2$ $PD > 4 \text{ W/m}^2$.

The power density of the project activity is 55.39 W/m².

As per para 38 of the applied methodology ACM 0002 Version 22.0, For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH₄ and CO₂ emissions from the reservoirs, estimated as follows:

- a) For integrated hydro power project PD of the entire project is calculated as follows:

$$PD = \frac{\sum Cap_{PJ,i}}{\sum A_{PJ,j}} \quad \text{Equation 2}$$

Where:

- i = Individual power plants included in integrated hydro power project
 j = Individual reservoirs included in integrated hydro power project

Validation team assessment: The project activity is not an integrated hydropower plant. Hence this option is not applicable.

- b) If the power density of the project activity using equation (1) or in case of integrated hydro power project using equation (2) is greater than 4 W/m² and less than or equal to 10 W/m²:

$$PE_{HP,y} = \frac{EF_{Res} \times TEG_y}{1000} \quad \text{Equation 3}$$

Where:

- $PE_{HP,y}$ = Project emissions from water reservoirs (t CO₂e/yr)
 EF_{Res} = Default emission factor for emissions from reservoirs of hydro power plants (kg CO₂e/MWh). The default value as per EB23 is 90 kg CO₂e /MWh.
 TEG_y = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

Validation team assessment: Since the power density is greater than 10 W/m², Hence this option is not applicable.

c) If the power density of the project activity is greater than 10 W/m²:

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

Equation 4

Validation team assessment: Since the power density is greater 10 W/m², Hence the project emission is zero.

Thus as per the applied methodology ACM 0002 Version 22.0, the project emission (PE_y) is zero.

$$PE_y = 0$$

Leakage:

As per the applied methodology i.e. ACM0002 Version 22.0, leakage is considered to be zero (LE_y = 0) which is found OK.

Emission reduction:

As per the methodology, emission reduction (ER_y) is calculated as below:

$$ER_y = BE_y - PE_y - L_y = 75,362 - 0 - 0 = 75,362 \text{ tCO}_2/\text{year}$$

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
05-October-2022 – 31 December 2022	18,169	0	0	18,169
01-January-2023 to 31-December-2023	75,362	0	0	75,362
01-January-2024 to 31-December-2024	75,362	0	0	75,362
01-January-2025 to 31-December-2025	75,362	0	0	75,362
01-January-2026 to 31-December-2026	75,362	0	0	75,362
01-January-2027 to 31-December-2027	75,362	0	0	75,362
01-January-2028 to 31-December-2028	75,362	0	0	75,362

01-January-2029 to 31-December-2029	75,362	0	0	75,362
01-January-2030 to 31-December-2030	75,362	0	0	75,362
01-January-2031 to 31-December-2031	75,362	0	0	75,362
01-January-2032 to 04-October-2032	57,193	0	0	57,193
Total estimated ERRs during the second or fixed crediting period	753,620	0	0	753,620

PP has submitted the ex-ante emission reduction estimation in a excel sheet/04/. The excel sheet is clear, viewable, non-protected and the calculated values in the sheet are reproducible. Hence the ex-ante emission reduction calculated for this project is correct.

Opinion:

As discussed above, the validation team confirms the following:

- All assumptions and data used by the project participants are listed in the PD, including their references and sources;
- All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PD;
- All values used in the PD are considered reasonable in the context of the proposed project activity;
- The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;

All estimates of the baseline/project emissions can be replicated using the data and parameter values provided in the PD and corresponding spreadsheets.

3.3.7 Methodology Deviations

No methodology deviations identified.

3.3.8 Monitoring Plan

Identify The project monitoring plan is in compliance with the monitoring methodology ACM 0002, version 22.0 /06/. The project was originally registered applying Large scale methodology ACM 0002, version 22.0. For the 2nd crediting period, latest version i.e. version 22.0 of the same methodology ACM 0002 “Grid-connected electricity generation from renewable sources” has been applied and the monitoring plan of the same has been adopted. As per the methodology, the following parameter will be monitored:

Sl. No.	Parameters	Monitoring procedure
1	Cap_{PJ} (W) Installed capacity of the hydro power plant after the implementation of the project activity.	Justification for the compliance: The capacity of the project activity is 48.81 MW. Excluding the solar portion capacity is 35,478,000 MW. There is no change in the hydro capacity from the 1st crediting period. The monitoring frequency is once a year which is in compliance with the latest version of the applied methodology i.e. Version 22.0 of ACM 0002 which refer “at the beginning of each crediting period. Validation team has checked the installed capacity of the hydro power plant from On-site audit, Commissioning certificate /16/, Technology specification /17/, Nameplate Photos /18/ and Electricity production license /20/. Hence validation team can conclude that the monitoring plan is complying with the applied methodology i.e. ACM 0002 version 22.0 and project participant is able to implement the monitoring plan.
2	A_{PJ} (m²) Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.	Justification for the compliance: The area of the reservoir is 640,471.91 m². The area of the reservoir has been fixed for the whole 2nd crediting period which is in compliance with the applied methodology /06/. The monitoring frequency is once at the beginning of each crediting period as per the latest version of the applied methodology i.e. Version 22.0 of ACM 0002 and hence accepted. The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area /23/ and found that the area of the reservoir is consistent with the registered VCS PD /11/. Hence validation team can conclude that the monitoring plan is complying with the applied methodology i.e. ACM 0002 version 22.0 and project participant is able to implement the monitoring plan.
3	EG_{PP-Import, y} (MWh) Quantity of electricity imported by the power plant	Justification for the compliance: The Primary source of data will be the Main TEIAS meter recorded at the monthly reading protocols, the column related to electricity imported from the Grid.

from the Grid, in year y	Measurements are to be made by electricity meters. That belong to the grid operator TEİAŞ. Data will be used to calculate the net electricity supplied to the grid. Recorded continuously, reported monthly on TEİAS Meter Reading Protocols, Reported annually on the VCS Monitoring Report. Main Electricity Meter: EMH LZQJ-XC -Serial Number: 9798700 Back-up Electricity Meter: EMH LZQJ-XC -Serial Number: 9798701 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market (http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44). They have an accuracy class of Class 002 indicating an accuracy range of 0.2%. Measurements are carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The accuracy of the meters is $\pm 0.2\%$. The monthly reported meter readings by the main meter with serial number 9798700 will be cross-checked against the backup meter that has serial number 9798701. If the reading difference is less than $\pm 0.2\%$, the meter readings are considered to be OK; if not, the meters will be checked. Murat HES Enerji will be responsible for providing OSF⁸ records showing the company's monthly electricity production. In addition to the measurement system, Murat HEPP production will be cross-checked from EPIAS/TEİAS-approved records. <table><tr><th>Meter</th><th>Serial Number</th><th>Calibration Done On</th><th>Valid Until</th><th>Type</th></tr><tr><td>Main Meter (Old)</td><td>424740</td><td>2012</td><td>2022</td><td>Elster A1500</td></tr><tr><td>Spare Meter (Old)</td><td>424741</td><td>2012</td><td>2022</td><td>Elster A1500</td></tr><tr><td>Main Meter (New)</td><td>9798700</td><td>2020</td><td>2030</td><td>EMH LZQJ-XC</td></tr><tr><td>Backup Meter (New)</td><td>9798701</td><td>2020</td><td>2030</td><td>EMH LZQJ-XC</td></tr></table>	Meter	Serial Number	Calibration Done On	Valid Until	Type	Main Meter (Old)	424740	2012	2022	Elster A1500	Spare Meter (Old)	424741	2012	2022	Elster A1500	Main Meter (New)	9798700	2020	2030	EMH LZQJ-XC	Backup Meter (New)	9798701	2020	2030	EMH LZQJ-XC
Meter	Serial Number	Calibration Done On	Valid Until	Type																						
Main Meter (Old)	424740	2012	2022	Elster A1500																						
Spare Meter (Old)	424741	2012	2022	Elster A1500																						
Main Meter (New)	9798700	2020	2030	EMH LZQJ-XC																						
Backup Meter (New)	9798701	2020	2030	EMH LZQJ-XC																						

⁸ The OSF Records are the Forms titled "TEİAŞ G.D.A. YÜK TEVZİ İŞLETME MÜDÜRLÜĞÜ BÖLGESİNDEKİ SANTRALLERİN AYLIK ÜRETİM, PUANT VE ÇALIŞMA SAATİ BİLGİLERİ" meaning "MONTHLY GENERATION, PEAK AND WORKING HOURS OF THE POWER PLANTS IN THE REGION OF TEİAŞ G.D.A. LOAD DISPATCH OPERATION DIRECTORATE" This is the official form of agreement related to net electricity generation between the project proponent and grid operator represented as TEİAŞ or EPIAŞ.

		All two meters are in compliance with the host country calibration regulations /27/ which refer calibration frequency as once in 10 years. Both meters were changed on 26.09.2020. Proof of meter change document has been provided to VVB. Data will be used to calculate net electricity supplied to the grid. Hence validation team can conclude that the monitoring plan is complying with the applied methodology i.e. ACM 0002 version 22.0 and project participant is able to implement the monitoring plan.
4	EG_{PP-export, y} (MWh) Quantity of electricity exported by the power plant to the grid, in year y	Justification for the compliance: The Primary source of data will be the Main TEİAŞ meter recorded at the monthly reading protocols, the column related to electricity exported to the Grid. Measurements are to be made by electricity meters. That belong to the grid operator TEİAŞ. Data will be used to calculate the net electricity supplied to the grid. Recorded continuously, reported monthly on TEİAŞ Meter Reading Protocols, Reported annually on the VCS Monitoring Report. Main Electricity Meter: EMH LZQJ-XC -Serial Number: 9798700 Back-up Electricity Meter: EMH LZQJ-XC -Serial Number: 9798701 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market. They have an accuracy class of Class 002 indicating an accuracy range of 0.2%. Measurements are carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The accuracy of the meters is $\pm 0.2\%$. The monthly reported meter readings by the main meter with serial number 9798700 will be cross-checked against the backup meter that has serial number 9798701. If the reading difference is less than $\pm 0.2\%$, the meter readings are considered to be OK; if not, the meters will be checked. Murat HES Enerji will be responsible for providing OSF⁹ records showing the company's monthly electricity production. In addition to the measurement system, Murat HEPP production will be cross-checked from EPIAŞ/TEİAŞ-approved records.

⁹ The OSF Records are the Forms titled "TEİAŞ G.D.A. YÜK TEVZİ İŞLETME MÜDÜRLÜĞÜ BÖLGESİNDEKİ SANTRALLERİN AYLIK ÜRETİM, PUANT VE ÇALIŞMA SAATİ BİLGİLERİ" meaning "MONTHLY GENERATION, PEAK AND WORKING HOURS OF THE POWER PLANTS IN THE REGION OF TEİAŞ G.D.A. LOAD DISPATCH OPERATION DIRECTORATE" This is the official form of agreement related to net electricity generation between the project proponent and grid operator represented as TEİAŞ or EPIAŞ .

		<table><tr><th>Meter</th><th>Serial Number</th><th>Calibration Done On</th><th>Valid Until</th><th>Type</th></tr><tr><td>Main Meter (Old)</td><td>424740</td><td>2012</td><td>2022</td><td>Elster A1500</td></tr><tr><td>Spare Meter (Old)</td><td>424741</td><td>2012</td><td>2022</td><td>Elster A1500</td></tr><tr><td>Main Meter (New)</td><td>9798700</td><td>2020</td><td>2030</td><td>EMH LZQJ-XC</td></tr><tr><td>Backup Meter (New)</td><td>9798701</td><td>2020</td><td>2030</td><td>EMH LZQJ-XC</td></tr></table> All four meters are in compliance with the host country calibration regulations /27/ which refer calibration frequency as once in 10 years. Data will be used to calculate net electricity supplied to the grid. Hence validation team can conclude that the monitoring plan is complying with the applied methodology i.e. ACM 0002 version 22.0 and project participant is able to implement the monitoring plan.	Meter	Serial Number	Calibration Done On	Valid Until	Type	Main Meter (Old)	424740	2012	2022	Elster A1500	Spare Meter (Old)	424741	2012	2022	Elster A1500	Main Meter (New)	9798700	2020	2030	EMH LZQJ-XC	Backup Meter (New)	9798701	2020	2030	EMH LZQJ-XC
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Backup Meter (New)	9798701	2020	2030	EMH LZQJ-XC																							
5	EG _{PP-net, y} (MWh) Quantity of the net electricity supplied to the grid by the power plant, in year y	Justification for the compliance: The Primary source of data will be the Main TEIAS meter recorded at the monthly reading protocols, the column related to electricity exported/imported from the Grid. Data will be calculated as a difference between EG_{PP, Import, y} and EG_{PPExport, y}. EG_{PP-net, y}= EG_{PP-export, y}- EG_{PP-import, y} Measurements for export/import are to be made by electricity meters. That belong to the grid operator TEIAS. Recorded continuously, reported monthly on TEIAS Meter Reading Protocols, Reported annually on the VCS Monitoring Report. Main Electricity Meter: EMH LZQJ-XC -Serial Number: 9798700 Back-up Electricity Meter: EMH LZQJ-XC -Serial Number: 9798701 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market. They have an accuracy class of Class 002 indicating an accuracy range of 0.2%. Measurements are carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The accuracy of the meters is ±0.2%. The monthly reported meter readings by the main meter with serial number 9798700 will be cross-checked against the backup meter that																									

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The responsibilities and authorities for project management, procedures for monitoring and reporting, and QA/QC procedures have been systematically established and formalized. Data will be archived electronically until 2 years after the end of the crediting period.

Details of the data collection and frequency of data recording and associated formats are described and observed to be adequate. The monitoring plan will give opportunity for real measurements of emission reductions that will be accrued.

The monitoring plan and the QA/QC procedure would ensure the accurate monitoring of the data/parameters mentioned in the VCS PD throughout the implementation of the project activity. The validation team confirms that the monitoring procedures mentioned are best as per Industry norms.

Opinion: The assessment team confirms that:

- (a) The monitoring plan mentioned in VCS PD is in compliance with the applied methodology ACM 0002 version 22.0;

(b) Based on the on-site interview and document review, the assessment team confirms that monitoring arrangements described in the monitoring plan are feasible within the project design;

(c) Based on the on-site interview and document review, the assessment team confirms that project participant deputed the competent personal to execute the monitoring approach and to follow the monitoring plan.

3.4 Non-Permanence Risk Analysis

The project activity does not require a non-permanence risk analysis. Hence this is not applicable.

4 VALIDATION OPINION

4.1 Validation Summary

Clearly Murat HEPP Energy Electricity Generation and Trade Inc. has commissioned “4K Earth Science Private Limited” to carry out the Validation of the VCS registered project “Murat HEPP” (VCS Ref. ID 1344) in Turkey for renewal of crediting period, with regard to the relevant requirements of VCS Standard Version 4.7 /08/.

Murat HEPP Energy Electricity Generation and Trade Inc. has constructed Murat HEPP (HPP) on the Göksu River, within the jurisdiction of Besni Town of Adıyaman Province. The purpose of the project is electricity production using the potential energy of Göksu River and solar components as a renewable resource. The capacity of Murat HEPP is 48.81 MW, (Murat-1 generators each 8,410 kW, Murat-2 generators 3416 kW each in total 25,230 kW and 10,248 kW and solar addition is 12,006 MWm. The project capacity has been verified from the commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/. The project originally commissioned in 05/10/2012 and PV addition commissioned on 20/07/2023 as verified from the commissioning certificate /16/. Since this date, there has been no event that would hinder the implementation of the project, except for minor maintenance activities which has been discussed during the on-site audit with the PP's representative.

During the 2nd crediting period, the project is expected to produce 168,390 MWh electricity and a total amount of 75,362 tonnes of CO₂e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 753,620 tCO₂e.

4.2 Validation Conclusion

Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated verified emission reductions (VERs).

A risk-based approach has been followed to perform this validation (renewal of crediting period). In the course of the validation 8 Corrective Action Requests (CAR) and 17 Clarification Requests (CL) were raised and successfully closed out. No FAR was raised during this validation and neither there is any pending FAR from the last Verification of 1st crediting period which needs to be addressed.

The validation is based on the revised VCS PD, additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and supporting documents made available to the validation team by project proponent.

The objective of this validation (renewal of crediting period) activity is to have an independent third party for the assessment of the revised project design, estimated ER sheet and to ensure a thorough assessment of the project activity against the applicable CDM and VCS requirements. As a result of the validation, the validation team confirms that:

- The project complies with the validation criteria for projects set out in VCS Version 4.
- The project is in line with all relevant VCS requirements.
- The project additionality is sufficiently demonstrated with respect to regulatory surplus as section 3.6.15 of VCS Standard Version 4.7.
- The validity of the original baseline scenario is sufficiently demonstrated as per section 3.6.15 of VCS Standard Version 4.7.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology ACM0002, Version 22.0.
- The calculation of the Baseline emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 753,620 tCO₂e is most likely to be achieved within the 10 years of second crediting period.
- The projects compliance with the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria.

The review of the project design and the subsequent follow-up interviews have provided 4KES with sufficient evidence to determine the project's fulfilment of all the above stated criteria. No restrictions or uncertainties were identified related to the validation.

Therefore, 4KES is able to certify that the project is in full compliance with the VCS Standard Version 4.7 and recommend registration (renewal of crediting period) of the project activity.

Crediting period: From 05-October 2022 to 04-October-2032

Validated estimated GHG emission reductions and carbon dioxide removals for the project crediting period:

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated reduction VCU (tCO ₂ e)	Estimated removal VCU (tCO ₂ e)	Estimated total VCUs (tCO ₂ e)
05-October-2022 – 31-December-2022	18,169	0	0	18,169	0	18,169
01-January-2023 to 31-December-2023	75,362	0	0	75,362	0	75,362
01-January-2024 to 31-December-2024	75,362	0	0	75,362	0	75,362
01-January-2025 to 31-December-2025	75,362	0	0	75,362	0	75,362
01-January-2026 to 31-December-2026	75,362	0	0	75,362	0	75,362
01-January-2027 to 31-December-2027	75,362	0	0	75,362	0	75,362
01-January-	75,362	0	0	75,362	0	75,362

2028 to 31-December-2028						
01-January-2029 to 31-December-2029	75,362	0	0	75,362	0	75,362
01-January-2030 to 31-December-2030	75,362	0	0	75,362	0	75,362
01-January-2031 to 31-December-2031	75,362	0	0	75,362	0	75,362
01-January-2032 to 04-October-2032	57,193	0	0	57,193	0	57,193
Total	753,620	0	0	753,620	0	753,620

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Not Applicable. There is no commercially sensitive information that needs to be excluded from the public version of the VCS PD to be displayed on the VCS Project Database.

Section	Information	Justification	Assessment method and conclusion
Not Applicable	Not Applicable	Not Applicable	Not Applicable

APPENDIX 2: REFERENCES

S. No.	Name of document	Details
/1/	Draft VCS PD	Version 1, dated 30/05/2024
/2/	Final VCS PD	Version 1.4, dated 03/05/2025
/3/	Draft ER spread-sheet	Corresponding to PD Version 1
/4/	Final ER spread-sheet	Corresponding to PD Version 1.3
/5/	CDM Validation and Verification Standard for project activity CDM Project Standard for project Activities	Version 03.0 Version 03.0
/6/	Approved CDM Methodology ACM0002: Grid-connected electricity generation from renewable sources - Version 22.0	31/05/2024
/7/	VCS Verified Carbon Standard: VCS Program Guide, VCS Version 4.0	-
/8/	VCS Verified Carbon Standard: VCS Standard, v4.7	-
/9/	VCS Verified Carbon Standard: Registration and Issuance Process Version 4.0	-
/10/	VCS Verified Carbon Standard: Validation and Verification Manual, Version 3.2	-
/11/	1 st Crediting period docs; - Registered PDD - Validation Report by RINA	Version 4, dated 19/02/2013 Version No. 1.2 Aa, dated 23/04/2014
/12/	VCS Project Description Template	Version 4.0

	https://verra.org/project/vcs-program/rules-and-requirements/	
/13/	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	Version 3.0.1
/14/	Tool to calculate the emission factor for an electricity system	Version 07.0
/15/	Grid emission factor calculation for turkey (Official data provided by Turkish Ministry of Energy and Natural Resources published on 18/03/2024 ¹⁰)	-
/16/	Commissioning Certificate dated 05/10/2012 for PV addition on 20/07/2023	-
/17/	Technical Specifications for Turbine, Generator and Panels	-
/18/	Photos of Turbine, Generator, Energy meters, fish passage, Monitoring, transmission etc.	-
/19/	Single line diagram	-
/20/	Electricity Production License issued by Energy Market Regulatory Agency (EMRA) dated 29/01/2009 (Valid for 49 years)	-
/21/	Common Practice Evaluation	Corresponding to PD Version 1.3
/22/	Declaration for non-Participation under Other GHG Programs	-
/23/	Map for the area of the reservoir	-
/24/	Feasibility -initial dated June 2009 Feasibility-solar dated 21/08/2020	-
/25/	Picture of the fish passage.	-
/26/	Water Usage Agreement co-signed with DSI (DSI Water usage Agreement)	17/10/2008
/27/	Periodic calibration is indicated as 10 years in article 9 of the regulation ¹¹	-
/28/	Connection agreement with TEIAS dated 21/01/2010	-
/29/	System Usage Agreement	21/01/2010

¹⁰

https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUES EmisyonFktr/Belgeler/TUESEF_Bilgi_Formu.pdf

¹¹

<https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=6381&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5>

/30/	EIA Exemption Certificate issued on 22/04/2009, for solar 29/09/2021	-
/31/	ISO Certifications	-
/32/	Tool to calculate the emission factor for an electricity system	Version 06.0
/33/	IRR Assessment	Corresponding to PD Version 1.3
/34/	Loan Agreement Payment Plan	18/09/2020
/35/	World Bank Report for Benchmark	01/05/2009
/36/	Alfa Solar Panel Agreement	20/08/2020
/37/	Construction Contract CCT Energy	01/06/2021
/38/	Construction Contract Eliss Energy	05/10/2020
/39/	SDG Contribution Evidences (donations to villagers, sports club)	
/40/	Meter Change Document	26/09/2020
/41/	Employee List	
/42/	Verification Report by EPIC v1.1	01/09/2023
/43/	Panel washing evidences and water amount	-
/44/	Lawyer declaration on Expropriation	-
/45/	Logbooks declaration by Muhtars	-

APPENDIX 3: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR)

Table 1. Remaining FAR from validation and/or previous verification

No FARs from previous validation/verification activities.

FAR ID		Section no.		Date:
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Description of FAR	
-	
Project participant response	Date:
Documentation provided by project participant	
VVB assessment	Date:

Table 2. CL from this validation

CL ID	1	Section no.	1.1	Date: 17/09/2024
Description of CR				
In PDD, the installed capacity is 35,478 MWe but this is not in line with license and acceptance				
Project participant response				Date: 19/09/2024
Please see version 1.1 of the PDD where we explained the reference of the CAP _{pl} /installed capacity value being the summation of the values indicated on the installed turbine generator equipment's' name plates. This value is only 0.15 MWe (150 kWe) less than the values estimated at the EMRA license and the Acceptance records. Although this is not 100% inline with only a 0,42 Percent difference the real value is the one indicated over the name plates. The Acceptance letters and the EMRA licence indicate a slightly larger number to be accurate we have used that of the name plates. And presented name plates as Appendix 4 in the version 1.1 of the PDD.				
Documentation provided by project participant				
Version 1.1. of the PDD and Name Plate Pictures				
VVB assessment				Date: 24/09/2024
<u>It is explained how the capacity is calculated and where it is referred to. Finding closed.</u>				

CL ID	2	Section no.	1.2	Date: 17/09/2024
Description of CR				
Please provide latest VER report by "EPIC Sustainability Services Private Limited"				
Project participant response				Date: 19/09/2024

You can Download the Latest verification Report from the following link at the registry: https://registry.terra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=108409&IDKEY=j0e98hfalksuf098fnsdalfkjoijmn4309JLKJFjlaksjfla9I149496011	
Documentation provided by project participant	
VERIFICATION REPORT OF "MURAT HEPP PROJECT" Version 1.1	
VVB assessment	Date: 24/09/2024
<u>Finding closed. Document provided.</u>	

CL ID	3	Section no.	1.10	Date: 17/09/2024
Description of CR				
In PDD section 1.10 CP1 And CP2 dates are not clearly stated				
Project participant response				Date: 19/09/2024
Corrected Please see version 1.1 of the PDD				
Documentation provided by project participant				
version 1.1 of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. CP dates stated.</u>				

CL ID	4	Section no.	1.1	Date: 17/09/2024
Description of CR				
Please show reference for calculations for "18,000 MWh"				
Project participant response				Date: 19/09/2024
As explained in the PDD Version 1.1, Section 1.1: the calculation is an extrapolation of the 20 % more capacity producing 20 % more energy taken from the number declared at the feasibility report for Solar PV addition as an auxiliary power source. The Feasibility report was prepared for 10 MWs producing 15,000 MWh; but, the Authorities allowed 2 more MWs and this 20 % increase corresponds to an addition of 20 % more electricity as 3000 MWh and the sum is 18'000 MWh.				
Documentation provided by project participant				
Version 1.1. of the PDD and Feasibility report dated 21.08.2020 for the auxiliary solar power source.				
VVB assessment				Date: 24/09/2024

It is explained how the capacity is calculated and where it is referred to. Finding closed.

CL ID	5	Section no.	1.1	Date: 17/09/2024
Description of CR				
Please provide equipment plate photos				
Project participant response				Date: 19/09/2024
Provided also added to the PDD as Appendix 4				
Documentation provided by project participant				
Equipment Plate Photos and Version 1.1. of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Document provided.</u>				

CL ID	6	Section no.	1.1	Date: 17/09/2024
Description of CR				
The former and current capacities and installed powers is not clear in PDD				
Project participant response				Date: 19/09/2024
The addition of the Solar Power arrays have not changed the electric capacity of the project activity but the mechanical capacity, this is explained in the version 1.1 of the PDD by adding the following paragraph: "This addition did not affect the electric capacity of the project activity which remains same as the previous crediting period. However, the mechanical capacity has increased from 36.80 to a total number of 48.81 MWm with the addition of the Solar Power Unit, planning to generate 18,000 MWh of electricity per year using this additional renewable resource." (See Section 1.1 of the version 1.1 of the PDD)				
Documentation provided by project participant				
Version 1.1. of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Capacity definition is clarified.</u>				

CL ID	7	Section no.	1.18	Date: 17/09/2024
Description of CR				
No evidence provided for scholarships				

Project participant response	Date:19/09/2024
We could not find the evidence therefore we have omitted this item from the PDD.	
Documentation provided by project participant	
Version 1.1. of the PDD	
VVB assessment	Date: 24/09/2024
<u>Finding closed. Statement removed.</u>	

CL ID	8	Section no.	1.1	Date: 17/09/2024
Description of CR				
Please explain in PDD the baseline scenario for solar portion				
Project participant response				Date: 19/09/2024
Prior to the implementation of the Solar PV arrays the land was not used for other purposes (such as agriculture etc.) and this is explained in the version 1.1 of the PDD section 1.1 with the addition of the following sentence: "The installation of this power unit took place on the site of Murat HEPP; the land used for PV installations was within the project boundary and was not suitable for other land use, such as agriculture or animal grazing, and there was no further need for expropriation. As a result, the commissioning of the Auxiliary Source Solar Power Unit occurred on 20.07.2023. The energy generated by this unit is transmitted to the grid through the same meters and switchyard." The addition of the solar PV is not effecting the baseline scenario related to the implementation of the project activity.				
Documentation provided by project participant				
Version 1.1. of the PDD (see page 5)				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Statement added.</u>				

CL ID	9	Section no.	3.1	Date: 17/09/2024
Description of CR				
Please explain why the latest version of methodology and tools are not used				
Project participant response				Date: 19/09/2024
We have updated the PDD after checking the latest version of the Methodology and tools even though the project is a registered project and have seen that the latest version of the methodology and the tools doesn't bring any alteration. Thus, we have updated the versions but we have not updated the standard version as the project is registered under VCS version 3.3 and is eligible for a crediting period renewal as claimed under the registered PDD under this particular version (VCS version 3.3).				

Documentation provided by project participant	
Version 1.1. of the PDD	
VVB assessment	Date: 24/09/2024
<u>Finding closed. Tools updated.</u>	

CL ID	10	Section no.	4.1	Date: 17/09/2024
Description of CR				
Please clarify why the latest published official TEIAS CM value is not used and if CM is changed revise “Data and Parameters Available at Validation” section, else update the section with most up to date data				
Project participant response				Date: 19/09/2024
We have updated the EF_{CM} according to the most recently published EF_{CM} of the host country and updated the relevant sections in the PDD. Considering it is a CPR we have used the registered PDD’s EF_{CM} with only updating the Weighted averages of EF_{OM} and EF_{BM} . But in the version 1.1 we have updated the PDD to the most UpToDate officially issued EF_{CM} .				
Documentation provided by project participant				
Version 1.1. of the PDD and Version 1.1. of the ER Excel sheet				
VVB assessment				Date: 24/09/2024
<u>Finding closed. CM updated.</u>				

CL ID	11	Section no.	3.5	Date: 17/09/2024
Description of CR				
In common practice analyses please summarise in what sense the similar projects are identified.				
Project participant response				Date: 19/09/2024
The similarities are determined as privately owned power plants with a capacity within the range common practice analysis.				
Documentation provided by project participant				
Version 1.1. of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Definition expanded.</u>				

CL ID	12	Section no.	3.5	Date: 17/09/2024
Description of CR				
Investment decision date is not stated in additionality section				
Project participant response				Date: 19/09/2024
We have added the investment decision dates of both the hydro and solar components. Please see page 58 of the PDD version 1.1.				
Documentation provided by project participant				
Version 1.1. of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Date defined and reference provided.</u>				

CL ID	13	Section no.	1.1	Date: 17/09/2024
Description of CR				
Timeline not provided in PDD				
Project participant response				Date: 19/09/2024
We have added a timeline at the end of section 1.1 Please see Version 1.1. of the PDD.				
Documentation provided by project participant				
Version 1.1. of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Timeline added.</u>				

CL ID	14	Section no.	3.5	Date: 17/09/2024
Description of CR				
In sensitivity analyses please comment on the values that meet the benchmark				
Project participant response				Date: 19/09/2024
Added to PDD.				
Documentation provided by project participant				
Version 1.1. of the PDD				

VVB assessment	Date: 24/09/2024
<u>Finding closed. Sensitivity updated.</u>	

CL ID	15	Section no.	Site visit	Date: 17/09/2024
Description of CR				
Please provide evidence that “expropriation has been %100 complete” as stated during site visit.				
Project participant response				Date: 19/09/2024
When we consulted to the project owners legal consultant although majority of the process was settled we learned that there were still ongoing cases, this situation is explained with a relatively detailed explanation in the PDD on page 41, section related to property rights.				
Documentation provided by project participant				
The testimony of the legal advisor to the project. And the PDD				
VVB assessment				Date: 24/09/2024
<u>Declaration by PP lawyer has been provided. VVB also interviewed stakeholders during site visit. Finding closed.</u>				

CL ID	16	Section no.	Site visit	Date: 17/09/2024
Description of CR				
In PDD the usage of water to wash the panels is not mentioned.				
Project participant response				Date: 19/09/2024
We have added a paragraph explaining water usage.				
Documentation provided by project participant				
Pannel washing procedural explanation by the Project owner, with pictures from the site And the PDD				
VVB assessment				Date: 24/09/2024
<u>Parameter added to PDD. Finding closed.</u>				

CL ID	17	Section no.	Site visit	Date: 17/09/2024
Description of CR				
As the muhtars of villages could not attend the site visit meeting due to the funeral, please clarify if logbooks have been distributed to stakeholders and if there are any comments in them.				

Project participant response	Date: 19/09/2024
A testimony is provided	
Documentation provided by project participant	
Testimony of Village heads (Muhtars).	
VVB assessment	Date: 24/09/2024
<u>Declarations from muhtars provided. Finding closed.</u>	

Table 3. CAR from this validation

CAR ID	1	Section no.	1.1	Date: 17/09/2024
Description of CAR				
The project title is not in line with registry				
Project participant response				Date: 19/09/2024
The title in the registry is made up of the name of the project and a shorthand for Hydro Electric Power Plant. Therefore, we used this title as the main title and changed the other title in the relevant places as "Murat HEPP". Please see version 1.1 of the PDD.				
Documentation provided by project participant				
Version 1.1. of the PDD				
VVB assessment				Date: 24/09/2024
<u>Finding closed. Title updated.</u>				

CAR ID	2	Section no.	1.1	Date: 17/09/2024
Description of CAR				
VCS Standard Version is not the latest available				
Project participant response				Date: 19/09/2024
The project is registered under VCS version 3.3 and is eligible for a CPR under this version as such we kept the version of PDD.				
Documentation provided by project participant				

WB assessment	Date: 24/09/2024
<u>Finding closed. Explained.</u>	

CAR ID	3	Section no.	1.4.1	Date: 17/09/2024
Description of CAR				
The font and format of section 1.4.1 of PDD is not in line with PDD template, please check all PDD.				
Project participant response				Date: 19/09/2024
Corrected Please see Version 1.1. of the PDD				
Documentation provided by project participant				
Version 1.1. of the PDD				
WB assessment				Date: 24/09/2024
<u>Finding closed. Fixed.</u>				

CAR ID	4	Section no.	annex	Date: 17/09/2024
Description of CAR				
Annex 2 has no title, Annex 3 format is corrupted and annexes not correctly stated in “contents”, all annexes not mentioned in “contents”				
Project participant response				Date: 19/09/2024
All the Annexes have been renamed as APPENDICES and re-arranged and properly formatted.				
Documentation provided by project participant				
Version 1.1. of the PDD				
WB assessment				Date: 24/09/2024
<u>Finding closed. Fixed.</u>				

CAR ID	5	Section no.	4.3	Date: 17/09/2024
Description of CAR				
CM calculation does not consider days of CP				
Project participant response				Date: 19/09/2024

ER Calculation Sheet and the relevant sections in the PDD have been revised to reflect day calculation omitting the dates outside crediting period.

Documentation provided by project participant

Version 1.1. of the PDD and Version 1.1. of the ER Calculation Excel Sheet

WB assessment

Date: 24/09/2024

Finding closed. Fixed.

CAR ID	6	Section no.	4.3	Date: 17/09/2024
Description of CAR				
Loan amount "\$41,791,523" is not found in loan agreement				
Project participant response				Date: 19/09/2024
The number is corrected in the financial analysis to be in line with the loan reference. The PDD is also updated				
Documentation provided by project participant				
Version 1.1. of the PDD and Version 1.1. of the Financial Analysis Excel Sheet				
WB assessment				Date: 24/09/2024
<u>Finding closed. Fixed.</u>				

CAR ID	7	Section no.	4.3	Date: 17/09/2024
Description of CAR				
CM info in IRR excel are not up to date				
Project participant response				Date: 19/09/2024
Corrected				
Documentation provided by project participant				
Version 1.1. of the IRR excel and the Version 1.1. of the ER Calculation Excel.				
WB assessment				Date: 24/09/2024
<u>Finding closed. Fixed.</u>				

CAR ID	8	Section no.	Site visit	Date: 17/09/2024
Description of CAR				
In PDD module number stated as 3 but 5 seen on site				
Project participant response				Date: 19/09/2024
Corrected in PDD				
Documentation provided by project participant				
-				
VWB assessment				Date: 24/09/2024
<u>Finding closed. Fixed.</u>				

Table 4. FAR from this validation

NO FARs raised during this validation.

FAR ID		Section No.		Date:
Description of FAR				
-				
Project participant response				Date:
Documentation provided by project participant				
VWB assessment				Date:

APPENDIX 4: COMPETENCE OF TEAM MEMBERS

<u>Certificate of Competence</u>							
Name	☐ Mr. ☒ Ms.	Fikriye Seda Atabek					
Qualification Procedure	Fulfil the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GCC/GHG Projects.						
Appointed to work as:							
	Validator/ Verifier	Team Leader	Trainee	Technical Expert	Technical Reviewer	Financial Expert	Approver
Appointed	Yes	Yes	No	Yes	No	No	No
Appointed Date	04-09-2024						
Authorized to work as Technical Expert for:							
Authorized Technical Area	Sectoral Scope		TA Code		Technical Area within the scope		
	Energy industries (renewable - / non-renewable sources)		1.2		Renewables		
Authorized to work as Local Expert for:							
Country/Countries	Turkey						
Compliance check by:				Anand S R			

<u>Certificate of Competence</u>							
Name	☒ Mr. ☐ Ms.	Chetan Swaroop Sharma					
Qualification Procedure	Fulfil the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GCC/GHG Projects.						
Appointed to work as:							
	Validator/ Verifier	Team Leader	Trainee	Technical Expert	Technical Reviewer	Financial Expert	Approver
Appointed	Yes	Yes	No	Yes	Yes	No	Yes
Appointed Date	15-07-2023						
Authorized to work as Technical Expert for:							
	Sectoral Scope		TA Code		Technical Area within the scope		

Authorized Technical Area	Energy industries (renewable - / non-renewable sources)	1.1	Thermal energy generation
	Energy industries (renewable - / non-renewable sources)	1.2	Renewables
	Energy distribution	2.1	Energy distribution
	Energy demand	3.1	Energy demand
	Waste handling and disposal	13.1	Solid waste and wastewater
	Waste handling and disposal	13.2	Manure
Authorized to work as Local Expert for:			
Country/Countries	India		
Compliance check by:		Anand S. R.	

<u>Certificate of Competence</u>							
Name	☒ Mr. ☐ Ms.	Rohit Badaya					
Qualification Procedure	Fulfil the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GCC/GHG Projects.						
Appointed to work as:							
	Validator/ Verifier	Team Leader	Trainee	Technical Expert	Technical Reviewer	Financial Expert	Approver
<i>Appointed</i>	Yes	Yes	No	Yes	Yes	No	No
<i>Appointed Date</i>	15-07-2023						
Authorized to work as Technical Expert for:							
Authorized Technical Area	Sectoral Scope		TA Code	Technical Area within the scope			
	Energy industries (renewable - / non-renewable sources)		1.1	Thermal energy generation			
	Energy industries (renewable - / non-renewable sources)		1.2	Renewables			
	Energy distribution		2.1	Energy distribution			
	Energy demand		3.1	Energy demand			
	Waste handling and disposal		13.1	Solid waste and wastewater			
	Waste handling and disposal		13.2	Manure			
Authorized to work as Local Expert for:							
Country/Countries	India						
Compliance check by:							
Anand S. R.							

APPENDIX 5: ABBREVIATIONS

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
EB	Executive Board
EISA	Environmental and Social Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel for Climate Change
ISO	International Organization for Standardization
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	Mega Watt hour
PD	Project Description
PP	Project proponent
QA/QC	Quality Assurance/Quality Control
tCO ₂	Tonnes of Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit