



**Verified Carbon
Standard**

VALIDATION REPORT “BYZ GLOBAL ENERGY BIOGAS PLANT”



South Asia

Document Prepared by

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Report Title	Validation report of “BYZ Global Energy Biogas Plant ”
Client	KUZEY GLOBAL ENERJİ VE GÜBRE A.Ş.

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Summary:

KUZEY GLOBAL ENERJİ VE GÜBRE A.Ş. (KGEG) has commissioned TÜV SÜD South Asia Pvt. Ltd to carry out the validation of the “**BYZ Global Energy Biogas Plant**”. This report summarizes the findings of the validation of the project, performed on the basis of VCS Version 4 criteria, GHG program applied as well as criteria given to provide for consistent project operations, monitoring and reporting.

The purpose of the proposed project activity is biogas-to-energy project that will generate renewable energy by capturing biogas from cattle 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 aerobic conditions.

The objective of the Validation is to have an independent evaluation of a project activity by a designated operational entity against the requirements of the VCS Version 4 and GHG program applied, on the basis of the project design document. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant VCS requirements, GHG program requirements and host Party criteria 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 Voluntary Carbon Units (VCUs).

The validation scope is to review the VCS-PD against the VCS criteria which refer to VCS Version 4 standard and all the GHG program requirements.

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

The validation team has **raised 08 CARs and 02 CLs**. The same has been successfully closed. More information is provided in Appendix-1 of the report. In conclusion, it is TÜV SÜD's opinion that the project activity "**BYZ Global Energy Biogas Plant**", as described in the VCS-PD version 4.0 of 12/11/2021, meets all relevant requirements for VCS activities and all relevant host Party criteria and correctly applies the small scale methodology "AMS III.D: Methane recovery in animal manure management systems", Version 21.0 and AMS I.D: Grid connected renewable electricity generation", Version 18.0.

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1 INTRODUCTION

1.1 Objective

The objective of the Validation is to have an independent evaluation of a project activity by a designated operational entity against the requirements of the VCS Version 4 and GHG program applied, on the basis of the project design document. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant VCS requirements, GHG program requirements and host Party criteria 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 Voluntary Carbon Units (VCUs).

1.2 Scope and Criteria

The validation scope is to review the VCS-PD against the VCS criteria which refer to VCS Version 4 standard and all the GHG program requirements. Validation is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

1.3 Level of Assurance

All the revisions of the validation report before being submitted to the client were subjected to an independent internal technical review to confirm that all validation activities had been completed according to the pertinent TÜV SÜD's instructions. The technical review was performed by a technical reviewer(s) qualified in accordance with TÜV SÜD's qualification scheme for VCS and CDM validation and verification.

The level of assurance of the validation report is defined as reasonable.

1.4 Summary Description of the Project

BYZ Global Energy Biogas Plant project (hereafter referred to as the project) is a biogas-to-energy project that will generate renewable energy by capturing biogas from cattle manure -via anaerobic digestion- and utilizing it to produce thermal and electric energy through biogas systems. The project is being implemented by BYZ Global Enerji ve Gübre

Üretimi Ticaret Sanayi Anonim Şirketi in Buğdaylı village, Kocasinan district, Kayseri province, Turkey.

It is estimated that approximately 220 tons of cattle manure and 110 tons of chicken manure generated at animal 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.

Biodegradation will take place in anaerobic condition of organic wastes coming to the Biogas Plant. The biogas that will be released during the biodegradation of organic wastes will be used for electricity and heat production. The proposed project activity has one biogas engine installed at the biogas power plant, with the total capacity of 1,501 KWe/h. Accordingly, the biogas generator system to be installed will be designed with a total power of 1.501 MWe/h. The annual feed-in electricity is estimated to be 12,968,640 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. Emission reductions from the heat component has not been claimed.

The starting date of the project activity and the start date of the crediting period is 30/07/2019. It has been verified by TÜV SÜD that the date of commercial operation of the proposed project activity is considered as the start date of the project.

This project adopts the fixed crediting period of 10 years. The expected average annual emission reductions are 61,243 tCO₂eq/y. Accordingly, the project is expected to generate 612,430 tCO₂eq emissions reduction throughout its fixed crediting period.

2 VALIDATION PROCESS

2.1 Method and Criteria

Validation was conducted using TÜV SÜD procedures in line with the requirements specified in the VCS Standard and all others GHG Programs Requirements.

The validation consists of the following three phases:

- Document review;
- Follow-up actions;
- The resolution of outstanding issues and the issuance of the final validation report.

The following sections outline each step in more detail.

The validation team and the technical reviewers consist of the following personnel:

Role/Qualification	Last Name	First Name	Country
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VCS Team Leader, VCS Validator	Kewat	Shailendra	India
Technical Expert	Nambiar	Dhanya	India
Technical Expert (TR)	Menon	Rekha	India
Technical Reviewer	Murty	Eswar	India

2.2 Document Review

The VCS-PD version 5.0 of 02/12/2021 in particular the applicability of the methodology, the baseline determination, the additionality of the project activity, the starting date of the project, the monitoring plan, the emission reduction calculations provided in the form of a spreadsheet version 03, were assessed as part of the validation.

The following table lists the documentation that was reviewed during the validation.

/1/	VCS PD for “BYZ Global Energy Biogas Plant” version 5.0 of 02/12/2021
/2/	Emission Reduction spread sheets version 03.0 of 15/07/2021
/3/	MERAM ÇEVRE İŞ SAĞLIĞI VE GÜVENLİĞİ ÇEVRE DAN. MÜH. MÜŞ. VE ÖLÇ. HİZM. TİC. LTD. ŞTİ. Feasibility study: February 2018
/4/	GE Jembacher: Gas Engine supply contract, dated 23/02/2018
/5/	Ministry of Energy and Natural Resources in Turkey: Commissioning certificate, dated 30/07/2019
/6/	Ministry of Environment and Urbanization in Turkey: EIA approval issued, dated 27/09/2018
/7/	BYZ Enerji: Manure collection agreement, dated 21/03/2018
/8/	BYZ Enerji: A declaration, making KUZEY GLOBAL ENERJİ VE GÜBRE A.Ş. as focal point for the project, dated 08/06/2021
/9/	BYZ Enerji: No ODA declaration, dated 12/05/2021
/10/	CDM Executive Board: approved baseline and monitoring methodology AMS III.D-Version 21.0: “Methane recovery in animal manure management systems”
/11/	CDM Executive Board: approved baseline and monitoring methodology AMS I.D-Version 18.0: “Grid connected renewable electricity generation”
/12/	CDM Executive Board: “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”, version 03.0
/13/	BYZ Enerji: O&M agreement with Renesco Enerji, dated 21/03/2018
/14/	CDM Executive Board: “Baseline, project and/ or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0
/15/	CDM Executive Board: “Project emissions from flaring, version 03.0
/16/	CDM Executive Board: Project and leakage emissions from anaerobic digesters”, Version 02.0
/17/	CDM Executive Board: Project and leakage emissions from biomass, Version 04.0;

/18/	VCS: VCS standard, V 4.0, dated 19/09/2019
/19/	VCS: VCS program guide, V 4.0, dated 19/09/2019
/20/	CDM Executive board :“Tool to calculate the emission factor for an electricity system” version 07.0
/21/	CDM Executive board: Validation and Verification standard for project activities, version 02.0 of 29/11/2018.
/22/	006 IPCC guidelines for National Greenhouse Gas inventories, volume 2

2.3 Interviews

	Date	Name and Role	Organization	Topic
/a/	12/07/2021	Mr. Gökhan PAK - Plant Manager	BYZ Enerji	Description of the project activity, Project technology, operation and maintenance, Project approval and implementation status, Investment Analysis, Baseline and Additionality, Monitoring plan and monitoring arrangements, roles and responsibilities, emergency procedures.
/b/	12/07/2021	Mr. Umut Onder, Consultant	BIO SOLUTIONS LLC.	Eligibility Criteria, Baseline and Additionality, Applicability Conditions, Emission reductions calculations, additionality and investment analysis, starting date and crediting period. Social & Environmental impacts,

2.4 Site Inspections

The VVB has not conducted the on-site inspection for this current monitoring period due to obligations imposed by COVID 19. 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 31 December 2021 as per p.28 EB 108 and EB 110. The DOE has used standard auditing techniques as per section 7.1.3 of CDM VVS PA v2.0 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

The objective of this phase of the validation is to resolve any outstanding issues, which need to be clarified for TÜV SÜD's positive conclusion on the project design.

To guarantee transparency a validation protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of validation and the results from validating the identified criteria. The validation protocol consists of three tables; the different columns in these tables are described in the figure below (see Figure 1). The completed validation protocol is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The VCS Version 4 requirements have not been met.
- There is a risk that the emission reductions cannot be monitored or calculated.

A clarification request (CR) is raised if information is insufficient or not clear enough to determine whether the applicable VCS Version 4.1 requirements have been met.

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Project design document	00	01	00
Description of project activity	01	01	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline	00	01	00
- Deviation from methodology	00	00	00

- Clarification on applicability of methodology, tool and/or standardized baseline	00	01	00
- Demonstration of additionality	00	01	00
- Emission reductions	00	01	00
- Monitoring plan	00	01	00
-Stakeholders consultation process	00	00	00
- Public comments	00	00	00
Others (please specify)-Matter related to double counting-	00	00	00
Others (please specify)-Matter related to Emission reduction calculation- ER achieved – Actual ER achieved calculations,	01	01	00
Total	02	08	00

The list of findings and their resolution is presented in appendix 1 of this report.

2.5.1 Forward Action Requests

No FAR is raised during the Validation.

3 VALIDATION FINDINGS

3.1 Project Details

BYZ Global Energy Biogas Plant project (hereafter referred to as the project) is a biogas-to-energy project that will generate renewable energy by capturing biogas from cattle manure -via anaerobic digestion- and utilizing it to produce thermal and electric energy through biogas systems. The project is being implemented by BYZ Global Enerji ve Gübre Üretimi Ticaret Sanayi Anonim Şirketi in Buğdaylı village, Kocasinan district, Kayseri province, Turkey.

It is estimated that approximately 220 tons of cattle manure and 110 tons of chicken manure generated at animal 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.

Biodegradation will take place in anaerobic condition of organic wastes coming to the Biogas Plant. The biogas that will be released during the biodegradation of organic wastes will be used for electricity and heat production. The proposed project activity has one biogas engine installed at the biogas power plant, with the total capacity of 1,501

KWe/h. Accordingly, the biogas generator system to be installed will be designed with a total power of 1.501 MWe/h. The annual feed-in electricity is estimated to be 12,968,640 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. Emission reductions from the heat component has not been claimed.

The starting date of the project activity and the start date of the crediting period is 30/07/2019. It has been verified by TÜV SÜD that the date of commercial operation of the proposed project activity is considered as the start date of the project.

This project adopts the fixed crediting period of 10 years. The expected average annual emission reductions are 61,243 tCO₂eq/y. Accordingly, the project is expected to generate 612,430 tCO₂eq emissions reduction throughout its fixed crediting period.

TÜV SÜD was able to verify all the documented evidence listed above during the validation process and can confirm that data and considerations are complete and accurate.

TÜV SÜD' confirms that the description of the proposed VCS project activity, as contained in the VCS-PD sufficiently covers all relevant elements, is accurate and complete and that it provides the reader with a clear understanding of the nature of the proposed VCS project activity.

Condition prior to project initiation

Before the project activity, cattle and chicken manure generated at cattle breeding and poultry farms were left to decay in aerobic conditions. Hence, greenhouse gases generated from animal manure were released directly into atmosphere. In addition, the quantity of electricity produced using biogas technologies would have been produced by power plants connected to the national grid in Turkey which is heavily dependent on fossil fuel resources.

Same has been confirmed via documents review and interviewing the PP and site personal.

Project proponent

The project proponents and their responsibility are clearly defined under Section 1.5 and 1.6 of the VCS PD. Project is being developed by BYZ Global Enerji ve Gübre Üretimi Ticaret Sanayi Anonim Şirketi (BYZ) who is also the project owner along with the BIO SOLUTIONS LLC. (BSL). PP has appointed "KUZEY GLOBAL ENERJİ VE GÜBRE A.Ş." as a focal point on their behalf and made them one of the project participants. A declaration

from BYZ has been submitted making KUZHEY GLOBAL ENERJİ VE GÜBRE A.Ş as a focal point for the VCS.

Project start date

The starting date of project activity is 30/07/2019 as confirmed through the date of commercial operation of the proposed project activity, which it is in line with the VCS Standard.

As per the VCS Standard, the project start date is the date on which the project began generating GHG emission reductions or removals.

Project crediting period

The crediting period of the project activity is fixed credit period of 10 years. The fixed crediting period is 10 years from 30/07/2019 to 29/06/2029 (both days included).

Project scale and estimated GHG emission reductions or removals

The estimated average annual emission reductions from the project are estimated to be on the average 61,243 tCO₂ per year over the selected 10 years crediting period.

Projects are categorized by size according to their estimated average annual emission reductions or removals according to VCS Standard. Since the estimated annual emission reductions resulting from the project is less than 300,000 tCO₂, the category of the project is defined as “Project” as per the VCS Standard.

Project location

The Project location is discussed in section 1.12 of the VCS-PD. The project location is taken as per the site layout as discussed below.

The project is located in Buğdaylı village, Kocasinan district, Kayseri province, Turkey. The central coordinated of the project location are longitude of +35.5514131 and latitude of +38.8171642.

Project compliance with applicable laws, statutes and other regulatory frameworks

The two of main regulatory approvals for such project types to prove that they are in compliance with relevant laws, statues and regulatory frameworks in Turkey are the Environmental Impact Assessment and the Electricity Generation License.

The project has obtained the approval of Environmental Impact Assessment (EIA) issued by the Ministry of Environment and Urbanization in Turkey on September 27th, 2018, and

the Electricity Generation License (EGL) issued by the Energy Market Regulatory Authority (EMRA) in Turkey on October 18th, 2018.

The project is in compliance with the given laws.

Ownership and other programs

Right of use: The legal right to control and operate the project activity is belong to BYZ. The same was also confirmed during the interview and the agreement between the BYZ and Electricity supply licence, which ensures that the emission reduction credits from the project go to the project owner.

Emissions trading programs and other binding limits: Net GHG emission reductions or removals generated by the project will not be used for compliance with an emissions trading program or for meeting binding limits on GHG emissions.

Participation under other GHG programs: The project has not been registered or seeking registration under other GHG programs.

Other forms of environmental credit sought or received: The project has not created another form of Environmental Credit.

Rejection by other GHG programs: The project has not been rejected by other GHG programs.

Additional information relevant to the project

Eligibility criteria for grouped projects:

The project is not a grouped project.

Commercially sensitive information:

This sensitive info is shared with DOE during validation and is in-line with the VCS requirements that are defined for sensitive information.

Any further information:

Not applicable.

3.2 Safeguards

3.2.1 No Net Harm

During the interview and documents review, it is concluded that there are no negative impacts of the project activity to the socio-environment topics. The biogas project has minimum impact on terrestrial fauna, aquatic life, and takes precautionary approach in regard to environmental challenges. More information on environmental impacts are discussed in section 3.2.3 below.

3.2.2 Local Stakeholder Consultation

Due to ongoing COVID-19 Pandemic situation, PP has asked for exemption from conducting the local stakeholder consultation. VERRA has approved the exemption via email.

Assessment team found it appropriate looking at current pandemic situation.

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 September 27th, 2018. 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 checked the EIA certificate and accepted.

3.2.4 Public Comments

Assessment team noted that this project was open for public comment from 16/03/2021 to 15/04/2021. The detail was checked by the assessment team in the following web platform: <https://registry.terra.org/app/projectDetail/VCS/2457>
During the period, no public comments were received.

3.2.5 AFOLU-Specific Safeguards

NA

3.3 Application of Methodology

3.3.1 Title and Reference

Methodologies used:

- AMS-III.D.: “Methane recovery in animal manure management systems”, Version 21.0¹
- AMS-I.D.: “Grid connected renewable electricity generation”, Version 18.0²

The tools applied for the project activity were:

“Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”, Version 03.0;

“Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, Version 03.0;

“Project emissions from flaring”, Version 03.0;

“Project and leakage emissions from anaerobic digesters”, Version 02.0;

“Tool to calculate the emission factor for an electricity system”, Version 07.0;

“Tool to determine the remaining lifetime of equipment”, Version 01;

“Project and leakage emissions from biomass”, Version 04.0;

Guidelines on the demonstration of additionality of small- scale project activities

3.3.2 Applicability

The project correctly applies the AMS-III.D.: “Methane recovery in animal manure management systems”, Version 21.0³.

The proposed project activity meets the criteria defined in the baseline methodology as it ensures that:

- The Project’s primary feedstock, cattle-manure and chicken-manure will be supplied mainly by animal farms. The farm owners manage the livestock population in their farms in accordance with the relevant Turkish laws and regulations confining conditions

¹ <https://cdm.unfccc.int/methodologies/DB/H9DVSB24O7GEZQYLYNWUX23YS6G4RC>

² <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

³ <https://cdm.unfccc.int/methodologies/DB/H9DVSB24O7GEZQYLYNWUX23YS6G4RC>

- The waste streams after the treatment will not be discharged into natural water resources.
- The annual average temperature of baseline site where manure is collected from multiple farms in KAYSERİ is 10.7 °C, which is higher than the 5°C.
- The retention time of manure waste is greater than one month in the baseline scenario
- No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.
- The residual waste from the manure management process will be handled aerobically utilized as fertilizer which will not result in methane emissions.
- In the project activity, the technical measures considered in the design ensures that all the biogas produced by the digester is used. In case of emergencies, flaring system is also provided.
- The manure after removal from the animal barns will be transferred into the anaerobic digesters via pre-treatment pool within same day.
- The recovered biogas is used to produce and deliver power to the grid.
- the estimated annual emission reductions that will be generated from the implementation of the proposed project activity is 52,348 tCO₂e/y, which is lower than the threshold of 60,000 tCO₂e/y set in the Guideline. Therefore, the proposed project activity complies with the General Guidelines for SSC CDM methodologies, Version 23
- The project is a Greenfield project, does not involve the replaced equipment.
- The generation of the project's emission reduction is estimated as 61,243 tCO₂e/y in total. However, the project's emission reduction from all Type III components is estimated as 55,570 tCO₂e/y which is lower than the threshold of 60,000 tCO₂e/y.

The project also correctly applies the AMS-I.D: "Grid connected renewable electricity generation", Version 18.0

The proposed project activity meets the criteria defined in the baseline methodology as it ensures that:

- The proposed project activity is implemented as a Greenfield Power Plant at the site where there was no renewable energy power plant operating prior to the implementation of the project activity.

- The project activity generates electricity from biogas recovered from animal manure via biogas generators/engines/units and is not a combined heat and power system.

The project activity correctly applies the following methodological tools:

Applicability conditions of "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"

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 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.

By checking Feasibility Study Report (FSR) 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

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.

This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, Scenario I: "Electricity is supplied to the grid" applies to the recipient of the electricity generated

This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO₂ emissions.

Through interview and checking FSR, it is confirmed by the assessment team that no captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage.

Applicability conditions of "Tool to calculate the emission factor for an electricity system"

This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).

Through interview and checking FSR, it is confirmed by the assessment team that the electricity supplied by the project was to replace 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.

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power

plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.

It is confirmed by the assessment team that the electricity supplied by the project was to replace electricity that have otherwise been supplied from NCPG. The emission factor for the project electricity system is calculated for grid power plants.

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.

Through interview and checking the FSR Approval, it is confirmed by the assessment team that the project activity is not a CDM project.

Applicability conditions of “Project emissions from flaring”

This tool provides procedures to calculate project emissions from flaring of a residual gas. The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.

Through interview and checking FSR of the project activity, the assessment team confirmed that open flare is installed in the project site. Therefore, it is applicable for the project activity.

This tool is applicable to the flaring of flammable greenhouse gases where: (a) Methane is the component with the highest concentration in the flammable residual gas; and (b) 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).

Through interview and checking FSR of the project activity, the assessment team confirmed that CH₄ is the mainly component in the residual gas for the project activity. Therefore, it is applicable for the project activity.

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. For the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare.

Through interview and checking FSR of the project activity, the assessment team confirmed that no auxiliary fuels are used for the flaring of the biogas and biogas itself is flammable enough to sustain combustion. Therefore, this tool is applicable for the project activity

The validation team hereby confirms that the selected baseline and monitoring methodology has been previously approved by the CDM Executive Board, and is applicable to the Project, which complies with all the applicability conditions therein.

3.3.3 Project Boundary

The project boundary is clearly defined in accordance with the applied methodology. According to the approved baseline and monitoring methodology AMS.III.D and AMS I.D, the project boundary complete

- The livestock;
- Animal manure management systems (including centralized manure treatment plant);
- Facilities which recover and flare/combust or use methane;
- The project power plant and all power plants connected physically to the electricity system that the proposed project power plant is connected to.

The geo co-ordinates of the same is discussed in the VCS-PD, which is cross checked with the google map and confirmed to be in order.

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 treatment processes	CO ₂	No	Excluded for simplification. This is conservative.
		CH ₄	Yes	The major source of emissions in the baseline
		N ₂ O	No	Excluded for simplification. This is conservative.
		Other	-	N/A
	Emissions from electricity consumption / generation	CO ₂	Yes	Major source of emissions in the baseline
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		Other	-	N/A
Project	Physical leakage of biogas	CO ₂	No	Excluded for simplification.
		CH ₄	Yes	Main emission source. Leakage from biogas digester has been considered.
		N ₂ O	No	Excluded for simplification.
		Other	-	N/A

Source		Gas	Included?	Justification/Explanation
	Emissions from on-site electricity or fossil fuel use	CO ₂	Yes	The emission from use of electricity is accounted for, since the proposed project will consume electricity from the national grid. However, since the proposed project activity does not involve fossil fuel consumption, the emission from use of fossil fuel is not included.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	-	N/A
	Emissions from flaring or combustion of the gas stream	CO ₂	No	The flare system would be used only in exigencies. In case the flare operation, the emission reduction will be excluded during this period, and thus emission source is not included.
		CH ₄	No	
		N ₂ O	No	
		Other	-	N/A
	Emissions from incremental transportation distances	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 ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	-	N/A
	Emissions from storage of manure	CO ₂	No	Excluded for simplification.
		CH ₄	No	The anaerobic digesters under the project are constructed close to the animal barns, the manure after removal from the animal barns will be transferred into the anaerobic digesters via pre-treatment pool within same day, so the storage time of manure is less than 24 hours, this source of emissions is not accounted for according to AMS-III.D. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification.
		Other	-	N/A

By checking the information by the document review, TÜV SÜD can confirm that all the emission sources, gases have been included in the project boundary, and the description in the VCS PD is accurate and complete, and also that the selected sources and gases

are justified for the proposed project activity. It is also checked that there are no emissions, which are the more than 1% and is neglected.

3.3.4 Baseline Scenario

Documentary evidence used in determining the baseline scenario is relevant, and correctly quoted and interpreted in the project description.

Relevant national and/or sectoral policies and circumstances have been considered and are listed in the project description.

As per AMS III.D, the baseline scenario is

In the absence of the project activity, animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere.

If all or part of the electricity generated by the project activity is exported to the grid, the baseline scenario for all or the part of the electricity exported to the grid is assumed to be electricity generation in existing and/or new grid-connected power plants.

As per CDM Validation and Verification Standard for project activities version 02.0, "where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the VCS PD selected to determine the most realistic baseline scenario." As the selected large-scale methodology clearly mention the baseline scenario and the same has been opted in this project, therefore, no further analysis on baseline is required.

The assessment team, therefore, concludes that the VCS PD conforms to the guidance given by EB via CDM Validation and Verification Standard for project activities version 02.0 and VCS via VCS standard version 4.0.

Assessment team confirms that the Project has been approved by Turkey government by checking the Project approval and Environmental Impact Assessment (EIA) approval. By checking laws and regulation, it is confirmed that the project activity is in complicate with all laws and regulations in Turkey.

3.3.5 Additionality

The paragraph 15 of the approved methodology of AMS-III.D., version 21.0, applied to the proposed project activity, states that "Project activities may demonstrate the additionality by showing that there is no regulation in the host country, applicable to the project site, that requires the collection and destruction of methane from livestock manure. If so, it is not required to apply the 'Guidelines on the demonstration of additionality of small-scale project activities'".

Para 2 of the section 3.13.1 of the VCS Standard V4.1 states that “the project proponent shall demonstrate to the validation/verification body that the simplified procedure is appropriate to apply to the project considering the project characteristics, including the context in which the project activity takes place.”

PP has stated that project is limited to a small farms’ community and only 28 small farms are part of the project, this makes the project characteristics unique. A list of the farms with their animal capacity has been submitted to the DOE. VVB has cross verified the farm list submitted by the PP.

As explained in the baseline selection section, there is no legal regulation to mandate the livestock farm owners to implement different anaerobic lagoon design and to capture and/or utilize methane generated at these lagoons, the continuum of this common practice -without making any modification of their existing manure management systems which are based on uncovered anaerobic lagoons/ponds- is the most economic, viable and reasonable for cattle farm owners. . Thus, it is not required to apply the ‘Guidelines on the demonstration of additionality of small-scale project activities’. Accordingly, Type III component of the proposed project activity, as methane recovery from animal manure, shall be considered as deemed additional.

Moreover, the paragraph 16 of AMS-III.D., version 21.0. clarifies that “This additionality condition also applies to Greenfield project activities. Furthermore, for project activities applying this methodology in combination with a Type I methodology, that has an energy component whose installed capacity is less than 5 MW, this procedure for additionality demonstration also applies to that component”.

By interviewing Plant staff, consultant, and document review, it is confirmed by the assessment team that project captures and utilizes biogas from animal manure in anaerobic digesters to generate electricity with biogas engines/units with the total installed capacity 1.5 MW, lower than 5 MW. Hence, as per the paragraph 16 of AMS-III.D., version 21.0, it is not required to apply the ‘Guidelines on the demonstration of additionality of small-scale project activities’ to the Type I component of the proposed project activity. Therefore, the project activity is deemed automatically additional.

3.3.6 Quantification of GHG Emission Reductions and Removals

Assessment team checked the baseline, project and leakage calculation and confirm that the evaluation of baseline, project and leakage is as per the approved methodology and formula used to calculate the same is correct. The detail analysis is as below:

Baseline Emission calculation for Manure management:

Baseline emission shall be calculated using the Option Para 17 (b) as follows: As per AMS III.D., version 21.0., baseline emissions are determined as follows:

Equation (1)

$$BE_y = GWP_{CH_4} \times D_{CH_4} \times UF_b \times \sum_{j,LT} (MCF_j \times B_{0,LT} \times Q_{manure,j,LT,y} \times SVS_{j,LT,y})$$

Where:

$Q_{manure,j,LT,y}$ = Quantity of manure treated from livestock type LT and animal manure management system j (tonnes/year, dry basis)

$SVS_{j,LT,y}$ = Specific volatile solids content of animal manure from livestock type LT and animal manure management system j in year y (tonnes/year, dry basis)

MCF_j = Annual methane conversion factor (MCF) for the baseline animal manure management system j

$B_{0,LT}$ = Maximum methane production potential of the volatile solid generated for animal type LT ($m^3CH_4/kg\text{-dm}$)

$$BE_{Other\ Cattle,y} = 28 \times 0,00067 \times 1000 \times 0,94 (0,76 \times 0,18 \times 15821 \times 0,8573)$$

$$BE_{Other\ Cattle,y} = 32719\ tCO_2eq/y$$

$$BE_{Hens,y} = 28 \times 0,00067 \times 1000 \times 0,94 (0,76 \times 0,39 \times 8417 \times 0,7641)$$

$$BE_{Hens,y} = 33616\ tCO_2eq/y$$

$$BE_{animal\ manure\ total,\ y} = 32719 + 33616$$

$$BE_{animal\ manure\ total,\ y} = 66335\ tCO_2eq/y$$

Calculation of Baseline Emissions as per AMS-I.D.

As per the paragraph 22 of AMS-I.D, version 18., baseline emissions include only CO2 emissions from electricity generation in power plants that are displaced due to the

project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

Equation (2)

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

Where:

BE_y = Baseline emissions in year y (t CO₂)

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

$EF_{grid,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO₂/MWh)

Since the proposed project activity is the installation of a greenfield power plant, as per the paragraph 26 of AMS-I.D, version 18., $EG_{PJ,y}$ is calculated as follows:

Equation (6)

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

Where:

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

As per the paragraph 23 of AMS-I.D, version 18., the emission factor shall be calculated in a transparent and conservative manner. The project participants choose to calculate a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”, version 07.0.

Based on 2018 data, Ministry of Energy and Natural resources of Turkey has calculated combined margin and published the data:

$$EF_{grid,CM,y} = 0.5403$$

$$BE_{EC,y} = 10,500 \times 0.5403$$

$$BE_{EC,y} = 5,673 \text{ tCO}_2\text{eq/y}$$

Calculation of Project Emissions as per AMS-III.D.

In accordance with AMS-III.D., version 21.0., Project activity emissions consist of:

- (a) Physical leakage of biogas in the manure management systems which includes production, collection and transport of biogas to the point of flaring/combustion or gainful use ($PE_{PL,y}$);
- (b) Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$);
- (c) CO₂ emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$);
- (d) CO₂ emissions from incremental transportation distances;
- (e) Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$)

Accordingly,

Equation (10)

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y}$$

Where:

PE_y = Project emissions (tCO₂e)

$PE_{PL,y}$ = Emissions due to physical leakage of biogas in year y (tCO₂e)

$PE_{flare,y}$ = Emissions from flaring or combustion of biogas stream in the year y (tCO₂e)

$PE_{power,y}$ = Emissions from use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO₂e)

$PE_{transp,y}$ = Emissions from incremental transportation in the year y (tCO₂e), as per relevant paragraph in AMS-III.A0

$PE_{storage,y}$ = Emissions from the storage of manure (tCO₂e)

As per the paragraph 21(b) of AMS-III.D., version 21.0., project emissions due to physical leakage of biogas from the animal manure management systems

$$PE_{PL,y} = PE_{CH_4,y} = Q_{CH_4} \times EF_{CH_4,y} \times GWP_{CH_4}$$

Where:

$PE_{CH_4,y}$ = Project emissions of methane from the anaerobic digester in year y (t CO₂e)

$Q_{CH_4,y}$ = Quantity of methane produced in the anaerobic digester in year y (t CH₄)

$EF_{CH_4,default}$ = Default emission factor for the fraction of CH₄ produced that leaks from the anaerobic digester (fraction)

GWP_{CH_4} = Global warming potential of CH₄ (t CO₂ /t CH₄)

As per the paragraph 23 of AMS-III.D., version 21.0., project emissions from electricity and fossil fuel consumption are determined by following the methodological tool “Project and leakage emissions from anaerobic digesters”, version 02.0., where PE_{power,y} is the sum of PEEC,y and PEFC,y in the tool.

Nevertheless, the rest of the electricity consumed at the plant will be supplied by the Turkish national grid. Hence, as per the paragraph 19 of the methodological tool “Project and leakage emissions from anaerobic digesters”, version 02.0.,

$$PE_{PL,y} = 3015 \times 0,028 \times 28$$

$$PE_{PL,y} = 2364 \text{ tCO}_2\text{eq/y}$$

Following tool has been used “Methodological tool – Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, version 03.0. In accordance with the Tool, in the generic approach, project emissions from consumption of electricity are calculated based on the quantity of electricity consumed,

an emission factor for electricity generation and a factor to account for transmission losses, as follows:

Equation (12)

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

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (t CO₂ / 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 CO₂/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source j in year y

j = Sources of electricity consumption in the project

$$PE_{power,y} = 612 \times 0,5403 \times (1 + 0,11)$$

$$PE_{power,y} = 367 \text{ tCO}_2\text{eq/y}$$

In accordance with the paragraph 22 of AMS-III.D., version 21.0., in the case of flaring of the recovered biogas, project emissions are estimated using the procedures described in the methodological tool “Project emissions from flaring”, version 03.0.

In the proposed project activity, an enclosed flare will be installed. The flare is installed for the case of emergency and malfunction in the plant. Thus, $PE_{flare,y}$ is considered as zero. Nevertheless, the monitoring plan of the facility shall measure the quantity of captured methane fed to the flare. If such measurement is positive, the emissions from flaring the biogas shall be determined following the procedure described in the methodological tool project emissions from flaring, version 03.0.

Equation (13)

$$PE_{flare,y} = GWP_{CH_4} \times \sum_{m=1}^{525600} F_{CH_4,RG,m} \times (1 - \eta_{flare,m}) \times 10^{-3}$$

Where:

$PE_{flare,y}$ = Project emissions from flaring of the residual gas in year y (tCO₂e)

GWP_{CH_4} = Global warming potential of methane valid for the commitment period (tCO₂e/tCH₄)

$F_{CH_4,RG,m}$ = Mass flow of methane in the residual gas in the minute m (kg)

$\eta_{flare,m}$ = Flare efficiency in minute m

As per the paragraph 24 of AMS-III.D., version 21.0., project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for if both condition (a) and condition (b) below are satisfied:

- (a) The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester;
- (b) The dry matter content of the manure when removed from the animal barns is less than 20%.

Since the storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester in the proposed project activity, $PE_{storage,y}$ shall be accounted as zero.

In accordance with AMS-III.D., version 21.0., $PE_{transp,y}$ is calculated as per the paragraph 14 of AMS-III.AO, version 01.0., which states project emissions due to incremental transport distances ($PE_{transp,y}$) are calculated based on the incremental distances between:

- (i) The collection points of biomass and/or manure and the digestion site as compared to the baseline solid waste disposal site or manure treatment site;
- (ii) When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site;

- (iii) Treatment sites and the sites for soil application, landfilling and further treatment of the residual waste.

Equation (13)

$$PE_{trans,y} = (Q_y/CT_y) \times DAF_w \times EF_{CO2,transport} + (Q_{res.waste,y}/CT_{res.waste,y}) \times DAF_{res.waste} \times EF_{CO2,transport}$$

Where:

Q_y = Quantity of raw waste/manure treated and/or wastewater co-digested in the year y (tonnes)

CT_y = Average truck capacity for transportation (tonnes/truck)

DAF_w = Average incremental distance for raw solid waste/manure and/or wastewater transportation (km/truck)

$EF_{CO2,transport}$ = CO2 emission factor from fuel use due to transportation (kgCO2/km, IPCC default values or local values may be used)

$Q_{res.waste,y}$ = Quantity of residual waste produced in year y (tonnes) (accounted as zero)

$CT_{res.waste,y}$ = Average truck capacity for residual waste transportation (tonnes/truck)

$DAF_{res.waste}$ = Average distance for residual waste transportation (km/truck)

$$PE_{trans,y} = (98375 / 21) \times 7 \times 0,245$$

$$PE_{trans,y} = 8034 \text{ tCO}_2\text{eq/y}$$

Calculation of Project Emissions as per AMS-I.D.

As per the paragraph 39 of AMS-I.D., version 18.0., for most renewable energy project activities, $PE_y = 0$. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of “ACM0002: Grid-connected electricity generation from renewable sources”:

- (a) Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption);
- (b) Emissions from water reservoirs of hydro power plants.

Leakage Emissions as per AMS-III.D.

The footnote 1 of the methodological tool “Project and leakage emissions from anaerobic digesters”, version 02.0., states that if the storage of digestate or the composting of digestate is occurring within the project boundary, these emissions will be considered as project emissions. Hence, since both the storage of digestate is occurring within the project boundary and no composting is applied to the proposed project activity, LEy shall be accounted as zero.

Leakage Emissions as per AMS-I.D.

Since the methodological tool “Project and leakage emissions from biomass”, version 04.0, is regarding the use of biomass residues which is not applicable to the proposed project activity, LEy as per AMS-I.D., version 18.0., shall be accounted as zero.

Estimated Emission reduction is:

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1	72,008	10,765	0	61,243
Year 2	72,008	10,765	0	61,243
Year 3	72,008	10,765	0	61,243
Year 4	72,008	10,765	0	61,243
Year 5	72,008	10,765	0	61,243
Year 6	72,008	10,765	0	61,243
Year 7	72,008	10,765	0	61,243
Year 8	72,008	10,765	0	61,243
Year 9	72,008	10,765	0	61,243
Year 10	72,008	10,765	0	61,243
Total	720,080	107,650	0	612,430

The validation team confirms the following:

All relevant assumptions and data are listed in the project description, 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.

TÜV SÜD's 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

NA

3.3.8 Monitoring Plan

The approved baseline and monitoring methodology "AMS III.D", version 021 has been applied.

The monitoring plan is in accordance with the monitoring methodology; the monitoring plan will give opportunity for real measurement of achieved emission reductions. TÜV SÜD's team has checked all the parameters presented in the monitoring plan against the requirements of the methodology; no deviations relevant to the project activity have been found in the plan.

TÜV SÜD's team confirms that the monitoring arrangements described in the monitoring plan are feasible within the project design, and the means of implementation of the monitoring plan are sufficient to ensure the emission reductions achieved by/resulting from the proposed VCS project activity can be reported ex post and verified.

Parameters Determined Ex-ante

The ex-ante parameters that are mentioned in the methodology are included in the VCS PD and are provided in compliance with the methodology:

	Data / Parameter	Unit	Value applied	Assessment
/1/	D _{CH4}	t/m ³	0.00067	PP has chosen a default value of density of methane. The same is as per the methodology AMS III.D. The justification was accepted by the validation team

/2/	GWP _{CH4}	t CO ₂ e/t CH ₄	28	Default value from IPCC is used as per the applied methodology and as per Version 4.0 of the VCS Standard
/3/	UF _b	Fraction	0.94	PP has chosen a default value of model correction factor. The same is as per the methodology AMS III.D. The justification was accepted by the validation team
/4/	MCF _j	Fraction	0.76	Default value from IPCC is used as per the applied methodology and as per Version 4.0 of the VCS Standard
/5/	B _{0,LT}	m ³ CH 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 4.0 of the VCS Standard
/6/	EF _{CO2,transport}	gCO ₂ /t km	245	Methodological tool: Project and leakage emissions from transportation of freight Version 1.1.0 ⁴
/7/	EF _{CH4,default}	Fraction (t CH ₄ leaked / t CH ₄ produced)	0.028	Methodological Tool: Project and leakage emissions from anaerobic digesters, Version 02.0 ⁵

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v2.pdf>

/8/	$EF_{CO2,grid,y} = EF_{EF,j,y}$	tCO ₂ e/ MWh	0.5403	<i>Published data from The Ministry of the Energy and Natural Resources in Turkey⁶</i>
/9/	TDL _{j,y}	%	0.11	<i>Calculated from the Data Provided by Turkish Electricity Transmission Corporation (TEİAŞ)⁷</i>

Parameters Monitored Ex-post

The ex-post parameters that are mentioned in the methodology are included in the VCS-PD and are provided in compliance with the methodology, and they will be monitored during the crediting period:

	Parameter	Description/Assessment
/1/	VS (kg-dm/animal/day)	Volatile solid excretion rate per day on a dry-matter basis for a defined livestock population Volatile solids will be measured at laboratory at project site. The three main equipment used to determine volatile solid excretion rate in animal waste are as follow: - Muffle Furnace: MagmaTherm MTP-1100-20-P PRIMARY 1100°C Kamara; - Dry air sterilizer ELEKTROMAG M5040 P; Radweg Balances and Scales Model AS 220.R2 Logbook records will be maintained for cross verification.
/2/	Q _{CH₄,y} (tCH ₄ /y)	The two main equipment used to determine Quantity of methane produced in the anaerobic digester are as follow: - Flow meter of blower (Proline Prosonic Flow B 200 HART) which provides an instantaneous data on the amount of biogas sent to the biogas engines from the anaerobic digesters; - Gas analyzer (AwiFLEX Cool+/XL) which provides an instantaneous data on the methane content in the biogas sent to the biogas engines

⁶ https://enerjiapi.etkb.gov.tr/Media/Dizin/ETKB/Duyurular/0c6b62ea-bf2f-4fea-b9b3-28bc6f48ddf2_Bilgi_Formu_-_Web_Sitesi.pdf

⁷ <https://webapi.teias.gov.tr/file/512cbf1d-0ca3-4492-b901-3722c7b682f7?download>

		Logbook records will be maintained for cross verification.
/3/	FE (%)	A flow meter has been installed to measure flare efficiency Data will be recorded every minute and will be accumulated for the month.
/4/	$Q_{\text{manure,LT,y}}$ (Tonnes-dm/year)	Quantity of manure treated from livestock type LT at animal manure management system j Each manure load transported to the site will be measured with weight balance / or truck load capacity. In case of weigh bridge failure. Rated capacity of truck load will be considered for the calculation
/5/	$PE_{\text{power,y}}$ MWh/yr	Parameters related to emissions from electricity and/or fuel consumption in year y. This parameter will be monitored using energy meter Class 0.5S Monthly bill supplied by electricity authority will be cross verified.
/6/	CT,y tonnes/truck	Average truck capacity for transportation Ex ante value estimated according to specifications of on-site truck. The procedure is considered appropriate given that no other practical methods exist which would materially improve accuracy.
/7/	DAFw Km/Truck	Average incremental distance for raw solid manure transportation. Direct measurement of the distance between the collection point of manure to manure discharge point.
/8/	$EG_{\text{facility,y}}$ MWh/yr	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y This parameter will be monitored using energy meter Class 0.5S. Electricity meter / Bill generated will be cross verified.

Management System and Quality Assurance

The validation team checked the O&M structure along with the roles and responsibilities assigned. It is checked that the measurement reports /data will be verified and approved by the head of control and operation section. The head section will also have the responsibility to consolidate and report data to the operation and maintenance manager. The same was also confirmed during the interviews.

The monitored data will be kept for two years after the end of the crediting period or the last issuance of VERs in line with the standard.

The validation team confirms that the monitoring arrangements described in the monitoring plan are feasible within the project design; The means of implementation of the monitoring plan, including the data management, emergency preparedness and quality assurance and quality control procedures, are sufficient to ensure that GHG emission reductions achieved by/resulting from the proposed VCS project activity can be reported ex post and verified.

3.4 Non-Permanence Risk Analysis

NA

4 VALIDATION CONCLUSION

TÜV SÜD South Asia Pvt has performed a validation of the project activity “BYZ Global Energy Biogas Plant ”. The validation was performed on the basis of VCS Version 4.0 requirements as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided TÜV SÜD with sufficient evidence to determine the fulfilment of stated criteria.

The project correctly applied the following baseline and monitoring methodology

AMS-III.D.: “Methane recovery in animal manure management systems”, Version 21.0

AMS-I.D.: “Grid connected renewable electricity generation”, Version 18.0

The purpose of the proposed project activity is to generate renewable energy by capturing biogas from cattle 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 manure management system, cattle manure generated at farms, which is left to decay in and around farms in aerobic conditions.

The total net anthropogenic GHG removals from the project are estimated as 612,430 tCO₂e for the selected first 10-year fixed crediting period, with an average value of 61,243 tCO₂e per year. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change. The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is TÜV SÜD opinion that the project participants are able to implement the monitoring plan.

In summary, it is TÜV SÜD opinion that the project activity ““BYZ Global Energy Biogas Plant ” as described in the PD version 04.0 dated 12/11/2021 meets all relevant VCS version 4.0 requirements and correctly applies the baseline and monitoring methodology AMS-III.D.: “Methane recovery in animal manure management systems”, Version 21.0.

APPENDIX 1: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS AND FORWARD ACTION REQUESTS

CL from this validation

CL ID	01	Section no.	1.6	Date:	14/07/2021
Description of CL					
Please clarify role of “other entity” involved in the project					
Project participant response				Date:	15/07/2021
This is an error and deleted now					
Documentation provided by project participant					
Revised PD					
DOE assessment				Date:	22/07/2021
Revised VCS-PD received. CL is closed					

CL ID	02	Section no.	2.2	Date:	14/07/2021
Description of CL					
Documentary evidence for the Stakeholder’s meeting has to be submitted for verification. Also same has to be elaborated in the section 2.2.					
Project participant response				Date:	15/07/2021
Due to COVID-19 pandemic, stakeholder meeting could not be conducted. Exemption for the same has been sought from the VERRA.					
Documentation provided by project participant					
Mail communication with VERRA					
DOE assessment				Date:	22/07/2021
Since PP has asked exemption from conducting stakeholder meeting due to COVID-19 pandemic, CL is closed					

CARs from this validation

CAR ID	01	Section no.	1.1	Date:	14/07/2021
Description of CAR					
1. “cattle manure generated at farms, which is left to decay at and around farms in aerobic conditions”. PP should provide reference for the statement made.					
2. PP should use consistent unit of energy generated throughout the PD.					
Project participant response				Date:	15/07/2021

1. Baseline study report is submitted for the reference	
3. Unit is made consistent	
Documentation provided by project participant	
Baseline study report	
Revised PD	
DOE assessment	Date: 22/07/2021
Revised PD and Baseline study report are submitted. CAR is closed	

CAR ID	02	Section no.	1.10	Date: 14/07/2021
Description of CAR				
PP should use year 1, year 2.... and so on in the annual ER table.				
Project participant response				Date: 15/07/2021
Table is corrected in the PD				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 22/07/2021
Revised VCS-PD received. CAR is closed				

CAR ID	03	Section no.	1.11	Date: 14/07/2021
Description of CAR				
1. Manure reception area for chicken manure is not consistent in the section.				
2. Section has too many repetitive information. Please avoid it to make it transparent.				
Project participant response				Date: 15/07/2021
1. Details are corrected in the PD				
2. Section is updated and repetitive information deleted				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 22/07/2021
Revised VCS-PD received. CAR is closed				

CAR ID	04	Section no.	3.2	Date: 14/07/2021
Description of CAR				
PP has to justify each applicability criteria of the methodology for the project				
Project participant response				Date: 15/07/2021
Justification is added in the section				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 22/07/2021
Revised VCS-PD received. CAR is closed				

CAR ID	05	Section no.	3.3	Date: 14/07/2021
Description of CAR				
Local grid has to be included in the project boundary				
Project participant response				Date: 15/07/2021
Local grid added in the project boundary				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 22/07/2021
Revised VCS-PD received. CAR is closed				

CAR ID	06	Section no.	3.4	Date: 14/07/2021
Description of CAR				
Justification for baseline selection for AMS I.D is missing.				
Project participant response				Date: 15/07/2021
Baseline criteria as per AMS I.D is added				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 22/07/2021
Revised VCS-PD received. CAR is closed				

CAR ID	07	Section no.	4.1,4.2, 4.3	Date: 14/07/2021
Description of CAR				
PP should mention only those equation which are used in ER calculation.				
Project participant response				Date: 15/07/2021
Non relevant equations are deleted				
Documentation provided by project participant				
Revised PD				
DOE assessment				Date: 22/07/2021
Revised VCS-PD received. CAR is closed				

CAR ID	08	Section no.	4.4, 5.1, 5.2, 5.3	Date: 14/07/2021
Description of CAR				
4.4, 5.1, 5.2, 5.3 sections of the PD are incomplete. Information in the section 2.3 and 2.4 has to be completed.				
Project participant response				Date: 15/07/2021
All sections are completed now in the revised PD				
Documentation provided by project participant				
Revised PD				

DOE assessment	Date: 22/07/2021
Revised VCS-PD received. CAR is closed	