



**Verified Carbon
Standard**

KOYULHISAR HYDRO ELECTRICITY POWER PLANT



Document Prepared By: 4K Earth Science Private Limited

Project Title	Koyulhisar Hydro Electricity Power Plant
Version	03
Report ID	2106: VCS

Report Title	Koyulhisar Hydro Electricity Power Plant
Client	Aydem Yenilenebilir Enerji A.Ş.
Date of Issue	16-11-2021
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Summary:

Aydem Yenilenebilir Enerji A.Ş. has commissioned “4K Earth Science Private Limited” to carry out the Validation of the VCS registered project “Koyulhisar Hydro Electricity Power Plant” (VCS Ref. No. 713) in Turkey for renewal of crediting period, with regard to the relevant requirements of VCS Standard Version 4.1 /08/.

Aydem Yenilenebilir Enerji A.S.¹ has constructed Koyulhisar Hydro Electric Power Plant (HPP) on the Kelkit Stream, within the jurisdiction of Koyulhisar Town of Sivas Province. The project is located at the Central Anatolian geographical region of Turkey at the Sivas Province. The purpose of the project is electricity production using the

potential energy of Kelkit Stream as a renewable resource. The capacity of Koyulhisar HPP is 63 MW, with 3 vertical axis Francis turbines of 21 MW each. One of these three turbines is installed as a standby unit, intended to operate only whenever one of the other two turbines will not be operating for the purpose of maintenance and repair. The project commissioned in 17/11/2019. Since this date, there has been no event that would hinder the implementation of the project, except for minor maintenance activities

During the 2nd crediting period, the project is expected to produce 193,574 MWh electricity and a total amount of 89,179 tonnes of CO₂e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 891,790 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 02 Corrective Action Requests (CAR) and 02 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

¹ Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019.

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 4.1 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 3.8.9 of VCS Standard Version 4.1.
- The validity of the original baseline scenario is sufficiently demonstrated as per section 3.8.9 of VCS Standard Version 4.1.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology ACM0002, Version 20.0.
- The calculation of the Baseline emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 891,790 tCO₂e is most likely to be achieved within the 7 years of first 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.

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1 INTRODUCTION

1.1 Objective

4KES has been contracted by “Aydem Yenilenebilir Enerji A.Ş.” to undertake the validation of the VCS registered project titled “Koyulhisar Hydro Electricity Power Plant” (VCS ID 713) in Turkey for renewal of crediting period, with regard to the relevant requirements of VCS Standard Version 4.1 /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 4.1 /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 4.1 /08/ and VCS program guide 4.0 /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 4.1 /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 4.1 /08/, VCS program guide 4.0 /07/ and the approved baseline and monitoring CDM methodology ACM0002, Version 20.0 /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 Level of Assurance

The validation report is based on revised VCS-PD /02/, Monitoring plan, supporting documents made available to the validator and information collected through performing interviews during the remote audit. Based on the process and procedures conducted, 4KES states with a reasonable level of assurance that information in the revised 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 methodology 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

Aydem Yenilenebilir Enerji A.Ş.² has constructed Koyulhisar Hydro Electric Power Plant (HPP) on the Kelkit Stream, within the jurisdiction of Koyulhisar Town of Sivas Province. The project is located at the Central Anatolian geographical region of Turkey at the Sivas Province. The purpose of the project is electricity production using the potential energy of Kelkit Stream as a renewable resource. The capacity of Koyulhisar HPP is 63 MW, with 3 vertical axis Francis turbines of 21 MW each. The project capacity has been verified from the commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/. One of these three turbines is installed as a standby unit, intended to operate only whenever one of the other two turbines will not be operating for the purpose of maintenance and repair. The project commissioned in 17/11/2019 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 remote audit with the PP's representative.

Based on the project description in the VCS PD /02/, remote 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 since the registration (for 1st crediting period) of the project activity.

² Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019.

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 remote 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 4.1 /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 first verification of the project activity.

Duration of Validation:

Verification Contract	13/01/2021
Remote audit	25/06/2021
Findings raised	26/06/2021
Draft Verification Report	11/07/2021
Final Verification Report	16/11/2021

2.2 Document Review

The validation team has conducted the validation using the VCS Standard and the applied methodology ACM0002, Version 20.0 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 4.1 /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 20.0 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 07/06/2021 /01/ was initially reviewed and the PP 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 1.02, dated 15/11/2021) /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 1.02 dated 15/11/2021) 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

Due to nationwide lockdown due to COVID-19 spread, Validation team could not conduct the site visit. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the validation team performed the Zoom remote interview with the PP representative, site person and consultant and reviewed documents to achieve a reasonable level of assurance in the validation. This is in line with Section 4.1.2 of the VCS Standard, v4.1 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications. No sampling procedures were adopted. Kindly find below names of the persons interviewed (Zoom remote interview).

Location	The project is located at the Central Anatolian geographical region of Turkey at the Sivas Province. The following are the exact coordinates of the main project structures, as shown in the following Table: Location of the project
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		Latitude	Longitude
	Power House	40° 16'13.48"N	37° 50'55.58"E
	Switch Gear	40° 17'28.28"N	38° 26'27.58"E
	The Location of the project has been checked form the web (https://www.latlong.net/) and found consistent.		
Dates	25/06/2021 (Zoom interview)		
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	Hasim Bedir	Regional Manager, Aydem Yenilebilir Enerji A.S.	
	İhsan Seker	Plant Manager, Aydem Yenilenebilir Enerji A.S.	
	Nuri Çevik	Electrical Technical Chief, Aydem Yenilenebilir Enerji A.S.	
	Özgün Gül Koparan	Environmental Relations Manager, Aydem Yenilenebilir Enerji A.S.	
	Sultan Tunçbilek	Environmental Relations Specialist, Aydem Yenilenebilir Enerji A.S.	
	Fatih Peker	Sustainability, OHS, IMS and Environment Manager, Aydem Yenilenebilir Enerji A.S.	
	Durmuş Görkem Kurt	Coordination Engineer, Aydem Yenilenebilir Enerji A.S.	
	Dr. G. Aslı Sezer Ozcelik	Manager, Ekobil Environmental Services and Consultancy Ltd.	
	Barış Kayalı	Self-employment, Villager	
	Suat Erdem	Self-employment, Villager	

2.4 Site Inspections

Due to nationwide lockdown due to COVID-19 spread, Validation team could not conduct the site visit. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the validation team performed the Zoom remote interview with the PP representative, site person and consultant and reviewed documents to achieve a reasonable level of assurance in the validation. This is in line with Section 4.1.2 of the VCS Standard, v4.1 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications.

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 02 CAR and 02 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

Aydem Yenilenebilir Enerji A.Ş.³ has constructed Koyulhisar Hydro Electric Power Plant (HPP) on the Kelkit Stream, within the jurisdiction of Koyulhisar Town of Sivas Province. The project is located at the Central Anatolian geographical region of Turkey at the Sivas Province. The purpose of the project is electricity production using the potential energy of Kelkit Stream 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 Koyulhisar Hydro Electric Power Plant (HPP) are delaying the addition of conventional thermal power plants to the Turkish National Electricity Grid.

The capacity of Koyulhisar HPP is 63 MW, with 3 vertical axis Francis turbines of 21 MW each. The project capacity has been verified from the commissioning certificate /16/, technical

³ Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019.

specification of the project equipment /17/, Photos /18/ and Production license /20/. One of these three turbines is installed as a standby unit, intended to operate only whenever one of the other two turbines will not be operating for the purpose of maintenance and repair. The project commissioned in 17/11/2019 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 remote audit with the PP's representative.

Koyulhisar HPP with 63 MW installed capacity, is connected to the Turkish National Power Grid via one of Transformer Substations by 80 km long 154 kV transmission line, at the Köklüce HPP. Transmission system has been verified from the single line diagram and also from the remote audit interview.

Based on the project description in the VCS PD /02/, remote 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 since the registration (for 1st crediting period) of the project activity.

The project participants involved in the projects are as per below tables.

Project participant:

Organization name	AYDEM YENİLENEBİLİR ENERJİ A.Ş. ⁴
Contact person	Özgün Gül Koparan
Title	Environmental Affairs Manager
Address	Adalet Mah. Hasan Gönüllü Bulvarı No:15-1 Merkezefendi Denizli/Turkey
Telephone	+90 258 242 27 76
Email	ozgun.gulkoparan@aydemenerji.com.tr

Other Entities Involved in the Project:

Organization name	Ekobil Environmental Services and Consulting Ltd ⁵
Role in the project	Preparation of the Project Design Document
Contact person	G. Aslı Sezer Özçelik
Title	Dr.
Address	Ahlatlıbel Mahallesi ,1839. Sk. No:56 Çankaya-Ankara-Turkey

⁴Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019. Therefore, the contact person also changed. Please see Annex 2.

⁵Registered to the Ankara Chamber of Trade, with the full name of "Ekobil Çevre Hizmetleri Danışmanlık Eğt.Tar. Hayv. Mad. İnş. İth. İhr.Tur. ve Tic. Ltd. Şti

Telephone	+90 312 489 13 38
Email	info@ekobil.com

Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. (as per registered VCS PD for 1st crediting period /11/) to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019. CL-01 has been raised in this respect and successfully closed. Validation team has checked the change of the title from the supportive document /21/ and also the updated information in the production license (the company name in the production license has updated on 06.02.2020) /20/. Hence the change is accepted to the validation team. Aydem Yenilenebilir Enerji A.Ş. has the ownership of the project plant as checked from production license /20/ for the project.

Project start date i.e. 17/11/2009 is confirmed from the commissioning certificate /16/ and found OK. This was already validated during the 1st crediting period.

As verified from the revised VCS PD/02/, 2nd crediting period is from 17/11/2019 to 16/11/2029 with the length of 10 years and the start date of 2nd crediting period is next date of the end date of 1st crediting period and hence it is acceptable. As per section 1.6 of the registered VCS PD /11/, the crediting period is renewable twice. Hence the 2nd crediting period is accepted to the validation team.

As per the registered VCS PD /11/, the operation lifetime of the project activity is considered as 20 years which will can last till the end of the 2nd crediting period.

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 4.1 /08/). There is no change in the project scale since the 1st crediting period.

During the 2nd crediting period, the project is expected to produce 193,574 MWh electricity and a total amount of 89,179 tonnes of CO₂e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 891,790 tCO₂e.

The project is located at the Central Anatolian geographical region of Turkey at the Sivas Province. The following are the exact coordinates of the main project structures, as shown in the following Table:

	Latitude	Longitude
Power House	40° 16'13.48"N	37° 50'55.58"E
Switch Gear	40° 17'28.28"N	38° 26'27.58"E

The Location of the project has been checked form the web (<https://www.latlong.net/>) and found consistent.

The project activity is in compliance with the Local Laws and regulations. EIA exemption /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 10/02/2005 (which is valid for 40 years), the company has to comply with all national, regional and local rules.

Project comes under Sectoral scopes: Energy industries (renewable - / non renewable sources) (Sectoral Scope 1). VVB have this sectoral scope to validate this project.

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.

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 remote audit.

No commercially sensitive information has been excluded from the public version of the project description as verified during the remote audit.

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

Sustainable development contributions from the project activity has been mentioned under section 1.17 of the VCS PD /02/ and found OK. Validation team has interviewed few stakeholders and did not found 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.

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

3.2.1 No Net Harm

Being a renewable project activity, No negative impacts from the project activity. According to the rules and regulations at the time of licence application for electricity production the project was given a certificate of Exemption for the EIA process, by the Sivas Provincial Directorate of Environment and Forestry. Because, at the time of licence application the Hydro Power Plants that had installed capacity lower than 50 MW⁶ was considered to be out of scope according to EIA regulation that was active during the period of application. This letter /30/ is checked by the validation team.

Also the Project activity meets all local laws and regulation of Turkey and has received the production license for 40 years /20/.

The project doesn't have any negative impact on socio-economical issues. Even, the project owner, supplied irrigation water to the local community, in coordination with the DSI. Local stakeholders were remotely interviewed and they were happy because of this support as they

⁶ The Project is first designed to be 42 MW, and the licence upgrade and a revised feasibility to add a third unit is implemented later on.

were able to grow more crops since they are able to irrigate their gardens. In addition to this the stakeholders stated that the project helped them improve their roads and also provide the local jobs.

PP has clarified the same in detail under section 2.1 of the VCS PD /02/ which is found OK.

3.2.2 Local Stakeholder Consultation

A local stakeholder consultation has been carried out on 13 November 2006 at Kılıçpınar village and invited the local inhabitants by sending invitation letters to village heads on 23rd of October 2006.

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.

The ongoing communication is undertaken through stakeholder visits to the site or direct contact via telephone. Verification team has interviewed various local stakeholders and confirm that no negative comments about the project have been received. Stakeholders tend to focus on the positive sides of the project such as creation of employment, infrastructure development etc. Stakeholders can directly visit or call the power plant when they have a problem. Remote meeting was held with stakeholders, at which stakeholders stated that they were satisfied with the project and they could easily contact the project owners whenever they wanted.

3.2.3 Environmental Impact

According to the rules and regulations at the time of licence application for electricity production the project was given a certificate of Exemption for the EIA process, by the Sivas Provincial Directorate of Environment and Forestry. Because, at the time of licence application the Hydro Power Plants that had installed capacity lower than 50 MW⁷ was considered to be out of scope according to EIA regulation that was active during the period of application. This letter /30/ is checked by the validation team.

Also the Project activity meets all local laws and regulation of Turkey and has received the production license for 40 years /20/.

3.2.4 Public Comments

As the project “Koyulhisar Hydro Electricity Power Plant” is already a VCS project, requirement of clause 3.16.5 of the VCS standard version 4.1 /08/ “All VCS projects are subject to a 30-day public comment period. The date on which the project is listed on the project pipeline marks the beginning of the project’s 30-day public comment period”. Is not applicable.

Further PP has taken the comments from the local people and project stakeholders. The forms /31/ were filled by people belonging to different occupational groups in the region. This group includes people as the headman of the region, school principal, tradesmen, general staff, employees etc. in the region.

⁷ The Project is first designed to be 42 MW, and the licence upgrade and a revised feasibility to add a third unit is implemented later on.

This group was asked questions about the social, economic and environmental impacts of the project. The questions were shared with the target group in form. Validation team has checked the filled forms /31/.

Stakeholders have no problems with the project. 1 person who had a concern about the project in the past stated that it has been resolved with the repair. 100% of the group stated that they could easily communicate with the project owners if they had any concerns about the project. The group usually prefers to communicate by phone or by visiting the power plant.

People has shared positive response about the project. 100% of the group thinks that the project provides employment to the region. Employment was provided both during the construction phase and during the operation phase. This was also confirmed from the remote interview of the stakeholders.

3.2.5 AFOLU-Specific Safeguards

Not Applicable.

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 12.1.0.

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

- ACM0002 “Grid-connected electricity generation from renewable sources” Version 20.0. It is latest version and Valid from 28 Nov 19 onwards. /06/

Other guidelines and tools referenced in these methodologies are:

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

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).

3.3.2 Applicability

Applicable criteria of the latest version of the selected baseline methodology ACM0002 Version 20.0 is assessed by the validation team by means of document review & remote audit. The project applicability was confirmed against each condition in the approved methodology by the following methods.

- ACM0002 “Grid-connected electricity generation from renewable sources” Version 20.0

Methodology Para	Applicability criteria	Applicability of the project activity	Validation Remarks
3	This methodology is applicable to grid-connected renewable energy power generation project activities that: a) Install a Greenfield power plant;	The Koyulhisar HPP project activity consists installation of a new grid connected renewable power plants at a site where no renewable power plant was operated prior to the	The project activity consists in the installation of a new grid connected renewable power plants at a site where no renewable power plant was operated

	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 e) Involve a replacement of (an) existing plant(s)/unit(s).	implementation of the project activity (green field plant)	prior to the implementation of the project activity (Greenfield power plant). Hence point (a) is applicable. Commissioning certificate /16/, Production license /20/, Initial feasibility approved /24/ and Connection agreement /28/ have been checked to confirm the same. Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.
4	The methodology is applicable under the following conditions: a). The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The project activity is the installation of a new hydropower plant.	a) The project activity is the installation of a new hydropower plant as verified during the remote interview. Commissioning certificate /16/, technical specification of project technology /17/, photos /18/, Production license /20/, Initial feasibility approved /24/ and Connection agreement /28/ have been checked to confirm the same. Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.
	b). In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity	The project activity is the installation of a new hydropower plant. It is not included capacity additions, retrofits, rehabilitations or	b) The project activity consists in the installation of a new grid connected renewable power plants at a site where

	addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and 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.	replacements of the existing plant/unit.	no renewable power plant was operated prior to the implementation of the project activity (Greenfield power plant). Hence this para is not applicable. Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.
5	In case of hydropower plants, one of the following conditions shall apply: a). The project activity is implemented in an existing single or multiple reservoir, with no change in the volume of any of the reservoir; or	The project involves construction of a new reservoir.	a) The project activity constructs a new reservoir. Hence this para is not applicable.
	b). 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/m ² ; or	The project involves construction of a new reservoir.	b) The project activity constructs a new reservoir. Hence this para is not applicable.
	c). The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m ² ; or	The project involves construction of a new single reservoir and the power density of the Koyulhisar HPP is 52 W/m ² , it is greater than 4 W/m ² .	c) The project activity results in a new reservoir and the power density of the project is 52 W/m ² . The calculation of the power density of the project activity has been checked and found OK. Hence this para is applicable.
	d). The project activity is	The project activity is not	d) The project activity

	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, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m²; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 percent of the installed capacity of integrated hydro power project.	an integrated hydropower plant	is not an integrated hydropower plant. Hence this para is not applicable. Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.
6	In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power	This project activity is not an integrated hydropower plant	The project activity is not an integrated hydropower plant. Hence this para is not applicable.

	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 five years prior to implementation of CDM project activity		Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.
7	This methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the	It is a renewable energy project with no fuel-switch and biomass fired power plant involved. The project activity is a hydropower plant.	It is a renewable energy project with no fuel-switch and biomass fired power plant involved. The project activity is the installation of new hydropower plant with a new

	continued use of fossil fuels at the site (b) Biomass fired power plants/ units		reservoir. Commissioning certificate /16/, technical specification of project technology /17/, photos /18/, Production license /20/, Initial feasibility approved /24/ and Connection agreement /28/ have been checked to confirm the same. Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.
8	In the case of retrofits, rehabilitations, 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, that is 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”.	The Koyulhisar Hydro Power Plant Project activity is the installation of a new hydropower plant.	The project activity is the installation of new hydropower plant with a new reservoir. Hence this para is not applicable. Commissioning certificate /16/, technical specification of project technology /17/, photos /18/, Production license /20/, Initial feasibility approved /24/ and Connection agreement /28/ have been checked to confirm the same. Hence the project is in compliance with latest version of the methodology ACM 0002 Version 20.0.

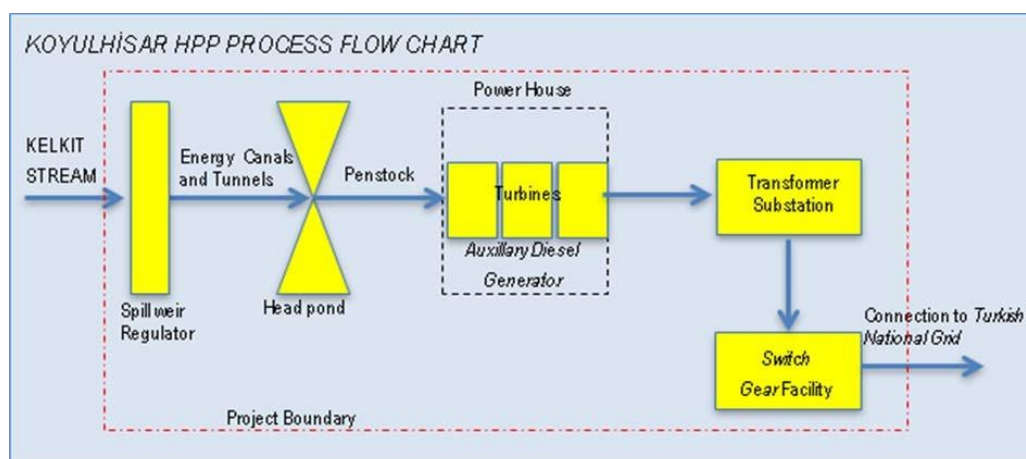
The project fulfils all relevant criteria of the applied methodology ‘ACM0002: Grid-connected electricity generation from renewable sources’ – Version 20.0. Hence, use of the selected methodology is appropriate for this project activity.

3.3.3 Project Boundary

As per para 20 of the applied Large-scale baseline methodology ACM0002 Version 20.0 /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 system⁴ that the CDM project power plant is connected to.”

The flow diagram of the project boundary is shown below.



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

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity Generation in baseline (Turkey's grid)	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	N.A	N.A
Project	Emission from the reservoir of the proposed project	CO ₂	No	Minor emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	N.A	N.A

Opinion:

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 20.0 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 4.1 section 3.8.9 /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 4.1 /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 4.1 /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 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 20.0.

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 20.0 §§ 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 Zoom 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 20.0 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 0.5403 tCO₂/MWh on September, 2020 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 Koyulhisar HPP 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

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 2 nd crediting period	Assessment
EF _{grid,y} (CO ₂ emission factor of the grid electricity in year y)	0.52826 tCO ₂ /MWh	0.4607 tCO ₂ /MWh	During the 1 st crediting period, the value of EF _{grid,y} was calculated as 0.52826 tCO ₂ /MWh even though this was not reported as ex-ante parameter.

			For 2nd crediting period, this is calculated as 0.4607 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.
EF_{grid,OM,y} (CO ₂ Operating Margin Emission Factor of the Grid (including import))	0.65689 tCO ₂ /MWh	0.6993 tCO ₂ /MWh	During the 1st crediting period, the value of EF_{grid,OM,y} was calculated as 0.65689 tCO₂/MWh. For 2nd crediting period, the value of EF_{grid,OM,y} is calculated as 0.6993 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)	0.39963 tCO ₂ /MWh	0.3812 tCO ₂ /MWh	During the 1st crediting period, the value of EF_{grid,BM,y} was calculated as 0.39963 tCO₂/MWh. For 2nd crediting period, the value of EF_{grid,BM,y} is calculated as 0.3812 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 20.0) 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

As per point no. 1 of para 3.8.9 of the VCS Standard version 4.1 /08/, “A full reassessment of additionality is not required when renewing the project crediting period. However, regulatory surplus shall be demonstrated in accordance with the requirements set out in the VCS Program rules and the project description shall be updated accordingly.”

Since “Koyulhisar Hydro Electricity Power Plant” is a VCS registered project, the reassessment of the additionality is not required for renewing crediting period. Hence PP has not updated section 3.5 of the VCS PD /02/ which is accepted to the validation team. Further the regulatory surplus has been checked and updated under section 3.5 of the VCS PD /02/ which is found OK.

Also as per the para 280 of the CDM Project Standard for Project Activities, version 02.0 /05/, “For renewal of crediting period of a registered CDM project activity, the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality”.

3.3.6 Quantification of GHG Emission Reductions and Removals

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 (L_y). 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 20.0) /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 193,574 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 0.4607 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.
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Based on the above values, the baseline emission is estimated as 89,179 tCO₂/year.

Project emission:

As per para 31 of the applied methodology ACM0002 - version 20.0, 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 20.0, 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 20.0, 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/m².

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 (m²).

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 (m²). For new reservoirs, this value is zero.

Validation team assessment: The project activity involves the construction of a new hydropower plant with capacity (Cap_{PJ}) of 63 MW (As verified from commissioning certificate/16/, Name plate capacity of turbine /18/) and a new reservoir with surface (A_{PJ}) of 1,204,040 m² (As verified from doc /19/), thus $A_{BL} = 0$ and $Cap_{BL} = 0$.

The power density of the project activity is 52 W/m².

As per para 38 of the applied methodology ACM 0002 Version 20.0, 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:

$$PE_{HP,y} = 0 \quad \text{Equation 4}$$

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 20.0, the project emission (PE_y) is zero.

$$PE_y = 0$$

Leakage:

As per the applied methodology i.e. ACM0002 Version 20.0, 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:

$$ER_y = BE_y - PE_y - L_y = 89,179 - 0 - 0 = 89,179 \text{ tCO}_2/\text{year}$$

Year	Estimated baseline emissions or removals (tCO _{2e})	Estimated project emissions or removals (tCO _{2e})	Estimated leakage emissions (tCO _{2e})	Estimated net GHG emission reductions or removals (tCO _{2e})
2019 (17 November to 31 December)	11,147	0	0	11,147
2020	89,179	0	0	89,179
2021	89,179	0	0	89,179
2022	89,179	0	0	89,179
2023	89,179	0	0	89,179
2024	89,179	0	0	89,179
2025	89,179	0	0	89,179
2026	89,179	0	0	89,179
2027	89,179	0	0	89,179
2028	89,179	0	0	89,179
2029(1 January to 16 November)	78,032	0	0	78,032
Total	891,790	0	0	891,790

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:

- a) All assumptions and data used by the project participants are listed in the PD, including their references and sources;
- b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PD;
- c) All values used in the PD are considered reasonable in the context of the proposed project activity;
- d) 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

The project monitoring plan is in compliance with the monitoring methodology ACM 0002, version 20.0 /06/. The project was originally registered applying Large scale methodology ACM 0002, version 12.1.0. For the 2nd crediting period, latest version i.e. version 20.0 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 63 MW. There is no change in the 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 20.0 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 Remote 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 20.0 and project participant is able to implement the monitoring plan.
2	A _{PJ} (m ²) Area of the single or multiple reservoirs measured in the	Justification for the compliance: The area of the reservoir is 1,204,040 m². The area of the reservoir has been fixed for the whole 2nd crediting period which is in compliance with the applied methodology /06/.

	surface of the water, after the implementation of the project activity, when the reservoir is full.	The monitoring frequency is once at the beginning of each crediting period as per the latest version of the applied methodology i.e. Version 20.0 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 20.0 and project participant is able to implement the monitoring plan.
3	EGPP-Import, y (MWh) Quantity of electricity imported by the power plant from the Grid, 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 imported from 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 TEIAS Meter Reading Protocols, Reported annually on the VCS Monitoring Report. Main Electricity Meter: EMH-Serial Number: 8923761 /8923763 Back-up Electricity Meter: EMH-Serial Number: 8923762 /8923764 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market⁸. 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 8923761/8923763, will be cross-checked against the back up meter that has the serial number 8923762/8923764, if the reading difference is less than $\pm 0.2\%$ than the meter readings are considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data.

⁸ The latest version of the communiqué (in Turkish) can be found in the following link: <http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44>

		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 20.0 and project participant is able to implement the monitoring plan.
4	EGPP-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 TEIAS 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 TEIAS Meter Reading Protocols, Reported annually on the VCS Monitoring Report. Main Electricity Meter: EMH-Serial Number: 8923761 /8923763 Back-up Electricity Meter: EMH-Serial Number: 8923762 /8923764 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market⁹. 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 8923761/8923763, will be cross-checked against the back up meter that has the serial number 8923762/8923764, if the reading difference is less than $\pm 0.2\%$ than the meter readings are considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data. 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

⁹ The latest version of the communiqué (in Turkish) can be found in the following link: <http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44>

		complying with the applied methodology i.e. ACM 0002 version 20.0 and project participant is able to implement the monitoring plan.
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 TEİAŞ. Recorded continuously, reported monthly on TEIAS Meter Reading Protocols, Reported annually on the VCS Monitoring Report. Main Electricity Meter: EMH-Serial Number: 8923761 /8923763 Back-up Electricity Meter: EMH-Serial Number: 8923762 /8923764 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market¹⁰. 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 8923761/8923763, will be cross-checked against the back up meter that has the serial number 8923762/8923764, if the reading difference is less than $\pm 0.2\%$ than the meter readings are considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data. All four meters are in compliance with the host country calibration regulations /27/ which refer calibration frequency as once in 10 years. Hence validation team can conclude that the monitoring plan is complying with the applied methodology i.e. ACM 0002 version 20.0 and project participant is able to implement the monitoring plan.

¹⁰ The latest version of the communiqué (in Turkish) can be found in the following link: <http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44>

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 20.0;

(b) Based on the remote 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 remote 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 CONCLUSION

Aydem Yenilenebilir Enerji A.Ş. has commissioned “4K Earth Science Private Limited” to carry out the Validation of the VCS registered project “Koyulhisar Hydro Electricity Power Plant” (VCS Ref. ID 713) in Turkey for renewal of crediting period, with regard to the relevant requirements of VCS Standard Version 4.1 /08/.

Aydem Yenilenebilir Enerji A.S.¹¹ has constructed Koyulhisar Hydro Electric Power Plant (HPP) on the Kelkit Stream, within the jurisdiction of Koyulhisar Town of Sivas Province. The project is located at the Central Anatolian geographical region of Turkey at the Sivas Province. The purpose of the project is electricity production using the potential energy of Kelkit Stream as a renewable resource. The capacity of Koyulhisar HPP is 63 MW, with 3 vertical axis Francis turbines of 21 MW each. The project capacity has been verified from the commissioning certificate /16/, technical specification of the project equipment /17/, Photos /18/ and Production license /20/. One of these three turbines is installed as a standby unit, intended to operate only whenever one of the other two turbines will not be operating for the purpose of maintenance and repair. The project commissioned in 17/11/2019 as verified from the commissioning certificate /16/. Since this date, there has been no event that would hinder the

¹¹ Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019.

implementation of the project, except for minor maintenance activities which has been discussed during the remote audit with the PP's representative.

During the 2nd crediting period, the project is expected to produce 193,574 MWh electricity and a total amount of 89,179 tonnes of CO₂e GHG reductions each year. Total estimated emission reduction within the 2nd crediting period is 891,790 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 02 Corrective Action Requests (CAR) and 02 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.

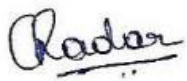
The objective of this validation (renewal of crediting period) activity is to have an independent third party for the assessment of the revised project design, estimated ER sheet and to ensure a thorough assessment of the project activity against the applicable CDM and VCS requirements. As a result of 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 3.8.9 of VCS Standard Version 4.1.
- The validity of the original baseline scenario is sufficiently demonstrated as per section 3.8.9 of VCS Standard Version 4.1.
- The monitoring plan is transparent, adequate and in line with applied baseline and monitoring methodology ACM0002, Version 20.0.
- The calculation of the Baseline emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 891,790 tCO₂e is most likely to be achieved within the 7 years of first 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 4.1 and recommend registration (renewal of crediting period) of the project activity.

Approved by



Chandrakala .R

Director

Date: 16/11/2021

4K Earth Science Pvt. Ltd

Place: Bangalore, India

APPENDIX 1: REFERENCES

S. No.	Name of document	Date
/1/	Draft VCS PD	Version 1.0, dated 07/06/2021
/2/	Final VCS PD	Version 1.02, dated 15/11/2021
/3/	Draft ER spread-sheet	Corresponding to PD Version 01
/4/	Final ER spread-sheet	Corresponding to PD Version 1.02
/5/	CDM Validation and Verification Standard for project activity CDM Project Standard for project Activities	Version 02.0 Version 02.0
/6/	Approved CDM Methodology ACM0002: Grid-connected electricity generation from renewable sources - Version 20.0	-
/7/	VCS Verified Carbon Standard: VCS Program Guide, VCS Version 4.0	-
/8/	VCS Verified Carbon Standard: VCS Standard, v4.1	-
/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 TÜV Rheinland	Version 1.4, dated 08/11/2011 Version No. 1.0, dated 11/11/2011
/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 03/09/2020 ¹²)	-
/16/	Commissioning Certificate dated 17/11/2009	-
/17/	Supportive document for the technology specification	-
/18/	Photos/Vedio 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 02/10/2005 (Valid for 40 years)	-
/21/	Denizli Chamber of Commerce (Change in Status to "AYDEM YENİLENEBİLİR ENERJİ ANONİM ŞİRKETİ" from "Bereket Enerji Üretim A.Ş.", on 24/12/2019)	24/12/2019
/22/	Declaration for non-Participation under Other GHG Programs	-
/23/	Map for the area of the reservoir	-
/24/	The initial Feasibility Approved by General Directorate of State Hydraulic Works (DSİ) dated 28/06/2004	-
/25/	Picture of the fish passage.	-
/26/	Water Usage Agreement co-signed with DSİ (DSİ Water usage Agreement)	18/01/2005
/27/	Periodic calibration is indicated as 10 years in article 9 of the regulation ¹³	-
/28/	Connection agreement with TEİAŞ dated 21/12/2005	-

¹²

<https://enerjiapi.enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/T%C3%BCrkiyeUlusalElektrik%C5%9EebekesiEmisyonFakt%C3%B6r%C3%BC/Belgeler/T%C3%BCrkiyeElektrik%C5%9EebekesiEmisyonFakt%C3%B6r%C3%BCBilgiFormu.pdf>

¹³

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

/29/	Organization structure	-
/30/	EIA Exemption Certificate issued on 01/06/2005	-
/31/	Public comments filled forms	-
/32/	Tool to calculate the emission factor for an electricity system	Version 06.0

APPENDIX 2: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR)

Table 1. CLs from this validation

CL ID	01	Section no.	-	Date: 26/06/2021
Description of CL				
From section 1.5 of the submitted VCS-PD, Validation team has found that name of Project Proponent has changed for the project. PP need to submit the supportive document for the name change along with the date of change.				
Project participant response				Date: 06/07/2021
Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş. on 24/12/2019. Therefore, the contact person also changed.				
Documentation provided by project participant				
https://app.box.com/s/6xzoq9a2s4ly084w2u4wm8hqjffldx6c				
DOE assessment				Date: 11/07/2021
The response provided by the PP is found OK. Validation team has checked the change of the title from the supportive document /21/ and also the updated information in the production license (the company name in the production license has updated on 06.02.2020) /20/. Hence this CL is closed.				

CL ID	02	Section no.	-	Date: 26/06/2021
Description of CL				
Under section 1.11 of the submitted VCS-PD, two different capacities of project turbine (each turbine) have been mentioned as 21 MW and 21.75 MW. PP need to clarify the discrepancy.				
Project participant response				Date: 06/07/2021

Every electric turbine has a mechanical capacity (MWm) which is in our case is 21,75 MWm. If this mechanical energy could be converted into electrical energy with 100% efficiency, then the value of Mwe (megawatt electrical) would be the same. These values can be seen in production license. Therefore the capacity of power plant is 3×21.75 MWm/21 MWe.

Documentation provided by project participant

<https://app.box.com/s/xf8o9ugqkmh1gvviscnk4o8s9u0p0tbe>

Please see page 2 of the above document

DOE assessment

Date: 11/07/2021

The response provided by the PP is found OK. Hence this CL is closed.

Table 2. CARs from this validation

CAR ID	01	Section no.	-	Date:	26/06/2021
Description of CAR					
Sections 1.1, 1.8, 1.10, 1.13, 1.14, 1.15, 3.2, 4.1, 4.2, 4.3 of the VCS PD are not filled as per the VCS template requirements.					
Project participant response					Date: 06/07/2021
All sections have been corrected according to template requirements.					
Documentation provided by project participant					
Please see revised version of the PD.					
DOE assessment					Date: 11/07/2021
Corrections have been done in the revised VCS PD /02/ and found OK. Hence this CAR is closed.					

CAR ID	02	Section no.	-	Date:	26/06/2021
Description of CAR					
Section 3.4 (Baseline Scenario) of the submitted VCS PD is not filled as per the requirement of section 3.8.9 of the VCS Standard version 4.1.					
Project participant response					Date: 06/07/2021
Section 3.4 (Baseline Scenario) corrected.					
Documentation provided by project participant					
Please see revised version of the PD.					
DOE assessment					Date: 11/07/2021
Corrections have been done in the revised VCS PD /02/ and found OK. Hence this CAR is closed.					

Table 3. FARs from this validation

No FAR raised during this validation.

FAR ID	Xx	Section no.		Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

APPENDIX 3: COMPETENCE OF TEAM MEMBERS

<u>Certificate of Competence</u>						
Name	☒ Mr. ☐ Ms.	Chetan Swaroop Sharma				
Qualification Procedure	Fulfills the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.					
Appointed to work as:						
	CDM Validator/Verifier	Team Leader	Team Member	Technical Expert	Technical Reviewer	Financial Expert
<i>Appointed</i>	Yes	Yes	Yes	Yes	Yes	No
<i>Appointed Date</i>	27-04-2021					
Authorized to work as Technical Expert for:						
<i>Authorized</i>	Sectoral Scope	TA Code	Technical Area within the scope			

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.	Ma Paa Puratchikkanal										
Qualification Procedure	Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.											
Appointed to work as:												
	CDM Validator/Verifier	Team Leader	Team Member	Technical Expert	Technical Reviewer	Financial Expert						
Appointed	Yes	Yes	Yes	Yes	Yes	No						
Appointed Date	27-04-2021											
Authorized to work as Technical Expert for:												
Authorized Technical Area	Sectoral Scope	TA Code	Technical Area within the scope									
	Energy industries (renewable -	1.1	Thermal energy generation									

	/ non-renewable sources)		
	Energy industries (renewable - / non-renewable sources)	1.2	Renewables
	Energy demand	3.1	Energy demand
	Construction	6.1	Construction
	Waste handling and disposal	13.1	Solid waste and wastewater
	Waste handling and disposal	13.2	Manure
	Agriculture	15.1	Agriculture
Authorized to work as Local Expert for:			
Country/Countries	India		
<u>Compliance check by:</u> Anand S. R.			

APPENDIX 4: 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	MegaWatt 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