VALIDATION REPORT "POLATLI ENERBES BIOGAS PROJECT"

Document Prepared by Carbon Check (India) Private Ltd.

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Report Title	Polatlı Enerbes Biogas Project
Client	Enerbes Elektrik Üretim Danişmanlik Sanayi Ve Ticaret Anonim Şirketi
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Summary:

- **A brief description of the validation and the project**

  Validation: ENERBES ELEKTRİK ÜRETİM DANIŞMANLIK SANAYİ VE TİCARET ANONİM ŞİRKETİ, as the Project Owner, in has commissioned Carbon Check (India) Private Ltd., to carry out the validation of the project "Polatlı Enerbes Biogas Project", with regards to the relevant requirements of VCS Standard Version 4.2 /B01/.

  Project: The purpose of the proposed project activity is biogas-to-energy project that will generate renewable energy by capturing biogas from animal manure -via anaerobic digestion- and utilizing it to produce thermal and electric energy through biogas systems. The project enables reduction of GHG incurred from existing system of cattle manure generated at farms, which is left to decay at and around farms in anaerobic conditions.

  The project is located at Çanakçı village, Polatlı district, Ankara province, in Turkey.

  The estimated annual average emission reduction saving for this Project is **401,680** tCO2e and total GHG emission reductions and removals over the lifetime of the crediting periods are 8,435,272 tCO2e.

- **The purpose and scope of validation**

Purpose: The purpose of a validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project's baseline, monitoring plan and the project's compliance with relevant VCS and host Party criteria. These are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. 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 emission reductions. Carbon Check's objective is to perform a thorough, independent assessment of the validation of the project activity.

Scope: The validation scope is defined as an independent and objective review of the Project Description (PD). The PD is reviewed against the relevant criteria and guidance documents provided by VCS which included the following: VCS Program Guide, version 4.1, VCS Standard, version 4.2, Program Definitions, version 4.1, Registration & Issuance Process, version 4.1 and in line with the VCS Validation and Verification Manual, version 3.2 applicable at the time in order to confirm that the project meets the applicability conditions of the selected baseline and monitoring methodology, AM0073, version 01.0 and also assess the claims and assumptions made in the PD without limitation on the information provided by the project proponents.

- **The method and criteria used for validation**

  Validation consists of the following four phases:

  I. A desk review of the project description documents

  - A review of data and information;
  - Cross checks between information provided in PD and information from sources with all necessary means without limitations to the information provided by the project proponent;

  II. **Remote site visit** and follow-up interviews with project stakeholders

  - Interviews with relevant stakeholders in host country with personnel having knowledge with the project development via telephone, email, or remote site visits.
  - Cross checking between information provided by interviewed personnel with all necessary means without limitations to the information provided by the project proponent;

  III. Reference to available information relating to projects or technologies similar to project under validation and review based on the approved methodology being applied for the appropriateness of formulae and accuracy of calculations.

  IV. The resolution of outstanding issues and the issuance of the final validation report and opinion.

- **The number of findings raised during validation**

  During the course of validation, a total of **14 findings** were raised, which include:

  03 Corrective Action Requests (CARs);

11 Clarification Requests (CLs);

00 Forward Action requests (FARs).

All the above findings have been successfully closed.

- **Any uncertainties associated with the validation**

  The PD /01.2/, emissions reduction calculations /02.2/ along with the supporting documents provided are considered to be in line with the VCS version 4 requirements. The validation team has detected no further uncertainties or quality restriction.

- **Summary of the validation conclusion**

  Carbon Check (India) Private Ltd. hereby confirms that the project is fulfilling the criterions specified by VCS PD template version 4.1 /B06/, VCS Standard version 4.2 /B01/, applied methodology AM0073 version 01.0 /B07/ and hence be successfully validated under VCS. Carbon Check confirms a positive validation opinion confirming the project complies with the applicable VCS requirements, thus recommending the project for registration.

CONTENTS

1 INTRODUCTION

ENERBES ELEKTRİK ÜRETİM DANIŞMANLIK SANAYİ VE TİCARET ANONİM ŞİRKETİ has commissioned the VVB, Carbon Check (India) Private Ltd. to perform a validation of the VCS Project Activity "Polatlı Enerbes Biogas Project". The project is located at Çanakçı village, Polatlı district, Ankara province, in Turkey. This report summarises the findings of the validation of the project, performed on the basis of the VCS Program Guide, version 4.1 /B02/, VCS Standard, version 4.2 /B01/, VCS Program Definitions, version 4.1 /B05/, Registration & Issuance Process, version 4.1 /B04/ and VCS Validation and Verification Manual, version 3.2 /B03/. This report contains the findings and resolutions from the validation of the project activity.

1.1 Objective

The purpose of a validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project's baseline, monitoring plan and the project's compliance with relevant VCS and host Party criteria. These are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. 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 emission reductions, VCUs.

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the Project Description (PD), project design, the project's baseline study and monitoring plan and other relevant documents. The PD is reviewed against the relevant criteria and decisions by the VCSA, including the approved baseline and monitoring methodology. Carbon Check has employed a risk-based approach in the validation, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

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

The validation is carried out on the basis of the following requirements, applicable for this project activity:

- VCS Program Guide (v4.1)
- VCS Standard (v4.2)
- Program Definitions (v4.1)

- Registration & Issuance Process (v4.1)
- VCS Validation and Verification Manual (v 3.2)
- CDM Methodology: AM0073: GHG emission reductions through multi-site manure collection and treatment in a central plant --- Version 01.0
- Other relevant rules, including the host country legislation

1.3 Level of Assurance

☒ Reasonable level of assurance

☐ Limited level of assurance

1.4 Summary Description of the Project

The proposed project activity is biogas-to-energy project that will generate renewable energy by capturing biogas from animal manure -via anaerobic digestion- and utilizing it to produce thermal and electric energy through biogas systems.

The project enables reduction of GHG incurred from existing system of cattle manure generated at farms, which is left to decay at and around farms in anaerobic conditions.

The project proponents for the project activity are Enerbes Elektrik Üretim Danişmanlik Sanayi Ve Ticaret Anonim Şirketi and BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri San. VeTic. Ltd. Şti.

The total estimated GHG emission reductions expected from the project activity are 401,680 tCO_2e and average of 8,435,272 tCO_2e per year.

2 VALIDATION PROCESS

2.1 Method and Criteria

Enerbes Elektrik Üretim Danişmanlik Sanayi Ve Ticaret Anonim Şirketi has commissioned Carbon Check (India) Private Ltd., to carry out the validation of project “Polatlı Enerbes Biogas Project”, with regards to the relevant requirements of VCS Standard, version 4.2 /B01/.

The validation includes a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project's baseline, monitoring plan and the project’s compliance with relevant VCS and host Party criteria. The validation involves assessment of the project and to confirm that the project meets the applicability conditions of the selected baseline and monitoring methodology, AM0073, version 01.0 and also assess the claims and assumptions made in the PD without limitation on the information provided by the

project proponents. The overall validation was conducted using Carbon Check's internal procedures.

2.2 Document Review

The VCS project description, emission reduction calculation spread sheet and supporting documents related to the project design and baseline were reviewed as per VCS Standard, version 4.2 standard /B01/ requirements. The desk review included:

- A review of the data and information presented to verify completeness and consistency in accordance with VCS version 04 requirements;
- A review of the project description and monitoring methodology, paying particular attention to the applicability conditions of the methodology and baseline and additionality related requirements.
- A review of the monitoring plan and the project's compliance with relevant VCS criteria.

Furthermore, the validation team used additional documentation by third parties like host-party legislation, technical reports referring to the project design or to the basic conditions and technical data.

2.3 Interviews

A remote site visit to the project activity was undertaken on 16/05/2022 to confirm the information as outlined in the table below and to resolve issues identified in the document review. The remote site visit was conducted to assess the implementation and operation of the project activity and to review evidence, and interview key personnel to confirm evidence associated with the project design, implementation, plant operations, environmental impacts, stakeholders etc.

The key personnel interviewed and the main topics of the interviews are summarized in the table below:

	Date	Name	Organisation	Topic
/a/	16/05/2022	Fatih Manisalıgi	Enerbes	• Project Design • Project start date and Project Location • Baseline Scenario • Baseline Identification and Additionality • Monitoring and reporting documentation • Quality Assurance – Management and operating system

				• Social and Environmental Impacts • Compliance with relevant laws
/b/	16/05/2022	Serim Baysun	Bio Solutions	• Project Design • Project start date and Project Location • Baseline Scenario • Baseline Identification and Additionality • Monitoring and reporting documentation • Quality Assurance – Management and operating system • Social and Environmental Impacts • Compliance with relevant laws
/c/	16/05/2022	Hüseyin Dinçer	Bio Solutions	• Project Design • Project start date and Project Location • Baseline Scenario • Baseline Identification and Additionality • Monitoring and reporting documentation • Quality Assurance – Management and operating system • Social and Environmental Impacts • Compliance with relevant laws
/d/	16/05/2022	İlayda Onaran	Bio Solutions	• Project Design • Project Implementation status • Project start date and Project Location • Qualification and Training • Plant Operations • Monitoring and reporting documentation • Quality Assurance – Management and operating system • Social and Environmental Impacts • Compliance with relevant laws

/e/	16/05/2022	Adnan Kılıç	Local stakeholder and Mukhtar of Çanakçı Village	• Local Stakeholder Consultation • Social and Environmental Impacts

2.4 Site Inspections

The VVB has not conducted the on-site inspection. However, the VVB has ensured that reasonable level of assurance has been achieved as per Verra regulations on the relaxation of mandatory site visits by the VVB due to Covid-19.

The DOE has used alternative measures of validation in place of mandatory on-site inspections This has been done as per the decision taken by CDM-EB on 20 March 2020 and subsequent extension of these alternative measures until 30th June 2022 as per p.22 of EB 112th meeting. The DOE has used standard auditing techniques as per section 7.1.3.1 of CDM VVS PA v3.0 to conduct the remote assessment of the PA with the help of web meetings and video conferencing. The interviews and discussions were conducted successfully with the PP and their representatives. The interviews and discussions were conducted successfully.

2.5 Resolution of Findings

This section summarizes the findings from the validation of the project activity. In this section the findings from the document review, site visit, assessments and interviews are provided.

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

Corrective action requests (CAR) are issued, where:

i. mistakes have been made with a direct influence on project results requiring adjustments of the VERs/VCUs monitoring report;
ii. applicable methodological specific requirements have not been met.

A **Clarification request (CL)** may be used where additional information is needed to fully clarify an issue or where the information is not transparent enough to establish whether a requirement is met.

A **forward action request (FAR)** should be issued, where:

i. the actual project monitoring and reporting practices requires attention and /or adjustment for the next consecutive verification period, or

ii. an adjustment of the MP is recommended.

In the context of FARs, risks have been identified, which may endanger the delivery of high quality emissions reductions in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from lack of data sustaining claimed emission reductions.

A total of 03 CARs and 11 CLs have been raised for the validation of the project activity. Please refer to Appendix 4 below for the details of the CARs/CLs are their closure.

2.5.1 Forward Action Requests

No Forward action requests have been raised during the course of validation.

3 VALIDATION FINDINGS

3.1 Project Details

Description of the Project Activity

The project will generate renewable energy by capturing biogas from animal manure via anaerobic digestion and utilizing it to produce thermal and electric energy through biogas systems.

Cattle manure and chicken manure generated at farms will be collected daily through special sewage trucks equipped with close-tanks in order to prevent any odor and/or manure leakages and to be fed into the anaerobic digesters at the proposed biogas power plant.

The proposed project activity has 3 biogas engines installed at the biogas power plant, with the total capacity of 4,000 kW. The annual feed-in electricity is estimated to be 28,000,000 kWh. Whilst heat generated at the plant is used at the facility to warm the digesters, the electricity generated is directly fed to the national grid.

Whilst providing sustainable development benefits to the host communities and the host country, the proposed project activity will reduce greenhouse gas (GHG) emissions mainly by

- preventing GHG emissions, methane in particular, from being emitted directly to the atmosphere from cattle manure that would be otherwise left to decay in aerobic conditions;

- replacing the electricity that would have otherwise been generated by the national grid which is heavily dependent on fossil-fuel-based resources, through generating renewable energy and feeding it to the grid;

The project proponents for the project activity are Enerbes Elektrik Üretim Danişmanlik Sanayi Ve Ticaret Anonim Şirketi and BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri San. Ve Tic. Ltd. Şti.

PP has demonstrated the ownership of the project activity and documents showing proof of title and ownership of the emission reductions are as follows:

- Environmental impact assessment (EIA) issued by the Ministry of Environment and Urbanization, Turkey, dated 08/12/2017. /6/
- Electricity generation license (EGL) issued by the Energy Market Regulatory Authority (EMRA), Turkey, dated 27/09/2018. /7/

The start date of the project activity is 12/06/2020 which is the commissioning date of the project and the date from which the project started generating emission reductions /09/. The start date of the project activity meets the requirements of the definition of start date as stated in Program Definitions version 04.1 /B05/.

The start date of the first crediting period is 12/06/2020 and end date of 11/06/2027. PP has chosen a renewable crediting period of 7 years, twice renewable for a total of 21 years.

The scale of the project is “Large Project” and the total estimated emission reductions throughout the three crediting periods are 8,435,272 tCO_2e with an average of 401,680 tCO_2e per year.

Prior to project implementation, the cattle manure generated at farms was left to decay at and around farms in anaerobic conditions.

An environmental impact assessment has been done for the project activity /6/.

It has been confirmed through the description in PD /01.2/ and through interviews during remote site visit that the project activity does not participate in any emission trading program or any other GHG program and has not sought or received any other form of environmental credit. The proposed project activity has not been rejected under any GHG programs.

The appropriate measures for leakage management have been taken into consideration in accordance with the methodology AM0073, version 01.0 /B07/.

The information provided in the PD is not commercially sensitive as has been confirmed in section 1.18 of the PD /01.2/.

In section 1.17 of the VCS PD, PP has explained the sustainable development taking place due to the implementation of the project activity in terms of Environmental, Social, Economic and Technological wellbeing.

The description contained in the VCS PD of the project activity provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation. The project description was verified by CCIPL through comparing to the real practice during the remote site visit and via checking with the supporting documents listed in Appendix 1 below. As a result, CCIPL confirms that the project description of the project contained in the VCS PD to be complete and accurate. The VCS PD complies with the relevant forms and guidance for completing the VCS PD.

3.2 Safeguards

3.2.1 No Net Harm

From the procedure involving interviews and document reviews, it is concluded that there are no negative impacts of the project activity to the socio-environment topics. The project has minimum impact on terrestrial fauna, aquatic life, and takes precautionary approach in regard to environmental challenges. More information on environmental impacts is discussed in section 3.2.3 below.

3.2.2 Local Stakeholder Consultation

Two stakeholder consultations were undertaken. The first session was held on 23rd December 2021 to inform local stakeholders about the 9th article of the EIA Regulation published in the Official Gazette dated 25/11/2014 and numbered 29186.

Stakeholders had been directly asked to comment on the project through an online meeting among local stakeholders, project proponent and local authorities on 24th February 2022. It was decided to have the meeting online due to the widespread instances caused by the Covid-19 pandemic. The locals of Polatli district were reached out via an announcement in local newspaper, invitation letters which were stuck at various public places, hand delivery of invitation letters and e-mail invitations. The attendees had registered for the meeting via online registration page made by the PP. All comments are positive in nature.

No adverse comments were received for both the meetings, and this is addressed in the PD. This was also confirmed by the validation team during the remote interviews.

3.2.3 Environmental Impact

The Environmental Impact Assessment (EIA) certificate has been approved and issued by the Ministry of Environment and Urbanization in Turkey on December 8th 2017. In accordance with the Turkish laws and regulations, EIA's approval shall be only made if a project subjected to the approval does not make any negative environmental and socio-economic impacts. Considering the fact that the proposed project

activity already obtained EIA approval by the Ministry of Environment and Urbanization in Turkey, it is therefore possible to claim that there is no net harm linked to the project.

The validation team has checked the Environmental impact assessment (EIA) certificate and found it to be acceptable.

3.2.4 Public Comments

The public commenting period for the project was from 18/04/2022 to 18/05/2022. No public comments were received for the project activity.

3.2.5 AFOLU-Specific Safeguards

Since the project is a non-AFOLU project, this section is not applicable.

3.3 Application of Methodology

3.3.1 Title and Reference

The project uses an approved baseline and monitoring methodology, AM0073: GHG emission reductions through multi-site manure collection and treatment in a central plant, Version 01.0,

Sectoral scopes: 13 and 1

The tools used are:

- CDM Tool 01: Tool for the demonstration and assessment of additionality, Version 07.0.0
- CDM Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 03.0
- CDM Tool 06: Project emissions from flaring, Version 04.0
- CDM Tool 07: Tool to calculate the emission factor for an electricity system, Version 07.0
- CDM Tool 14: Project and leakage emissions from anaerobic digesters, Version 02.0
- CDM Tool 24: Common Practice, Version 03.1
- CDM Tool 27: Investment analysis, Version 11.0

3.3.2 Applicability

The project applies the approved baseline and monitoring methodology AM0073, version 01.0 /B07/. Applicability criteria for the baseline methodology are assessed by the validation team by means of document reviews and interviews. It is agreed in the validation team's opinion that the project activity fully met the criteria as described below:

	Applicability Criteria	Applicability to the Project	Validation team assessment
1.	Farms where livestock populations, comprising of cattle, buffalo, swine, sheep, goats, and/or poultry, are managed under confined conditions	Project area has livestock population in confined condition. Hence applicable	Cattle and chicken in the project area are a part of the proposed project activity. This was confirmed during remote interviews. Conclusion: The methodology applicability criterion is fulfilled.
2.	Farms where manure is not discharged into natural water resources (e.g. rivers or estuaries)	Manure is left for anaerobic decaying not discharged into natural water resources. Hence applicable	The manure is not discharged into natural water resources. This was confirmed during remote interviews and document reviews. Conclusion: The methodology applicability criterion is fulfilled.
3.	Farms where animal residues are treated under anaerobic conditions	Manure is left for anaerobic decaying. Hence applicable	The manure is treated under anaerobic conditions. This was confirmed during remote interviews and document review. Conclusion: The methodology applicability criterion is fulfilled.
4.	The annual average temperature in the site where the anaerobic manure treatment facility in the baseline existed is higher than 5°C	The annual average temperature of baseline site where manure is collected from multiple farms in Ankara Polatlı is 11.9°C . The months of December, January and February has not been accounted for monitoring and the operations has not been monitored as the temperatures are below 5^{o}C. Hence, the proposed	The annual average temperature at the site where the anaerobic manure treatment plant in the baseline existed is higher than 5°C except for the months of December, January, and February. These months were not considered in the estimation of emission reductions. This was confirmed by relevant document reviews.

		project activity complies with this criteria/condition.	Conclusion: The methodology applicability criterion is fulfilled.
5.	In the cases where the baseline anaerobic treatment system is an open lagoon, the lagoon depth shall be greater than 1 m;	Baseline anaerobic treatment system is uncovered lagoon and depth is greater than 1m, Depth of each lagoon at farms which supply manure in time of preparation of this PD is included in the Appendix-1 of the PD. Hence applicable.	The depth of open anaerobic lagoons in the farms included in the project activity is greater than 1 m. This was confirmed during remote interviews. Conclusion: The methodology applicability criterion is fulfilled.
6.	The retention time of the organic matter in the baseline anaerobic treatment systems should be at least 30 days	Baseline anaerobic treatment system has retention time more than 30 days, same has been explained in detail in Baseline section. Hence applicable.	The retention time of the organic matter in the baseline anaerobic treatment system is higher than 30 days which was confirmed during interviews. Conclusion: The methodology applicability criterion is fulfilled.
7.	If residues are stored in between collection activities, storage tanks shall comprise outdoor open equipment's.	Residues are not stored in outdoor open equipment. Hence condition not applicable.	Not applicable as the residues are not stored in between collection activities.
8.	If the treated residue is used as fertilizer in the baseline, project proponents must ensure that this end use remains the same throughout the project activity	No treated residue in baseline. Hence condition not applicable.	Not applicable as the manure in the baseline scenario was not treated.
9.	Sludge produced during the project activity shall be stabilized through thermal drying or composting, prior to its final disposition/application	Sludge produced during the project activity is stabilized through thermal drying, prior to its final disposition/application. Please refer section 1.11. Hence applicable	The sludge produced during the project activity is stabilized through thermal drying prior its final disposition/application, as

			confirmed during the remote interviews. Conclusion: The methodology applicability criterion is fulfilled.
10.	The AWMS/process in the project case should ensure that no leakage of manure waste into ground water takes place, e.g., the lagoon should have a non-permeable layer at the lagoon bottom	The fermenter tanks and other units where leakage may occur (waste feeding and pre-pools, mixture tank and liquid fermented product storage), the ground is covered with a membrane. Please refer section 1.11. Hence Applicable.	The units from where leakage may occur is covered with EPDM membrane for insulation. This was confirmed during remote interviews. Conclusion: The methodology applicability criterion is fulfilled.
11.	CERs shall be claimed by the Central Treatment Plant managing person/entity, only. Other parties involved must sign a legally binding declaration that they will not claim CERs from the improved animal waste treatment practices. Such declarations shall be verified by the DOE during the validation, and these documents shall be valid throughout the whole crediting period	A manure supply agreement with farm owners submitted to the DOE which states that owner of central treatment plant has the rights of VCUs.	The VERs will be claimed by the Central Treatment Plant managing entity only as per the declaration signed by each farm owner. Conclusion: The methodology applicability criterion is fulfilled.
12.	Anaerobic manure treatment systems without methane recovery in the farms are the most plausible baseline scenario	Anaerobic manure treatment systems without methane recovery is the most plausible baseline scenario. Please refer section 3.4. Hence applicable	The baseline animal manure treatment in the project area is the anaerobic treatment without methane recovery as it is stored in an uncovered lagoon and subjected to anaerobic decay. This was confirmed during remote interviews and by document reviews.

			Conclusion: The methodology applicability criterion is fulfilled.

Applicability conditions for the applied tools:

CDM Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0			
1.	If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One	Scenario A, electricity consumption from the grid is suitable for the project activity.	By checking third party pre-feasibility report of the project activity, it is confirmed by the assessment team that emissions are calculated for electricity consumption, Scenario A "Electricity consumption from the grid" applies to the sources of electricity consumption for the project activity

	or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.		
2.	This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	Scenario 1, Electricity is supplied to the grid is suitable for the project activity.	Since Scenario I: "Electricity is supplied to the grid" applies to the recipient of the electricity generated, this tool can be used in approaches to give procedures for monitoring the amount of electricity generated in the project scenario.
3.	This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project	Since the project exports electricity to the grid, this tool is not suitable.	This criterion is not applicable to the project activity since captive renewable power generation technologies are not installed to provide

	activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO2 emissions.		electricity in the project activity, in the baseline scenario or to sources of leakage. This was confirmed with the third party feasibility study report.
CDM Tool 06: Project emissions from flaring, version 04.0			
1.	Methane is the component with the highest concentration in the flammable residual gas	Methane component is the highest in the project case	Through remote interviews, the VVB confirms that methane is the main component in the residual gas for the project activity.
2.	The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g., biogas, landfill gas or wastewater treatment gas)	The gas source is biogas	The source of the residual gas is biogas generated from anaerobic digestion of animal manure which was confirmed during remote site visit.
3.	The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. In the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare	In the project, there is no usage of auxiliary fuel	This criterion is not applicable since auxiliary fuels are not used for the flaring of the biogas and biogas itself is flammable enough to sustain combustion. This was confirmed during remote site visit.
CDM Tool 07: Tool to calculate the emission factor for an electricity system, version 07.0			
1.	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid	The project activity substitutes grid electricity by supplying renewable power to the grid. Hence this criterion is applicable.	It is confirmed by the VVB through remote site visit interviews and checking relevant supporting documents that the electricity supplied by the project was to replace

	electricity, i.e. 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 (e.g. demand-side energy efficiency projects).		electricity that have otherwise been supplied from grid. OM, BM and CM are estimated using the tool for calculating baseline emissions for the project activity.
2.	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project is not a CDM project.	Since the project is not a CDM project, this criterion is not applicable.

3.3.3 Project Boundary

According to the applied methodology AM0073, the spatial extent of the project boundary encompasses the following:

- The central treatment plant
- The livestock farms
- The site of the biogas combustion or energy generation facility (if existent)
- The manure storage tanks
- The road itineraries and/or piping system between the manure collection points and the central treatment plant.

The relevant GHG sources included in or excluded from the project boundary are shown on the Table below:

Source		Gas	Included?	Justification/Explanation
Baseline	Direct emissions from the manure	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	Yes	The major source of emissions in the baseline

Source		Gas	Included?	Justification/Explanation
	treatment processes	N_2O	No	Direct and indirect N_2O emissions are not accounted
		Other	-	-
	Emissions from electricity consumption / generation	CO_2	Yes	Electricity may be consumed from the grid or generated onsite in the baseline scenario
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
		Other	-	-
	Emissions from thermal energy generation	CO_2	No	Excluded for simplification. Although thermal energy will be generated through the implementation of the proposed project activity, no emission will be claimed for this, as noted in this PDD. Hence, this exclusion shall be considered as conservative.
		CH_4	No	
		N_2O	No	
		Other	-	
Project	Emissions from on-site electricity use	CO_2	Yes	These emissions are accounted since the proposed project will consume electricity from the national grid.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	-	-
	Emissions from thermal energy generation	CO_2	No	Excluded for simplification. As noted above, the project will also generate thermal power. Although the proposed project activity will not claim any emission reduction from the thermal energy generation, it will not consume thermal energy from any outside source. The thermal energy generated within the boundaries of the proposed project activity will be used for the project's auxiliary heat consumption. This exclusion shall be considered as conservative.
		CH_4	No	
		N_2O	No	
		Other	-	
	Emissions from the	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted.

Source		Gas	Included?	Justification/Explanation
	waste treatment processes	CH_4	Yes	The emissions from anaerobic digesters and aerobic treatment are accounted.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	-	-
	Emissions from manure / waste residue transportation	CO_2	Yes	May be an important emission source. Hence, they are accounted.
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	-	-
	Emissions from residue from anaerobic digester composting	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	No	The proposed project activity does not involve composting.
		N_2O	No	The proposed project activity does not involve composting.
		Other	-	-
	Emissions from manure storage tanks	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	No	Since manure is not stored more than 24 hours these emissions are not accounted. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	-	-

The project boundary and identified GHG sources, sinks and reservoirs for the project and baseline scenarios (including leakage if applicable) are appropriately defined in the VCS PD /01.2/. The selection and justification for inclusion or exclusion is appropriate and duly supported by the observation during the remote site visit. In addition to the table, a diagram of the project boundary, showing the physical locations of the various installations as part of the

project activity are included in the PD. The choice of GHGs is also appropriate to the context of the project description. There is no GHG source that is omitted.

3.3.4 Baseline Scenario

The PP has identified baseline scenario in accordance with the approved baseline and monitoring methodology, AM0073: "GHG emission reductions through multi-site manure collection and treatment in a central plant", version 01.0.

According to the applied methodology, baseline scenario should be identified from the perspective of the owner of central treatment plant, as well as from the perspective of the multiple livestock farms owners (Page 2 of the methodology).

The following steps were undertaken by the PP to identify the baseline scenario:

Step 1: Identify plausible alternative scenarios

Alternative Scenario	Is the alternative credible and plausible?	VVB assessment
For the Owner of the Central treatment Plant		
The proposed project activity not being registered as a VERRA/VCS activity	Yes	VVB, by checking relevant laws and regulations in Turkey, can confirm that this scenario complies with laws and regulations in Turkey and is a common practice used in Country.
If applicable, continuation of the current situation (no project activity or alternatives undertaken)	Yes	VVB, by checking relevant laws and regulations in Turkey, can confirm that this scenario complies with laws and regulations in Turkey and is a common practice used in Country.
For the Owners of the Livestock Farms		
The proposed project activity not being registered as a VERRA/VCS activity	Yes	VVB has confirmed that there are no laws or regulations in Turkey which forbids project being registered as VERRA/VCS activity
All other plausible and credible alternatives to the project activity scenario, including the common practices in the relevant sector. In doing so, the complete set of possible manure management systems listed in the 2006 IPCC Guidelines for National	Yes	VVB has assessed the following cases as alternatives to identify whether they are plausible or not: • Uncovered anaerobic lagoon is the current animal waste manure management

Greenhouse Gas Inventories (Chapter 10, Table 10.17)5 should be taken into account. In drawing up a list of possible scenarios, possible combinations of different Animal Waste Management Systems (AWMS) should be taken into account. The list includes the following scenarios: • Uncovered Anaerobic Lagoon • Liquid/slurry, pit storage > 1 month • Solid storage • Dry lot • Daily spread • Anaerobic Digestion – Biogas • Burned for fuel		system and is compliant with environmental and legal regulations in Turkey and therefore applicable as a baseline and/or alternative scenario for the proposed project activity. • Liquid/Slurry is a common animal waste manure management for chicken farms. However, this kind of manure management system is not allowed due to the regulation that requires that manure shall be kept only on concrete made floor. Pit storage under animal confinements is not allowed as per legal regulations of Turkey. • Solid storage as a manure management system is not in line with current regulations of Turkey. • Since animal farms in Turkey are mandated to function in confined conditions, Dry lot as an alternative is not in compliance with regulatory requirements. • In line with the legal regulations made on livestock farms, Daily spread is not allowed due to the fact that untreated animal manure contains high nitrogen level and harms the organic quality of soil. • Anaerobic digestion is the measure usen in the proposed project activity. This alternative will be the project activity not being registered with VERRA/VCS. Due to barriers such as technological barriers, lack of skilled labour to operate

		the facility and prevailing practice, as well as the investment barrier, this system is not applicable for the baseline scenario. • Manure being burned for fuel is not in line with current regulations of Turkey.
If applicable, continuation of the current situation (no project activity or alternatives undertaken)	Yes	VVB considers this alternative as plausible because it represents the present situation

The VVB concludes that the VCS PD conforms to the guidance given by EB via CDM Validation and Verification Standard for project activities version 03.0 and VCS via VCS standard version 4.2. The alternatives have been identified and justified in PD and the above section of this report.

The procedures and analyses carried out in accordance with the methodology and tools used resulted in the following two scenarios being identified as the most plausible baseline scenarios:

- Anaerobic manure treatment systems in the farms
- No implementation of the central plant

Hence, the VVB confirms that:

- The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a VCS project activity;
- The list contains all plausible alternatives that the VVB, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the comparable outputs or services that are to be supplied by the proposed project activity;
- The Project has been approved by Turkey government by checking the Project approval and Environmental Impact Assessment (EIA) approval. The project activity is in complicate with all laws and regulations in Turkey and the alternatives comply with all applicable and enforced legislation.

The VVB considers the listed alternatives to be credible and complete.

3.3.5 Additionality

The PP has demonstrated additionality in accordance with the applied methodology AM0073, version 01.0 which in turn follows TOOL 01: Tool for the demonstration and assessment of additionality, version 07.0.

The following steps from the Tool are completed below:

STEP 0 – Demonstration whether the proposed project activity is the First-of-its-kind

The proposed project activity shall not be considered as the first-of-its-kind, since the proposed project activity is not the first that applies biogas technology in the host country i.e., Turkey.

STEP 1 – Identification of alternative scenarios

This step was completed in section 3.4 of the PD and section 3.3.4 of this validation report.

STEP 2 - Barrier analysis

Not applicable.

STEP 3 – Investment analysis

Investment analysis is carried out in accordance with section 4.3. of the CDM Tool: "*Tool for the demonstration and assessment of additionality*." A step-wise approach is used as follows:

Sub-step 3a: Determine appropriate analysis method

Since the Project generates economic benefits from sales of electricity, the simple cost analysis is not applicable. Also, since the baseline of the project is generation of electricity by the grid, no alternative investment is considered at issue. In this regard, it has been decided to use the benchmark analysis for the evaluation of the project investment.

Sub-step 3b: Option III. Apply benchmark analysis

Equity IRR is selected as the financial indicator for the demonstration of the additionality of the project as permitted in the additionality tool.

In the Table 3.3, titled as 'Prototype Sub-projects for CTF Financing', in the report on 'Private Sector Renewable Energy and Energy Efficiency Project in Turkey' published by the World Bank in 2017, the threshold IRR on Equity (%) for similar project types (Biomass gas) is given as 20% (pg. 40). For the benchmark analysis conducted here, this figure is taken as a benchmark.

The IRR benchmark of 20% used for the financial analysis was obtained from the World Bank report on financing the RE and EE projects for Turkey. The benchmark IRR of capital Investment IRR (after tax) for similar project types (Biomass gas) in Turkey is 20% at the time of validation. As project activity produces electricity from the biomass gas, the benchmark IRR of the RE and EE projects in Turkey can be applied to this project. Thus, the validation team finds this benchmark to be acceptable.

Investment decision date has been identified as 24/06/2019. All the data used for the investment analysis were available at the time of the investment decision.

The timeline of this project activity is demonstrated as follows:

29/11/2017	Environmental Impact Assessment Report
08/12/2017	EIA approval
27/09/2018	Enerbes Biogas Electricity Generation License
17/06/2019	Biyogaz Teknik Preliminary Feasibility Report
24/06/2019	Board Meeting for Investment Decision Taking
26/07/2019	Gas Engines Agreement (Confirmation of Order and Investment Decision

	Date)
01/09/2019	Construction Start Date
12/06/2020	Enerbes Biogas Commissioning Date
12/06/2020	Enerbes Biogas Electricity Production Start Date
01/01/2021	Transition to YEKDEM Tariff
15/02/2022	VCS Listing Request

The key data parameters used to calculate Equity IRR are tabulated below:

Parameter	Value	VVB Assessment
Installed Capacity	4.00 MW	This value is based on the Power purchase agreement
PLF	79.96%	This value is based on the pre-feasibility study
Annual generation	23,540,224 kWh	This value was obtained by calculation.
Total Cost	11.021 million $	This value is based on the pre-feasibility study
Equity Investment	3.621 million $	This value is based on the feasibility study
Income tax rate	22%	This value is as per income tax rule
Expected Feed-in-Tariff	13.3 $ Cents/kWh	This value is as per YEKDEM Tariff
Operation & Maintenance Cost	1.327 million $ / Year	This value is based on the pre-feasibility study

Based on the above values, Equity IRR is calculated as 14.76% without the consideration of VCU revenue which is compared with the benchmark value i.e., 20%. Equity IRR is found to be less than the benchmark value and therefore renders the project activity financially non-feasible.

The validation team has cross checked all the input values and calculations which are found to be correct and in accordance with Tool 27, version 11.

Sub-step 3c: Sensitivity Analysis

As per Tool 27, version 11, variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. Accordingly, the PP has appropriately taken the following financial parameters for sensitivity analysis:

- Operational Cost
- Project Cost
- Annual Generation
- Tariff

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	+10%	Breaching Value
PLF	10.70%	14.76%	18.46%	15.00%
O&M	16.42%	14.76%	13.00%	-33.00%
Project Cost	18.89%	14.76%	11.99%	-12.00%
Tariff Rate	10.70%	14.76%	18.46%	15.00%

In conclusion, the equity IRR will not reach the benchmark of 20% within reasonable fluctuation range of +/-10% of the key financial parameters due to the following reasons:

1. According to the PP's financial records, the calculated project cost is 1.11% lower than the predicted value in the IRR calculations.
2. The O&M cost for the year 2021 is 21% higher than the predicted value. However, this is due to the unexpected increase in the commodity prices.
3. According to the law on utilization of renewable energy sources for the generation of electrical energy, biogas Plants who have the Electricity Production License between 18/05/2005 and 31/12/2020 the tariff rate as 13.3 USD cents/kWh is fixed for 10 years.
4. Drastic change in the PLF is not expected since it is reported as per the third-party pre-feasibility report which is based on long-term data. The 2021 yearly electricity generation is 10% lower than then average yearly calculated value.

The above mentioned points have been verified by the VVB with relevant sources and supporting documents and has found it to be acceptable.

<u>STEP 4 – Common practice analysis</u>

Common practice analysis for the proposed project activity is conducted as per the methodological tool: "Common practice", Version 03.1. A step-wise approach is used as follows:

Sub-step 4a-1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity

The design capacity of the proposed project activity is 4.00MWe/h for its first phase. Accordingly, the applicable output range is from 2.00 MWe/h to 6.00 MWe/h.

Sub-step 4a-2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

(a) **The projects are located in the applicable geographical area**
The applicable geographical area for the proposed project covers the entire host country Turkey.

(b) **The projects apply the same measures as the proposed project activity**
The applicable measure is anaerobic digestion

(c) **The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity**
The main feedstock is animal waste

(d) **The plants in which the projects are implemented produce goods and services with comparable quality, properties and application areas (e.g. clinker) as the proposed project plant**
All of the selected plants deliver the same service which is the electricity generation by biogas/biomass.

(e) **The capacity or output of the projects is within the applicable capacity or output range calculated in Step 4.1**
The applicable capacity or output range is 2.00 MWe to 6.00 MWe

(f) **The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity**
The start date of the project activity is 25th July 2019, when the purchase order for gas engines was issued.

41 projects have been identified which follow the conditions stated above.

Sub-step 4a.3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

Within the 41 projects identified above, 37 projects are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Hence, $N_{all} = 37$

Sub-step 4a-4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.

Amongst the 37 projects identified in Step 3 above, 31 projects apply technologies that are different to the technology applied in the proposed project activity, which is anaerobic digestion with the main feedstocks of animal waste. Therefore, $N_{diff} = 31$

Sub-step 4a-5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

The factor of the proposed project activity is calculated as follows:

F = 1 – Ndiff/Nall = 1 – (31/37) = 0.162

Nall – Ndiff = 37 – 31 = 6

As per am-tool-24-v03.1, the proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall -Ndiff is greater than 3. For the proposed project, F is not greater than 0.2 and Nall -Ndiff is greater than 3, therefore, the project is not a common practice in Turkey.

The validation team concludes that as the project activity is not financially feasible and not a common practice, the project is additional.

3.3.6 Quantification of GHG Emission Reductions and Removals

The following formulae will be followed by the project activity as per methodology AM0073 " GHG emission reductions through multi-site manure collection and treatment in a central plant" (version 01.0).

BASELINE EMISSIONS

Baseline emissions are determined according to the applied methodology, AM0073, version 01 - equation (16):

$$BE_y = BE_{AW,y} + BE_{\frac{elec}{heat},y}$$

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2e/yr)
$BE_{AW,y}$	=	Baseline emissions attributable to animal waste treatment in year y, in tCO_2e/year
$BE_{elec/heat,y}$	=	Baseline CO2 emissions from electricity and/or heat generated/consumed in the baseline, in tCO_2e/year

Emissions from animal waste treatment (*BEAW,y*)

Baseline emissions from animal waste treatment are determined according to the applied methodology, AM0073, version 01 - equation (17):

$$BE_{AW,y} = BE_{AW,CH4,y} + BE_{AW,N20,,y}$$

$BE_{AW,y}$	=	Baseline emissions attributable to animal waste treatment in year y, in tCO_2e/year

$BE_{AW,CH4,y}$	=	Baseline methane emissions attributable to animal waste treatment in year y, in tCO_2e/year
$BE_{AW,N2O,y}$	=	Baseline N_2O emissions attributable to animal waste treatment in year y, in tCO2e/year

CO2 emissions from electricity and heat within the project boundary (*$BE_{elec/heat,y}$*)

$$BE_{\frac{elec}{heat},y} = EG_{Bl,y} \times CEF_{Bl,elec,y} + EG_{d,y} \times CEF_{grid} + HG_{Bl,y} \times CEF_{Bl,therm,y}$$

$BE_{\frac{elec}{heat},y}$	=	Baseline CO2 emissions from electricity and/or heat used in the baseline, in tCO_2e/year
$EG_{Bl,y}$	=	Amount of electricity in the year y that would be consumed in the absence of the project activity (MWh) for operating all AWMs facilities
$CEF_{Bl,\,elec,\,y}$	=	Carbon emissions factor for electricity consumed at the project site in the absence of the project activity (tCO_2e/MWh)
$EG_{d,\,y}$	=	Amount of electricity generated utilizing the biogas collected during project activity and exported to the grid during the year y (MWh)
CEF_{grid}	=	Carbon emissions factor for the grid in the project scenario (tCO2e/MWh)
$HG_{Bl,\,y}$	=	Quantity of thermal energy that would be consumed in year y in the absence of the project activity (MJ) using fossil fuel for operating all AWMSs
$CEF_{Bl,\,therm,\,y}$	=	CO2 emissions intensity for thermal energy generation (tCO_2e/MJ)

Accordingly,

$$\boldsymbol{BE_y = 483,398\ tCO2e/year}$$

PROJECT EMISSIONS

Project emissions are determined according to the applied methodology AM0073 - equation (2):

$$PE_y = PE_{AD,y} + PE_{Aer,y} + PE_{Comp,y} + PE_{N2O,y} + PE_{PL,y} + PE_{flare,y} + PE_{\frac{elec}{heat}y} + PE_{CO2,Trans,y} + PE_{storage,y}$$

PE_y	=	Project emissions (tCO_2 e/yr)
$PE_{AD,y}$	=	Leakage from treatment stage that captures methane (tCO_2 e/yr)
$PE_{Aer,y}$	=	Methane emissions from the aerobic treatment stage (tCO_2 e/yr)
$PE_{Comp,y}$	=	Total project emissions due to composting (tCO_2 e/yr)
$PE_{N2O,y}$	=	Nitrous oxide emission from project treatment system (tCO_2 e/yr)
$PE_{PL,y}$	=	Physical leakage of emissions from biogas network to flare the captured methane or supply to the facility where it is used for heat and/or electricity generation (tCO_2e/yr)
$PE_{falre,y}$	=	Project emissions from flaring of the residual gas stream (tCO_2e/yr)
$PE_{elec/heat}$	=	Project emissions from use of heat and/or electricity in the project case (tCO_2e/yr)
$PE_{CO2,Trans,y}$	=	Project emissions from manure road transportation (tCO_2e/yr)
$PE_{storage,y}$	=	Project emissions from manure storage (tCO_2e/yr)

$PE_{Aer,y}$, $PE_{Comp,y}$, and $PE_{storage,y}$ will be accounted as 0 since the project activity does not consist of aerobic AWMS treatment, composting and storage in outdoor open storage tanks for more than 24 hours. $PE_{N2O,y}$ is accounted as zero for simplification and annual baseline N_2O emissions are not claimed.

Methane emissions from AWMS where gas is captured ($PE_{AD,y}$)

It is calculated in accordance with equation (3) of the applied methodology AM0073, ver 01.0.

$$PE_{AD,y} = GWP_{CH4} \times \rho_{CH4,n} \times \frac{LF_{AD}}{(1 - LF_{AD})} \times 10^{-3} \times \sum_{h=1}^{8760} \left(FV_{RG,h} \times fv_{CH4,RG,h}\right)$$

$PE_{AD,y}$	=	Leakage from AWMS systems that capture's methane in tCO2e/yr

GWP_{CH4}	=	Global Warming Potential (GWP) of CH4
$\rho_{CH4,n}$	=	Density of methane at normal (at room temperature 20°C and 1 atm pressure) conditions (6.7x10-4 t/m^3)
$FV_{RG,h}$	=	Volumetric flow rate of the captured biogas in dry basis at normal conditions in hour h (m^3/h)
$fv_{CH4,RG,h}$	=	Volumetric fraction of methane in the captured biogas on dry basis in hour h (fraction)
LF_{AD}	=	Methane leakage from anaerobic digesters/reactor, default of 0.15

Physical Leakage from distribution network of the captured methane ($PE_{PL,y}$)

One flow meter will be used to account for the leakage in case where the biogas is just flared and the pipeline from collection point to the flare is short otherwise it will be considered as 0.

Project emissions from heat use and electricity use ($PE_{elec/heat}$)

It is calculated in accordance with equation (13) of the applied methodology AM0073, ver. 01.

$$PE_{\frac{elec}{heat},y} = PE_{Elec,y} + PE_{heat,j,y}$$

Where:

$PE_{Elec,y}$	=	Are the emissions from consumption of electricity in the project case. The project emissions from electricity consumption ($PE_{Elec,y}$ = $PE_{EC,y}$) will be calculated following the latest version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". In case, the electricity consumption is not measured then the electricity consumption shall be estimated as follows: = $EC_{PJ,y} = \sum_I CPi,y \times 8760$, where $CP_{i,y}$ is the rated capacity (in MW) of electrical equipment i used for project activity
$PE_{heat.j.y}$	=	Are the emissions from consumption of heat in the project case. The project emissions from fossil fuel combustion ($PE_{heat,j,y}$ = $PE_{FC,j,y}$) will be calculated following the latest version of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". For this purpose, the processes j in the tool corresponds to all fossil fuel combustion in the plant established as part of the project activity, as well as any other on-site fuel combustion for the purposes of the project activity

$PE_{Elec,y}$ ($PE_{EC,y}$) is calculated in accordance with CDM methodological tool: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", version 03.0.

$$PE_{EC,y} = \sum_{j} EC_{PJ,j,y} \times EF_{EF,j,y} \times (1 + TDL_{j,y})$$

Where:

$PE_{EC,y}$	=	Project emissions from electricity consumption in year y (tCO_2 / yr)
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EF,j,y}$	=	Emission factor for electricity generation for source j in year y (t CO_2/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source j in year y

Project emissions from flaring ($PE_{flare,y}$)

It is considered as zero but an enclosed flare is installed in case of emergencies. Accordingly, it will be calculated using the CDM methodological tool: "Project emissions for flaring", ver.03.

$$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3}$$

Where:

$PE_{falre,y}$	=	Project emissions from flaring of the residual gas in year y (tCO_2e)
GWP_{CH4}	=	Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)
$F_{CH4,RG,m}$	=	Mass flow of methane in the residual gas in the minute m (kg)
$\eta_{flare,m}$	=	Flare efficiency in minute m

Project emissions from road transportation ($PEC_{O2,Trans,y}$)

It is determined according to equation (14) of the applied methodology AM0073, ver. 01.

$$PE_{CO2,Trans.y} = \{\sum(N_{vehicles,i,y} \,.\, Dist_{i,y} \,.\, FC_{i,f}) \,.\, \left[\sum_{f} NCV_f \,.\, EF_{CO2,f}\right]\}$$

Where:

$PE_{CO2.Trans,y}$	=	Project emissions from manure road transportation in tCO2e/yr
$N_{vehicles,j,y}$	=	Number of trips of vehicles type i used for transportation, with similar loading capacity
$Dist_{i.f}$	=	Average distance per trip travelled by transportation vehicles type i during the year y (km)
$FC_{i,f}$	=	Specific consumption of fuel type f in volume or mass units per km for vehicle type i
NCV_f	=	Net calorific value of fuel type f in TJ per volume or mass units
$EF_{CO2,f}$	=	CO2 emission factor of the fossil fuel type f used in transportation vehicles, (tCO2e/TJ)

Accordingly,

$$\boldsymbol{PE_y = 35,020\ tCO2e/year}$$

LEAKAGE

Leakage is calculated according to equation (28) of the applied methodology, AM0073, ver. 01.

$$\boldsymbol{LE_y = (LE_{PJ,N2O,y} - LE_{BL,N20,y}) + (LE_{PJ,CH4,y} - LE_{BL,CH4,y}) + LE_{CO2,Trans,y} + LE_{AD,y}}$$

Where:

LE_y	=	Leakage emissions for the year y, in tCO2e/year
$LE_{PJ,N2O,y}$	=	N2O emissions released during project activity from land application of the treated residues, in tCO2e/year
$LE_{BL,N2O,y}$	=	N2O emissions released during baseline scenario from land application of the treated manure, in tCO2e/year
$LE_{PJ,CH4,y}$	=	CH4 emissions released during project activity from land application of the treated residues, in tCO2e/year

$LE_{BL,CH4,y}$	=	CH4 emissions released during baseline scenario from land application of the treated manure, in tCO2e/year
$LE_{CO2,Trans.y}$	=	Emissions from treated residues road transportation in tCO2e/yr
$LE_{AD,y}$	=	Leakage emissions associated with the anaerobic digester in year y (tCO2e)

Estimation of N2O Emissions

The baseline case N_2O emissions are estimated according to the sum of nitrogen excretion of the livestock types included in the project boundary and to the nitrogen removal capacity of the baseline AWMS. This was calculated in accordance with equations (29), (30), (31), and (32) of the applied methodology AM0073, ver 01. In contrast, the project case N2O emissions are estimated through the direct measurement of the treated effluent disposed outside the project boundary which was calculated in accordance with equations (33), (34), (35), and (36) of the applied methodology AM0073, ver. 01.

Estimation of CH_4 Emissions

The baseline and project CH_4 emissions from disposal of treated residues are estimated according to equations (37) and (38) of the applied methodology, AM0073, ver. 01.

Estimation of leakage emissions associated with the anaerobic digester ($LE_{AD,y}$)

It is estimated using CDM methodological tool "Project and leakage emissions from anaerobic digesters", ver. 02.

$$LE_{AD,y} = LE_{storage,y} + LE_{comp,y}$$

Where:

$LE_{AD,y}$	=	Leakage emissions associated with the anaerobic digester in year y (t CO2e)
$LE_{storage,y}$	=	Leakage emissions associated with storage of digestate in year y (t CO2e)
$LE_{comp,y}$	=	Leakage emissions associated with composting digestate in year y (t CO2e)

Since the project does not apply composting digestate, $LE_{comp,y}$ will be accounted as 0.

Estimation of Emissions from treated residues road transportation in tCO2e/yr ($LE_{CO2,Trans,y}$)

It is estimated in accordance with equation (14) of the applied methodology AM0073, ver. 01 where project emissions from road transportation is calculated. Such emission shall be considered as leakage if the final destiny and itinerary between the treatment plant are included outside the project boundary.

$$LE_{CO2,Trans.y} = \{\sum(N_{vehicles,i,y} \,.\, Dist_{i,y} \,.\, FC_{i,f}) \,.\, \left[\sum_{f} NCV_f \,.\, EF_{CO2,f}\right]\}$$

$LE_{CO2.Trans,y}$	=	Leakage emissions from manure road transportation in tCO2e/yr
$N_{vehicles,j,y}$	=	Number of trips of vehicles type i used for transportation, with similar loading capacity
$Dist_{i.f}$	=	Average distance per trip travelled by transportation vehicles type i during the year y (km)
$FC_{i,f}$	=	Specific consumption of fuel type f in volume or mass units per km for vehicle type i
NCV_f	=	Net calorific value of fuel type f in TJ per volume or mass units
$EF_{CO2,f}$	=	CO2 emission factor of the fossil fuel type f used in transportation vehicles, (tCO2e/TJ)

Accordingly,

$$\boldsymbol{LE_y = 46,699\ tCO2e/year}$$

EMISSION REDUCTIONS

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	=	Emission reductions in year y (t CO_2e/yr)
BE_y	=	Baseline emissions in year y (t CO_2e/yr)
PE_y	=	Project emissions in year y (t CO_2/yr)

LE_y = Leakage emissions in year y (t CO_2/yr)

Accordingly,

$$\boldsymbol{ER_y = 401,680 \ \ t\,CO2e/y}$$

The validation team confirms the following:

- All the assumptions and data are listed in the project description are relevant, including their references and sources.
- All data and parameter values used in the project description are considered reasonable in the context of the project.
- All estimates of the baseline emissions can be replicated using the data and parameter values provided in the project description.

Hence, the validation team confirms that the methodology and the above referenced tools have been applied correctly to calculate baseline emissions, project emissions, leakage and net GHG emission reductions and removals.

3.3.7 Methodology Deviations

The project does not seek any methodology deviations.

3.3.8 Monitoring Plan

The project activity has correctly applied the Approved Monitoring Methodology AM0073, version 01.0 titled "GHG emission reductions through multi-site manure collection and treatment in a central plant". The monitoring plan provides detailed information related to the collection and archiving of all relevant data needed to:

- Estimate or measure emissions occurring from GHG sources, sinks and reservoirs
- Determine the baseline emissions

The monitoring plan as per AM0073, version 01.0 has been clearly described in section 5 of the VCS PD. It covers all the monitoring parameters required to monitor by the project activity and emission reductions due to the project activity accurately.

The monitoring plan/procedure followed to measure the emission reduction is applied accurately and with a conservative approach.

Parameters Determined ex-ante

The following parameters are determined ex-ante and mentioned in section 5.1 of the PD:

Parameter	Unit	Value	Assessment
D_{CH4}	t/m^3	0.00067	PP has chosen a default value of density of methane. The same is as per the methodology AM0073, ver 1.0. The justification was accepted by the validation team
GWP_{CH4}	tCO_2e/ tCH_4	28	Default value from IPCC is used as per the applied methodology and as per version 4.2 of the VCS standard
MCF_j	Fraction	0.76 for uncovered anaerobic lagoons	Default value from IPCC is used as per the applied methodology and as per Version 4.2 of the VCS Standard.
$B_{0,LT}$	m_3CH_4 /kg-dm	Dairy Cattle: 0.24; Non Dairy Cattle: 0.18; Chicken Layer (Hens): 0.39	Default value from IPCC is used as per the applied methodology and as per Version 4.2 of the VCS Standard.
$EF_{CO2,grid,y} = EF_{EF,j,y}$	tCO_2e/MWh	0.5706	Published data from The Ministry of the Energy and Natural Resources in Turkey
$TDL_{j,y}$	-	0.11	Calculated from the Data Provided by Turkish Electricity Transmission Corporation (TEİAŞ)
$EF_{CO2,f}$	Fraction (tCO_2e/TJ)	74.8	CO2 emission factor of the fossil fuel type f used in transportation vehicles. 2019 refinement for 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.4, page 1.23 - Gas/Diesel Oil - Upper Limits - Conservative

NCV_f	Fraction	43.3	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2, page 1.18 - Gas/Diesel Oil - Upper Limits - Conservative
$R_{VS,n}$	Fraction	Uncovered anaerobic lagoon: 85% Anaerobic digesters: 80%	Annex 1 of the applied methodology AM0073 version 01
$R_{N,n}$	Fraction	$R_{N,n}$ anaerobic digester : 0.25	Annex 1 of the applied methodology AM0073 version 01
$EF_{N2O,D,j}$	kg N_2O-N/kg N	0.0006	2019 refinement for 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.21 – Anaerobic digester
$EF_{N2O,ID,j}$	Kg N_2O/kg NH_3-N and NO_X-N	0.01	2019 refinement for 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3
F_{gasm}	Fraction	0.21	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3
EF_1, EF_4, EF_5	kg N_2O N/kg N for EF_1, EF_5 and [kg N_2O N/(kg NH_3 N and NO_XN) for EF_4	EF1 : 0.010 EF4 : 0.010 EF5 : 0.011	EF1 – 2019 refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.1 EF4 and EF5 – 2019 refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3

F_{leach}	Fraction	0.24	2019 refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11, Table 11.3
$NEX_{IPCC,default}$	Kg N/animal/year	0.82	2019 refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.19

Parameters Monitored ex-post

Monitoring of the project activity involves all the parameters necessary for calculation of GHG emission reduction by the proposed project activity. These parameters are mentioned in section 5.2 of the PD. The parameters, which are to be monitored include:

Parameter	Unit	Value	Assessment
VS	kg dm/animal/day	-	Monitored daily, accumulated to monthly records.
N_p	Number	-	Monitored Annually
N_{da}	Number	-	Monitored Annually
FE	%	-	Monitored once per minute. According to the regulation: "MEASUREMENT AND MEASURING INSTRUMENTS INSPECTION REGULATION", the monitoring equipment will be calibrated every 10 years.
$\sum(vehicles,i,y \times Disti,y \times F\ i,f)i$	Litres	108,000	Monitored Annually, based on daily records, monthly aggregation
$EG_{d,y}$	MWh/yr	23,540	Continuous measurements and monthly recorded.
n_{dy}	Number	365	Monitored Annually

$W_{manure,LT}$	Fraction	Dairy Cattle: 40 Other Cattle: 25 Chicken Layer (Hens): 0.08	Monitored Daily
$EC_{PJ,j,y}$	MWh/yr	28	Continuous measurements and monthly recording
$NEX_{LT,y}$	kg N/animal/year	1.33	Monitored Annually
$FV_{RG,h}$	m^3/h	-	Monitored continuously by flow meter
$fv_{CH4,RG,H}$	fraction	-	Monitored continuously
$N_{LT,y}$	Number	-	Monitored monthly
N	Number	-	This parameter is not used in ER calculation, hence does not require monitoring
Q_{EM}	m^3/month	-	Monitored continuously
$Q_{DE,m}$	m^3/month	-	Monitored continuously
T	^oC	-	Monitored daily

Detailed responsibilities and authorities for project management, monitoring procedures, calibration procedures and QA/QC procedures have been presented and were verified during follow up interviews. The detailed monitoring practice is considered appropriate and the implementation of these will enable subsequent verification of the project's emission reductions.

All relevant data will be archived electronically and further maintained for the entire crediting period plus two years. Based on the above assessment the validation team concludes that the PP is capable to implement the monitoring plan and hence confirms compliance of VCS guidelines /B01/ and the applied methodology /B07/.

3.4 Non-Permanence Risk Analysis

This is not applicable to the project activity as the Project is not an AFOLU (Agriculture, Forestry and Other Land Use) project.

4 VALIDATION CONCLUSION

Enerbes Elektrik Üretim Danişmanlik Sanayi Ve Ticaret Anonim Şirketi has commissioned Carbon Check (India) Private Ltd. (CCIPL) to validate the project "Polatlı Enerbes Biogas Project", with regard to VCS Version 4 requirements and the information provided by the project proponent related to the project design, operation, monitoring and reporting.

CCIPL has reviewed the project description documents and subsequently carried out remote site visit interviews to confirm the fulfilment of stated criteria. The project intends to reduce GHG emissions by displacing grid electricity. A risk based approach has been followed to perform this validation. In the course of validation, 03 CARs and 11 CLs are raised which have been resolved by the PP.

The project activity has applied the baseline and monitoring methodology, AM0073, version 01.0: "GHG emission reductions through multi-site manure collection and treatment in a central plant", which is an approved methodology under the CDM programme and is acceptable under VCS Version 4. The baseline has been determined in accordance with the stated approved baseline methodology.

Analysis of the proposed project activity reveals that the emission reductions resulting from the project activity are real, measurable and give long term benefits and are additional to what would have occurred in the absence of the project activity. The annual average emission reductions from the project activity are estimated to be 401,680 tCO_2e per annum. The emission reductions forecast has been checked and is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan makes sufficient provision for monitoring relevant project and baseline emission indicators. Responsibilities and authorities for project management, monitoring and reporting and QA/QC procedures have also been addressed.

Based on the information provided by the project developer, it is CCIPL's opinion that the project, "Polatlı Enerbes Biogas Project in Turkey as described in the VCS PD, Version 02.0 dated 01/06/2022, meets all relevant VCS Version 4 requirement and correctly applied approved CDM baseline and monitoring methodology AM0073, version 01.0.

CCIPL's validation opinion is purely based on the information made available to us by the project proponent during the course of validation and hence CCIPL cannot guarantee the accuracy or correctness of the information. Keeping this in mind, no party can hold CCIPL liable for any decisions made or not made in this report.

APPENDIX 1.1: REFERENCE DOCUMENTS

Ref	Document
/01/	1. Draft VCS PD version 01, dated 14/02/2022 2. Final VCS PD version 02, dated 01/06/2022
/02/	ER sheet corresponding to: 1. /01-1/ 2. /01-2/
/03/	IRR spread sheet
/04/	Evidence regarding the legal status of the project owner "ENERBES ELEKTRİK ÜRETİM DANIŞMANLIK SANAYİ VE TİCARET ANONİM ŞİRKETİ" and project developer "BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri San. Ve Tic. Ltd. Şti" and relationship between the two entities
/05/	Evidence for the project location (GPS coordinates) including photographs of the site and the installed units.
/06/	EIA report issued by the Ministry of Environment and Urbanization, dated December 8th 2017
/07/	Electricity generation license issued by the Energy Market Regulatory Authority (EMRA) on September 27th 2018.
/08/	Pre-Feasibility study report prepared by BiyogazTeknik Enerji, dated 17/06/2019
/09/	Evidence for the start date of the project activity on 12th June 2020: Plant acceptance approval by ministry of energy, dated 26/11/2019
/10/	Evidence for the actual project cost
/11/	Gas engine supply contract signed between INNIO Jenbacher GmbH & Co OG (Seller) and CIFTAY INSAAT TAAHHUT VE TIC.A.S. (Buyer) for 3 units of engine (make - JGS 420 GS-B.L)
/12/	Evidence for Baseline scenario: • ESTABLISHMENT, WORKING, SUPERVISION OF LIVESTOCK ENTERPRISES REGULATION ON PROCEDURES AND PRINCIPLES, dated 09/08/2006 • Surveys conducted with farm owners along with farm photos
/13/	All evidence related to Local Stakeholders Consultation processes carried out on 23/12/2021 and 24/02/2022 (invitations, attendance, photos/videos, minutes of meeting, etc.)
/14/	Evidence for the compliance of each methodology applicability criteria (AM0073, ver 01): • Environmental permit and license certificate, dated 12/11/2021 • Surveys conducted with farm owners along with farm photos
/15/	Declarations by farm owners stating that they will not claim CERs claim CERs from the improved animal waste treatment practices.
/16/	Commissioning certificate: Plant acceptance approval by ministry of energy, dated 26/11/2019

/17/	Manure collection agreements
/18/	Credible evidence for the calculation of Operating, Build and Combined margin in line with CDM TOOL 07: Turkey National Electricity Network Emission Factor Information Form, Dated 01/09/2020
/19/	Provisional baseline surveys and lab results on volatile matter (dry basis) of manure for the calculation of baseline methane emissions generated from each of the 64 farms
/20/	Evidence for the Investment decision date (based on which all the input parameters are taken for financial analysis in line with CDM Tool 27, version 11 "Investment Analysis": • Investment decision meeting of minutes dated 24/06/2019
/21/	Purchase orders for equipment used for the project activity
/22/	Evidence for electricity tariff rate and tenure (https://www.epdk.gov.tr/Detay/Icerik/3-0-0-122/yenilenebilir-enerji-kaynaklari-destekleme-mekanizmasi-yekdem)
/23/	Lab log book records for the years 2020 and 2021.
/24/	Animal counting records: • Animal counting declarations from farm owners • District Directorate of Agriculture – Animal records (2020)
/25/	Electricity generation Invoices for the years 2020, 2021, and 2022, corresponding to the quantity of electricity supplied by the project
/26/	Evidence for all the input parameters including the benchmark for financial analysis complying Tool 27, version 11: Document of the World Bank for Republic of Turkey (Private Sector Renewable Energy and Energy Efficiency Project), Dated 19/07/2017
/27/	Third party PLF report: Pre-Feasibility study report prepared by BiyogazTeknik Enerji, dated 17/06/2019
/28/	Evidence for the technical specification for all the monitoring equipment
/29/	ODA declaration Letter, dated 25/01/2022
/30/	Evidence for the calibration frequency of electricity and gas flow meters
/31/	Evidence for storage of fermented product and leachate management

APPENDIX 1.2: BACKGROUND DOCUMENTS

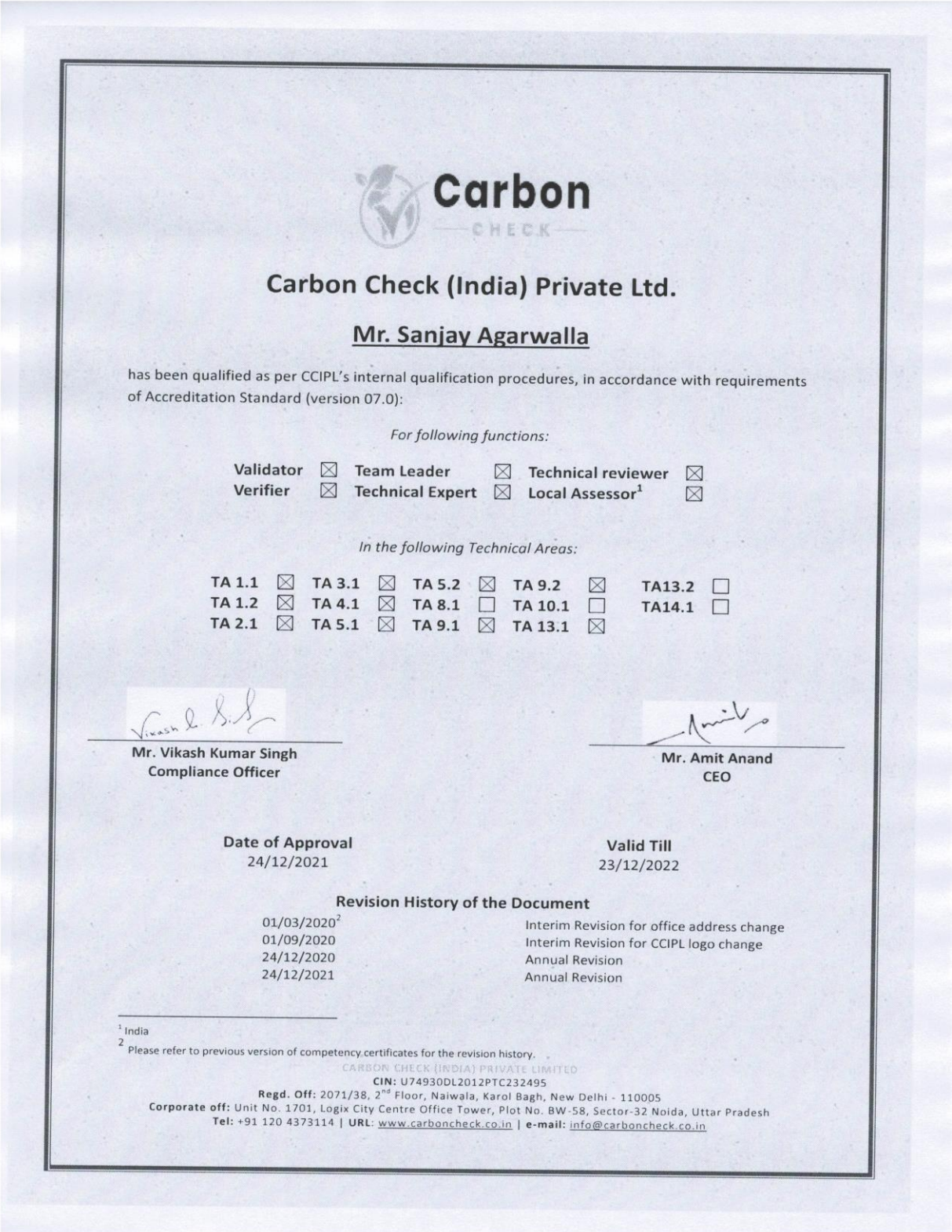
	Document
/B01/	VCS Standard (v4.2)
/B02/	VCS Program Guide (v4.1)
/B03/	VCS Validation and Verification Manual version 3.2
/B04/	Registration & Issuance Process (v4.1)
/B05/	VCS Programme Definitions version 4.1
/B06/	VCS PD template version 4.1
/B07/	Applied baseline and monitoring methodology, AM0073, version 01.0
/B08/	CDM Validation and Verification Standard for PoAs, version 03.0 CDM Project Standard for PoAs, version 03.0
/B09/	https://cdm.unfccc.int/
/B10/	CDM Tool 01: Tool for the demonstration and assessment of additionality, Version 07.0.0
/B11/	CDM Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 03.0
/B12/	CDM Tool 06: Project Emission from Flaring, Version 4.0
/B13/	CDM Tool 07: Tool to calculate the emission factor for an electricity system, Version 07.0
/B14/	CDM Tool 14: Project and leakage emissions from anaerobic digesters, Version 02.0
/B15/	CDM Tool 24: Common practice, Version 3.1
/B16/	CDM Tool 27: Investment analysis, Version 11.0

APPENDIX 2: ABBREVIATION

CDM	Clean Development Mechanism
BE	Baseline Emission
CAR	Corrective Action Request
CCIPL	Carbon Check (India) Private Ltd.
CDM	Clean Development Mechanism
CL	Clarification Request
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalent
DOE	Designated Operational Entity
DPR	Detailed project report
DVR	Draft Validation Report
EB	CDM Executive Board
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
FVR	Final validation Report
GHG	Greenhouse gas(es)
GWh	Giga Watt Hour
IPCC	Intergovernmental Panel on Climate Change
MW	Mega Watt
MWh	Mega Watt Hour
NA	Not Applicable
OSV	On Site Visit
PD	Project Description
PP	Project Proponent
QC/QA	Quality control/Quality assurance
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard

VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VVM	Validation and Verificatoin Manual
VVS	Validation and Verification Standard

APPENDIX 3: CERTIFICATES OF COMPETENCE



Carbon CHECK

Carbon Check (India) Private Ltd.

Mr. Sanjay Agarwalla

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☒	Team Leader	☒	Technical reviewer	☒		
Verifier	☒	Technical Expert	☒	Local Assessor[1]	☒		

In the following Technical Areas:

TA 1.1	☒	TA 3.1	☒	TA 5.2	☒	TA 9.2	☒	TA13.2	☐
TA 1.2	☒	TA 4.1	☒	TA 8.1	☐	TA 10.1	☐	TA14.1	☐
TA 2.1	☒	TA 5.1	☒	TA 9.1	☒	TA 13.1	☒		

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2021

Valid Till
23/12/2022

Revision History of the Document

01/03/2020[2]	Interim Revision for office address change
01/09/2020	Interim Revision for CCIPL logo change
24/12/2020	Annual Revision
24/12/2021	Annual Revision

[1] India
[2] Please refer to previous version of competency certificates for the revision history.

CARBON CHECK (INDIA) PRIVATE LIMITED
CIN: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL:** www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

Carbon CHECK

Carbon Check (India) Private Ltd.

Ms. Indumathi. C

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☐	Team Leader	☒	Technical reviewer	☒
Verifier	☐	Technical Expert	☒	Local Assessor[1]	☒

In the following Technical Areas:

TA 1.1	☒	TA 4.1	☐	TA 9.1	☐	TA 13.1	☒
TA 1.2	☒	TA 5.1	☐	TA 9.2	☐	TA 13.2	☒
TA 3.1	☒	TA 5.2	☐	TA 10.1	☐	TA 14.1	☐

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2021

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Tel: +91 120 4373114 | **URL:** www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

APPENDIX 4: FINDINGS LOG

Table 1. CLs from this Validation

CL ID	01	Section no.	1.4, 3.1	Date: 16/05/2022
Description of CL				
The pre-project scenario, as stated in the PD at several places, is that the cattle manure generated on farms is left to decay in aerobic conditions. However, the applied methodology, AM0073, version 01, is applicable to the existing anaerobic manure treatment systems in multiple livestock farms within the project boundary. The project proponent is requested to clarify how the pre-project scenario of aerobic degradation aligns with the applied methodology.				
Project Proponent's response				**Date:** 23/05/2022
The pre-project scenario is that cattle manure generated at farms is left to decay in anaerobic conditions. As stated in Regulation 0n Establishment, Working, Inspection Procedures and Principles of Livestock Enterprises Article 10, the solid wastes must be stored in surrounded by concrete wall with a sufficient depth. These conditions create anaerobic conditions for cattle manure. The term used aerobic conditions in the PD is a human error. When manure is given aerobic treatment in a controlled manner it is called aerobic treatment. Here manure is left in uncovered lagoon and in uncontrolled manner, hence this falls under anaerobic activity.				
Documentation provided by Project Proponent				
PD has been revised, and information has been made consistent.				
DOE assessment				**Date:** 26/05/2022
PP has satisfactorily explained that the pre-project scenario is that farm manure is left to decompose in anaerobic conditions, and the PD has been revised to reflect this information consistently. Hence, this CL is closed.				

CL ID	02	Section no.	3.3.2, 3.3.6, 3.3.8	Date: 16/05/2022
Description of CL				
According to footnote 1 of the applied methodology, AM0073 ver. 01, "*If monthly average temperature in a particular month is less than 5°C, this month is not included in the estimations, as it is assumed that no anaerobic activity occurs below such temperature."* The PP, on the other hand, has included the months of December, January, and February in its calculations, despite the fact that the average temperature in these months is below 5°C. PP is requested to clarify the inclusion of these months in its emissions reduction estimates.				
Project Proponent's response				**Date:** 23/05/2022
The months of December, January and February has not been accounted for monitoring as the temperatures are below 5ºC. The calculations have been revised and the months of December, January and February are excluded from calculations. Note has been added in the ER sheet. In this regard the net annual emission reduction calculation has been reduced from 485,987 to 401,680 in the PD.				
Documentation provided by Project Proponent				
PD has been revised and also please refer datas of General Directorate of Meteorology; https://mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx/Ankara				
DOE assessment				**Date:** 26/05/2022
PP has revised the ER sheet to exclude the months of December, January and February from the emission reductions estimate and have made the necessary changes in the PD. Hence, this CL is closed.				

CL ID	03	Section no.	3.3.4	Date: 16/05/2022
Description of CL				

In section 3.4 of the PD i.e., Baseline scenario, under Uncovered anaerobic lagoon – Current animal waste manure management, it is stated that "*the overall depth of such lagoons at the farms around the project site is 2 meters."* The methodology, AM0073 ver. 01 is applicable when the depth of each lagoon is greater than 1 m not when the average of the depths for all lagoons is more than 1 m. Therefore, PP is requested to verify and clearly demonstrate the lagoon depth for each farm included within the project boundary in the PD along with additional information on lagoon features for each farm and provide credible evidence for the same.
Project Proponent's response **Date:** 23/05/2022
Baseline anaerobic treatment system is uncovered lagoon and depth is greater than 1m.
Documentation provided by Project Proponent
Depth of each lagoon at farms which supply manure in time of preparation of this PD is included in the Appendix-1 of the PD.
DOE assessment **Date:** 26/05/2022
PP has confirmed with credible evidence that the depth of the lagoon at each farm included in the project activity is greater than 1m and revised the PD to include the same in Appendix-1. Hence, this CL is closed

CL ID	04	**Section no.**	3.3.4	**Date:** 16/05/2022
Description of CL				
The applied methodology, AM0073 ver. 01, is applicable when the retention time of the organic matter in the baseline anaerobic treatment systems is at least 30 days and this condition shall be applied for each farm included in the project activity. PP is requested to demonstrate in the PD and provide credible evidence regarding the retention time of organic matter in the baseline scenario, for each farm included in the project activity.				
Project Proponent's response **Date:** 23/05/2022				
Baseline anaerobic treatment system has retention time more than 30 days. Farm owner has declared retention times for the organic matter in biogas surveys. Farm wise retention time has been included in the revised PD in Appendix-1				
Documentation provided by Project Proponent				
PD has been updated also please refer to Biogas Survey file				
DOE assessment **Date:** 26/05/2022				
PP has confirmed with credible evidence that the retention time of the organic matter at each farm included in the project activity is more than 30 days and revised the PD to include the same in Appendix-1. Hence, this CL is closed				

CL ID	05	**Section no.**	3.3.4	**Date:** 16/05/2022
Description of CL				
According to the applied methodology, AM0073 ver. 01, "*CERs shall be claimed by the Central Treatment Plant managing person/entity, only. Other parties involved must sign a legally binding declaration that they will not claim CERs from the improved animal waste treatment practices. Such declarations shall be verified by the DOE during the validation, and these documents shall be valid throughout the whole crediting period".* PP, in section 3.2 of the PD, for point 11, has stated that "*A declaration will be submitted by Central Treatment Plant managing person/entity to the DOE."* PP is requested to clarify how a declaration by the central treatment plant aligns with the above-mentioned applicability criterion of the methodology.				
Project Proponent's response **Date:** 23/05/2022				
Farm owners have declared that they will not claim CERs from the animal waste treatment practices in manure collection agreements that they have signed with the PP.				
Documentation provided by Project Proponent				
Please refer Manure collection Agreements.				
DOE assessment **Date:** 26/05/2022				
PP has satisfactorily revised the justification for point 11 under section 3.2 and have provided credible evidence to be in line with the applied methodology. Hence, this CL is closed.				

CL ID	06	**Section no.**	1.4, 3.1	**Date:** 16/05/2022

Description of CL	
The entity, BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri San. Ve Tic. Ltd. Şti is one of the project proponents as per section 1.5 of the PD. But it is also mentioned as the other entity involved in the project in section 1.6 of the PD. Clarification is requested.	
Project Proponent's response	**Date:** 23/05/2022
BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri San. Ve Tic. Ltd. Şti stays as one of the project proponents. Section 1.6 of the PD has been revised as N/A.	
Documentation provided by Project Proponent	
Please refer revised version of PD.	
DOE assessment	**Date:** 26/05/2022
PP has revised section 1.6 of the PD to remove BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri San. Ve Tic. Ltd. Şti as the other entity involved in the project. Hence, this CL is closed.	

CL ID	07	**Section no.**	3.1	**Date:** 16/05/2022
Description of CL				
In section 1.10 of the PD, PP is requested to check and confirm on the calculation for the total estimated emission reductions and average annual emission reductions.				
Project Proponent's response				**Date:** 23/05/2022
Calculations have been revised in PD and ER sheet.				
Documentation provided by Project Proponent				
Please refer revised versions of PD and ER.				
DOE assessment				**Date:** 26/05/2022
PP has revised section 1.10 of the PD satisfactorily. Hence, this CL is closed.				

CL ID	08	**Section no.**	3.2.2	**Date:** 16/05/2022
Description of CL				
During remote interview with the local stakeholder, it was found that a meeting was held on December 23, 2021, in addition to the one mentioned on February 24, 2022. PP is requested to clarify the significance of the meeting held on December 23, 2021 and update the same in the PD.				
Project Proponent's response				**Date:** 23/05/2022
The local stakeholder meeting held on the 23rd of December was about informing local people about the Enerbes project and the environmental and social impacts. And the second one held on the 24th of February was about to tell local people about the project and its relation to carbon mechanism. Local stakeholder meeting reports have been created separately. Summary of the LSC meetings have been included in the PD.				
Documentation provided by Project Proponent				
Two local stakeholder meetings added in PD with pictures and reports.				
DOE assessment				**Date:** 26/05/2022
PP has clarified the significance of the meeting held on 23/12/2021 and updated the PD to add relevant information about the two meetings. The evidence for the same has also been provided. Hence, this CL is closed				

CL ID	09	**Section no.**	3.3.5	**Date:** 16/05/2022
Description of CL				
Following clarification requests are raised with respect to financial analysis: i. For each of the input values for investment analysis (including benchmark), PP needs to confirm on the compliance of paragraph 10 of CDM Tool 27, version 11 which states: "I*nput values used in all investment analysis shall be valid and applicable at the time of the investment decision taken by the project participant*" along with credible evidence.				

ii. PP has chosen Equity IRR as the financial indicator to prove additionality. However, PP has taken total project cost as the net cash outflow. Clarification is requested on how this complies to paragraph 14 of the latest version of Tool 27.
iii. PP has taken a benchmark of 20% considering compliance to UNFCCC's Guidelines on the assessment of investment analysis. However, this guideline is applicable to requests for registration submitted by 19 March 2016. Clarification is requested on how this guideline is applicable for the proposed project activity and whether the benchmark considered for investment analysis complies to the latest version of Tool 27.
iv. Since a PPA has not been signed, PP is requested to clarify how input parameters like tariff rate will remain fixed for 10 years and to modify statements regarding PPA in the PD and references made of PPA in ER spread sheet wherever required. PP is also requested to provide credible evidence for transition date (01/01/2021) to YEKDEM tariff and provide justification of more than six months' gap between electricity production start date (12/06/2020) and the transition date.

Project Proponent's response	**Date:** 23/05/2022

i. 3rd Party technical report before the Investment decision date has been shared for the relevant input values that have been identified in the IRR study.
ii. We have made a mistake and used another calculation table to calculate Project IRR. The correct table used to calculate the Equity IRR has been published. Also, PD has been revised with updated values.
iii. It is stated that the "Benchmark supplied by relevant national authorities are also appropriate" Statement takes place and complies with Methodological Tool 27 Investment Analysis Section 6 Paragraph 15.
iv. On EMRA (Turkey's Energy Markets Regulation and Assessment) web site it has been stated that the Biogas Plants who have the Electricity Production License between 18-05-2005 and 31.12.2020 the tariff rate as 13,3 USD Cents/kWh is fixed for 10 years. Supporting Information Link has been added in the IRR Calculation Sheet. YEKDEM registration of the project has started from 2021.Tariff rate without YEKDEM registration is lower. So, the invoices have been shared to show the YEKDEM transition. On the invoices after Dec 2020, you can see the Yekdem tariff that have been added on the invoice. According to YEKDEM registration process, the project owner has to send registration request till 30th of November after the commissioning date. After that EMRA confirms the application of the project owner and the project owner can only benefit from YEKDEM tariff beginning of the next calendar year. The project owner has to apply to EMRA to be included in the YEKDEM list every year.

Documentation provided by Project Proponent

Pre-Feasibility Report from Biyogaz Teknik on 17-06-2019 has been added.
Equity IRR Calculation Sheet has been shared.
PD has been revised and PPA has been removed.
Electricity Generation Invoices in 2020 and 2021 has been shared.

DOE assessment	**Date:** 26/05/2022

i. It is confirmed that all the input parameters for financial analysis are taken from the third party pre-feasibility report issued prior to the investment decision date and hence was available at the time of decision making for the project activity. This part of the CL is closed.
ii. PP has explained that it was a human error and have revised the IRR sheet satisfactorily to take the equity part as the net cash flow. This part of the CL is closed.
iii. PP has satisfactorily explained and revised the PD to reflect that the benchmark taken complies with CDM methodological tool 27, version 11.0. This part of the CL is closed.
iv. PP has adequately explained that the tariff rate will be fixed for a period of ten years, as required by country regulation, and has updated the PD to reflect this information, along with supporting evidence. PP has also justified and provided credible evidence for the six-month gap between the start of electricity generation and the YEKDEM transition date. This part of the CL is closed.

CL ID	10	**Section no.**	3.3.5	**Date:** 16/05/2022
Description of CL				

For common practice analysis, under Sub-Step 41-2 point(f), PP needs to provide all the dates in a transparent manner before conclusion and accordingly provide evidence of all the identified / not identified projects.
Project Proponent's response **Date:** 23/05/2022
The purchase order for gas engines was made on 25th July 2019. Common Practice Analysis has been accordingly updated in the PD. *Timeline of ENERBES Biogas Project Activity* *29.11.2017 Environmental Impact Assessment Report* *8.12.2017 EIA Positive Letter* *27.09.2018 Enerbes Biogas Electricity Generation License* *17.06.2019 Biyogaz Teknik Preliminary Feasibility Report* *24.06.2019 Board Meeting for Investment Decision Taking* *26.07.2019 Gas Enginee Agreement (Confirmation of Order and Investment Decision Date)* *1.09.2019 Construction Start Date* *12.06.2020 Enerbes Biogas Commissioning Date* *12.06.2020 Enerbes Biogas Electricity Production Start Date* *1.01.2021 Transition to YEKDEM Tariff* *15.02.2022 VCS Listing Request*
Documentation provided by Project Proponent
PSF has been revised
DOE assessment **Date:** 26/05/2022
PP has submitted a revised PD where all the dates are provided in a transparent manner and also provided credible evidence for all identified projects, which the assessment team has reviewed and found to be acceptable. This CL is closed.

CL ID	11	**Section no.**	3.3.8	**Date:** 16/05/2022
Description of CL				
Following clarification requests are raised with respect to calibration of electricity and flow meters: i. The actual calibration frequency is not mentioned under 'QA/QC procedures to be applied' row for parameter "$EC_{PJ,j,y}$"and as per the methodology applied, calibration of the electricity meters to be done as per appropriate industry standards. PP is requested to justify compliance with regard to this with credible evidence. Also, it is not described in the PD how the uncertainty of the meters is included in a conservative manner while calculating emission reductions. Clarification is requested. ii. Calibration details for flow meter are not provided under 'QA/QC procedures to be applied' row for parameter "*FE*". PP is requested to clearly demonstrate calibration practice as per the appropriate industry standard with credible evidence.				
Project Proponent's response				**Date:** 23/05/2022
i. QA/QC procedures to be applied Section has been revised in PD. Electricity meters will be calibrated every 10 years according to local standard and regulation (MEASURING AND MEASURING INSTRUMENTS INSPECTION REGULATION dated 15-12-2019) to ensure accuracy and data will be recorded and backed-up. Readings will be also verified by the spare electricity meter regularly. The accuracy of meters is given as 0.5s class which have an uncertainty of ±%0,75 which is a negligible value. *ii. QA/QC procedures to be applied Section has been revised in PD. Flow meters will be calibrated at least every 10 years according to local standard and regulation (MEASURING AND MEASURING INSTRUMENTS INSPECTION REGULATION dated 15-12-2019) to ensure accuracy and data will be recorded and backed-up. Readings will be also verified by the spare flow meter regularly*				
Documentation provided by Project Proponent				
PD has been revised.				
DOE assessment				**Date:** 26/05/2022

i. PP has clarified with credible evidence that the electricity meters will be calibrated every ten years. A spare meter has been installed which was confirmed during remote audit activity. Relevant information has also been added in 'QA/QC procedures to be applied' row. Hence, this part of the CL is closed. ii. PP has clarified with credible evidence that the flow meters will be calibrated every ten years. A spare flow meter has been installed which was confirmed during remote audit activity. Relevant information has also been added in 'QA/QC procedures to be applied' row. Hence, this part of the CL is closed.

Table 2. CARs from this Project Verification

CAR ID	01	**Section no.**	3.3.4	**Date:** 16/05/2022
Description of CAR				
As per the project description completing guidelines, PP needs to demonstrate and justify the applicability conditions of the tools applied by the project in section 3.2 of the PD.				
Project Proponent's response				**Date:** 23/05/2022
Applicability conditions of the tools applied by the project are given in revised PD.				
Documentation provided by Project Proponent				
Please refer revised PD.				
DOE assessment				**Date:** 26/05/2022
PP has revised section 3.2 of the PD to demonstrate and justify the applicability conditions of the tools applied. CAR 01 is closed.				

CAR ID	02	**Section no.**	3.1, 3.3.1	**Date:** 16/05/2022
Description of CAR				
In sections 1.2 and 3.1 of the PD, PP has stated that the project falls into sectoral scope 13. However, according to the standard "Applicability of sectoral scopes", version 1.0, for methodology AM0073, Sectoral scope 1 is applicable as conditional sectoral scope. PP needs to revise the same at relevant sections in the PD.				
Project Proponent's response				**Date:** 23/05/2022
Scope 1 is included in the sectoral scope of the PD.				
Documentation provided by Project Proponent				
PD has been revised.				
DOE assessment				**Date:** 26/05/2022
PP has revised the PD to include sectoral scope 1 along with 13. CAR 02 is closed.				

CAR ID	03	**Section no.**	3.2.2	**Date:** 16/05/2022
Description of CAR				
In section 2.2 of the PD, PP has stated that "The project's local stakeholder consultation meeting will take place by 24th February 2022." Since the local stakeholder consultation has already been carried out, PP needs to revise the section accordingly.				
Project Proponent's response				**Date:** 23/05/2022
The statement of local stakeholder meeting was corrected and local stakeholder meeting outcomes has been added to PD.				
Documentation provided by Project Proponent				
Please refer revised PD.				
DOE assessment				**Date:** 26/05/2022
PP has revised section 2.2 of the PD satisfactorily to include information on local stakeholder meetings conducted on 23/12/2021 and 24/02/2022. CAR 03 is closed.				

Table 3. FARs from this Project Verification

FAR ID	xx	**Section no.**	-	**Date:** DD/MM/YYYY
Description of FAR				
-				
Project Proponent's response				**Date:** DD/MM/YYYY
-				
Documentation provided by Project Proponent				
-				
DOE assessment				**Date:** DD/MM/YYYY
-				