BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT

Document Prepared by

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Project Title	BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT
Version	5.0
Report ID	10975SK

Report Title	Validation report of "BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT"
Client	BIOTREND Çevre ve Enerji Yatırımları Anonim Şirketi
Date of Issue	14/09/2022

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Summary:

TÜV SÜD South Asia Pvt. Ltd , commissioned by BIOTREND Çevre ve Enerji Yatırımları Anonim Şirketi has performed the validation of **BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT** (hereafter referred to as "the project") on the basis of requirements of Verified Carbon Standard (VCS) Version 4.1.

The project is to utilize landfill gas (LFG) for electricity generation. The project involves the construction and operation of 14.14 MW LFG power generation project in Balıkesir Province, Altıeylül District, Gökköy village. The project is expected to supply electricity per year to the Grid, displaces the equivalent power generated by the existing power plants and likely capacity additions within the given grid and avoids GHG emissions from releasing LFG into atmosphere at the landfill site.

The validation is an independent 3rd party assessment of the project's baseline, estimated GHG emission reductions or net anthropogenic GHG removals, the monitoring plan and the crediting period using the applicable CDM and VCS requirements, Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated Verified Carbon Units (VCUs). Verification is the periodic independent review and ex-post determination by a VVB of the monitored reductions in GHG emissions during defined verification period. In carrying out its verification work, the VVB shall ensure that the project complies the applicable CDM and VCS requirements.

The scope of the validation and verification is defined as an independent and objective review of the Project Description, the project's baseline study and monitoring plan, the emission reduction calculation spreadsheet and other relevant documents refer to VCS Version 4.2 standard and CDM requirements.

A risk-based approach has been followed to perform this validation and verification activity. TUV SUD appointed a qualified team in accordance with internal procedures to perform the validation. During the validation, 09 Clarification Requests (CL), 07 Corrective Action Requests (CARs) and no forward action request (FAR) were raised.

In conclusion, it is TUV SUD opinion that the project “BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT”, in the VCS PD (version 4.0 dated 01/08/2022) meets all relevant requirements for VCS activities and all relevant host Party criteria and correctly applies methodologies “ACM0001: Flaring or use of landfill gas, Version 19.0”.

CONTENTS

1 INTRODUCTION

1.1 Objective

BIOTREND Çevre ve Enerji Yatırımları Anonim Şirketi has commissioned TUV SUD to performed the validation of BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT (hereafter referred to as "the project, on the basis of requirements of Verified Carbon Standard (VCS) Version 4.2.

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 was performed on the basis of VCS criteria. The information in these documents is reviewed against CDM Validation and Verification Standard, VCS standard version 4.2 and associated interpretations.

- TUV SUD has, based on the instructions in the VVS employed a risk-based and step-wise approach when conducting the validation, focusing on the identification of significant risks for project implementation and the generation of VCUs. The validation is not meant to provide any consulting towards the PPs. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design. The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the TUV SUD. The verification scope covers the relevant documents (e.g. VCS PD , the monitoring plan, the emission reduction calculation spreadsheet ,supporting documents available to the validator and information collected through performing interviews and during the remote site inspection, VERRA's requirements publicly available, relevant rules, including the host country legislation, etc.) to be independently reviewed, the project geographical locations to be visited remotely, the related project local stakeholders to be interviewed with, and processes that are necessary to acquire objective evidence for the evaluation of the project compliance to the VCS requirements and associated interpretations.

- The validation activities are conducted according to the VERRA's requirements. In doing so, the principles of accuracy and completeness, relevance, reliability and credibility were followed. The verification is not meant to provide any consulting service towards the PPs. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project.

1.3 Level of Assurance

TUV SUD has undertaken a reasonable assurance engagement in accordance with VCS Standard (version 4.1). The validation conclusions are based on the VCS PD and supporting evidences made available to the VVB and information collected through performing interviews and during the on-site inspection.

1.4 Summary Description of the Project

The project is to utilize landfill gas (LFG) for electricity generation. The project involves the construction and operation, out of 10 gas engines, 8 has been installed and another 2 will be commissioned by 2023. PP has planned 10 gas engines with an installed capacity of 1.414 MWe each, total capacity 14.14 MWe., where the LFG is burnt and converted into electric power. The generated power is fed into the Grid and it is further delivered to the consumers through power transmission lines.

The geographical coordinates for the project site are longitude of +27.853139 and latitude of +39.612806.

The project is expected to supply of electricity per year to the Grid, displaces the equivalent power generated by the existing power plants and likely capacity additions within the given grid and avoids GHG emissions from releasing LFG into atmosphere at the landfill site. The total amount of emission reductions is 2,344,393 tCO2e during the 7 years crediting period, and the average annual emission reductions are 334,913 tCO2eq/y tCO_2e.

The starting date of the project activity and the start date of the crediting period is 27/10/2019. 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 renewable crediting period of 7 years, twice renewable for a total of 21 years. Its first crediting is from 27/10/2019 to 26/10/2026 (the start and end dates included).

2 VALIDATION PROCESS

2.1 Method and Criteria

The overall validation, from Contract Review to Validation Report and opinion, was conducted using TUV SUD internal procedures.

The process includes three phases:

1) Desk review of documents;

2) On-site inspection and follow-up interviews;

3) final Validation Report and opinion.

TUV SUD validated the project against the requirements set in VCS requirements, and other relevant VCS requirements. No sampling was utilized during the on-site inspection as well as validation and verification for project activity. 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
VCS Team Leader, VCS Validator	Kewat	Shailendra	India
Technical Expert	Nambiar	Dhanya	India
Technical Reviewer	Murty	Eswar	India
Technical Expert (TR)	Menon	Rekha	India

2.2 Document Review

A desk review of the VCS PD and supporting documents was conducted by the assessment team. The aim of the desk review of the documentation was to verify correctness, credibility, interpretation and completeness of presented data and information, and to cross check between information provided in the updated VCS PD and information from sources other than that used, if available.

Review of the appropriateness of formulae and correctness of calculations was also carried out during this stage based on the approved methodology being applied. And particular attention was given to the quality of the metering equipment including calibration requirements, the monitored data and its evidence, and the emission reduction calculation. The evaluation of data management and the quality assurance and quality control system in

the context of their influence on the generation and reporting of emission reductions was also conducted.

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

/1/	VCS PD for "*BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT*" version 5.0 of 06/09/2022
/2/	Emission Reduction spread sheets version 5.0 of 06/09/2022
/3/	IRR calculation sheet version 2.0 of 10/02/2022
/4/	SEF Engineering Germany Feasibility study: January 2019
/5/	BİOTREND Energy: Gas Engine supply contract with GE Jambecher, dated 21/12/2018
/6/	Ministry of Energy and Natural Resources in Turkey: Commissioning certificate, dated 27/10/2019
/7/	Ministry of Environment and Urbanization in Turkey: EIA approval issued, dated 26/05/2008
/8/	Electricity Generation License (EGL) issued by the Energy Market Regulatory Authority (EMRA) in Turkey on 17/10/2019
/9/	Declaration for no double counting, dated 07/02/2022
/10/	The data sheet of the flare manufacturer CONVECO on flare specification
/11/	TAX rate applicable: https://www.pwc.com.tr/en/hizmetlerimiz/vergi/bultenler/2021/corporate-income-tax-rate-increased.html#:~:text=Corporate%20Income%20Tax%20rate%20increases,23%25%20for%20the%20year%202022 https://www.vatupdate.com/2021/04/26/vat-rates-in-turkey/
/12/	CDM Executive Board: ACM0001 Version 19, "Flaring or use of landfill gas [1]"
/13/	CDM Executive Board: "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", version 03.0
/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 -TOOL04 "Emissions from solid waste disposal sites" (Version 08.0).

[1] https://cdm.unfccc.int/methodologies/DB/JPYB4DYQUXQPZLBDVPHA87479EMY9M

/17/	CDM Executive Board: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0):
/18/	VCS: VCS standard, V 4.2, dated 20/01/2022
/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 03
/22/	2006 IPCC guidelines for National Greenhouse Gas inventories, volume 2

2.3 Interviews

The objective of the interview process was to solicit important information from personnel related to project and relevant to the validation and verification process. Remote interviews and information discussions were conducted with PP. The key personnel interviewed are summarized in the table below: -

	Date	Name and Role	Organization	Topic
1	05/02/2022	Zülfikar KOÇ	Plant Manager, Biotrend	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.
2	05/02/2022	Onur AKDENİZ	Environmental Engineer, Biotrend	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.

3	05/02/2022	Mert KARAOSMANOĞLU	Project Engineer, Biotrend	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.
4	05/02/2022	Laura Cubillos	Consultant, Biosolutions	Eligibility Criteria, Baseline and Additionality, Applicability Conditions, Emission reductions calculations, additionality and investment analysis, starting date and crediting period. Social & Environmental impacts
5	05/02/2022	İlayda Onaran	Consultant, Biosolutions	Eligibility Criteria, Baseline and Additionality, Applicability Conditions, Emission reductions calculations, additionality and investment analysis, starting date and crediting period. Social & Environmental impacts
6	05/02/2022	Adrian Caduff	Manager, Biosolutions	Eligibility Criteria, Baseline and Additionality, Applicability Conditions, Emission reductions calculations, additionality and investment analysis, starting date and crediting period. Social & Environmental impacts
7	05/02/2022	Tuncay BAYMAN, Neighbouring resident	-	Awareness about the pros and cons of the project

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 30 June 2022 as per p.28 EB 108 & 112. The DOE has used standard auditing techniques as per section 7.1.3 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

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 4.1 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.

The final VCS PD Version 2 submitted by project owners on 10/02/2022 serves as the basis for the final assessment presented. Additional changes to the project during the validation process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Project design document	00	00	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	01	01	00
- Deviation from methodology	00	00	00
- Clarification on applicability of methodology, tool and/or standardized baseline	01	01	00
- Demonstration of additionality	01	01	00
- Emission reductions	01	01	00
- Monitoring plan	01	01	00
-Stakeholders consultation process	00	01	00
- Public comments	00	00	00
Others (please specify)-Matter related to double counting-	01	00	00
Others (please specify)-Matter related to Emission reduction calculation- ER achieved – Actual ER achieved calculations,	02	00	00
Total	09	07	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

The project is a landfill gas recovery and power generation project of which the main purpose is to use landfill gas for electricity generation. The total installed capacity of the project is 14.14 MW. The project uses LFG from landfill Site for power generation. During the 7 years crediting period, the power generated by the project will be exported to the grid.

The project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants. Meanwhile by utilization the landfill gas recovered by project, the project avoids the emission of methane that would be generated under landfill condition. It's estimated that the project could achieve average annual GHG emission reductions of 2,344,393 tCO2e during this crediting period.

The engines installed in the project are Genset JGS 420 GS-L-L characterized by a high-power density and efficiency.

Technical specifications Janbacher Genset JGS 420 GS-L-L[2]

Technical specifications	
Electrical output	1414 kW
Voltage	480V-13.8kV
Thermal Output	980-1.720kW
Thermal Efficiency	Up to 43%
Fuel Type	Flexible
	

Technology Units

The technology to be employed will be the improvement of landfill gas collection and flaring, through the installation of an active recovery system composed by:

List of Units

Number Installed	MACHINE AND EQUIPMENT (Type and Technical Properties)	Total Capacity (kW)
8	JENBACHER Gas Engine	11,312
8	Transformer (2000 kVA)	0
8	Alternator	1400
8	Turbo (ABB)	0

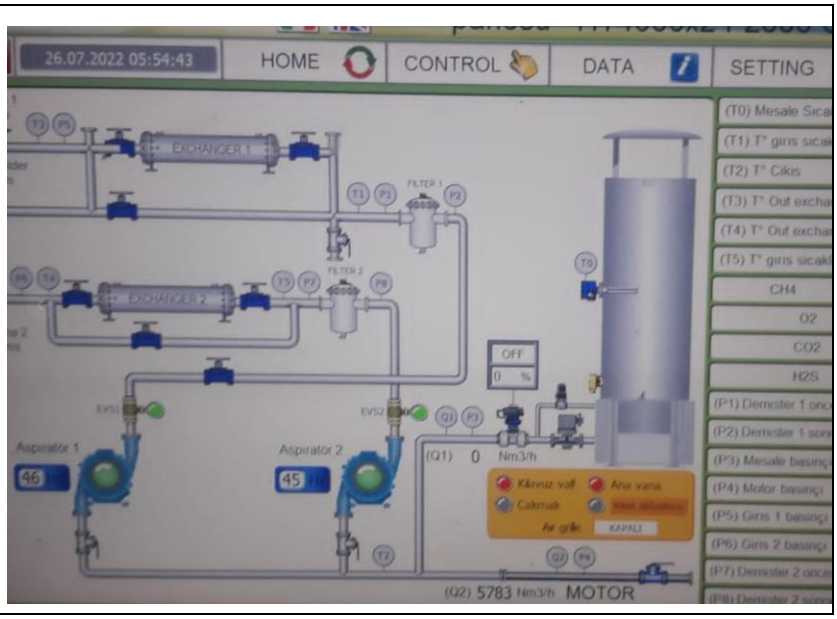
[2] See document Balikesir Gas Engines Datasheet.

1	Transformer (internal need) (800 kVA) (Maksan)	0
1	Chiller (122.18 kW/h)	0
1	Chiller (255 kW/h)	0
1	Exchanger (3-4,5 bar)	0
1	Exchanger (1-9 bar)	0
3	Blower	3*55
1	CONVECO Booster and Flare Unit	0

Technical specification CONVECO S. r. l. Static closed chamber flare

Technical specifications	
Capacity range	Designed for combustion of 300 m3/h of biogas Flow capacity rage (50-2,500 m3/h)
Combustion temperatures	850-1100 °C
Flame retention	>0.3 sec
Operation	PLC

	Static closed chamber flare 
On-site installation of flare	

Control panel visualization from flare system.	

Through document review and remote - site inspection, the technical specifications are confirmed by the assessment team.

Through document review and on-site inspection, the assessment team confirmed the details of the project proponent as:

Organization name	BIOTREND Çevre ve Enerji Yatırımları Anonim Şirketi
Contact person	Zülfikar Koç
Title	Project Manager
Address	Kavacık Mahallesi, Ekinciler Caddesi, Ertürk Sokak No: 3/1, İç Kapı NO:1, Beykoz, 34810, İstanbul/TURKEY
Telephone	+90 538 403 84 61
Email	zulfikar.koc@biotrendenerji.com.tr

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Organization name	BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri Sanayi ve Ticaret Limited Şirketi (LLC.)
Contact person	Adrian CADUFF

Title	Managing Partner
Address	AKDENİZ MAH. ŞEHİT FETHİBEY CAD. NO: 55 İÇ KAPI NO: 091 KONAK, 35210, İZMİR/TURKEY
Telephone	+905383384626
Email	a.caduff@biosolutions.com.tr

Ownership

By checking business license and Project Approval, the assessment team confirmed that Biotrend Çevre ve Enerji Yatırımları A.Ş. is the project owner and also project proponent (PP) of the project. Apart from the Biotrend, another entity “Ilda Enerji” is also shareholder in the project. A declaration submitted by the “Ilda Enerji” authorizing “Biotrend Çevre ve Enerji Yatırımları A.Ş” for the project operation and the focal point. Therefore, Biotrend Çevre ve Enerji Yatırımları A.Ş., Ltd. has the legal right to control and operate the project.

Project Start Date

By checking commissioning certificate of the project and remote-site inspection, the assessment team confirmed that the project started operation on 27/10/2019, which is the start date of the project.

Project Crediting Period

Assessment team confirms that the project adopts the renewal crediting period of 7 year as from 27/10/2019 to 26/10/2026 (the start and end dates are included).

Project Scale and Estimated GHG Emission Reductions or Removals

The total installed capacity of the project is 14.14 MW. As the estimated annual average GHG emission reductions or removal per year is 334,913 tCO2e which is more than 300,000 tonnes of CO_2e per year, thus the project falls in the category of Project. Therefore, the assessment team confirms that the project scale falls under Project.

Project Scale	
Project	
Large project	√

Estimated GHG emission Reductions or removals (tCO_2e)

Through checking emission reductions calculation spreadsheet provided by PP, the assessment team was able to confirm that the estimated GHG Emission Reductions or Removals of the project is as follows:

Year	Estimated GHG emission reductions or removals (tCO_2e)
1	207,155
2	259,740
3	289,390
4	325,491
5	376,155
6	419,203
7	467,259
Total estimated ERs	**2,344,393**
Total number of crediting years	7
Average annual ERs	334,913

The above estimated emission reduction is confirmed by the assessment team via emission reduction calculation spreadsheet. the assessment team confirmed that the calculation is correct and conservative.

Conditions Prior to Project Initiation

Before the implementation of the project, the electricity generated by the project would be supplied by the grid in the baseline scenario and the landfill gas combusted would be vented to the atmosphere.

Compliance with Laws, Statutes and Other Regulatory Frameworks

The 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.

Other Forms of Credit

Emissions Trading Programs and Other Binding Limits

The assessment team confirms that the Net GHG emission reductions or removals generated by the project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits. Further, Declaration in effect of the same has been submitted by PP to the assessment team and found to be correct. Thus, the assessment team concluded that the project activity not involved on other Emissions trading programs and other binding limits.

Other Forms of Environmental Credit

The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program. The undertaking regarding the same is submitted by PP which is acceptable to the assessment team.

Sustainable development contributions

The project would contribute sustainable development in the region in following aspects confirmed by remote-site inspection:

• Reduce air pollution. The project will utilize and destroy landfill gas that would otherwise be released directly into the atmosphere, effectively reducing air pollution and improving the environment around landfill.

• Improve the operational safety of the landfills. The project reduces the potential safety hazards of landfill gas explosion by recycling landfill gas and improves the safety of landfill operation.

• The construction and operation of the project will provide new local jobs and increase tax revenue, which will have a positive effect on the local economy. Overall, it is confirmed that the PD is accurate, complete, and provides an understanding of the nature of the project, and the project has been implemented as described in the project description.

Additional information relevant to the project

Eligibility criteria for grouped projects:

The project is not a grouped project.

Commercially sensitive information:

The financial analysis of the project investment as a whole and the values that have been discussed are considered as commercially sensitive information. In addition, the variables and their explanations that are used for the benchmark calculations in investment analysis that are subject to extensive research and effort which are classified as commercially sensitive information for the project developer. Baseline Information is confidential as well.

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

The Environmental Impact Assessment (EIA) Report of the project activity approved by the Agency. The assessment team confirm all environmental impacts has been analyzed and no net harm was detected.

Through interview with local stakeholders, it is confirmed by the assessment team the implementation of the project will improve local socio-economic development and contribute to the sustainable development as described in section 3.1 of this report above. In conclusion, it is confirmed by the assessment team the project has no negative impacts on local environment and socio-economy. And no net harm on local environment and social community has been detected for the project.

3.2.2 Local Stakeholder Consultation

As per the VCS requirements, it is necessary to invite the relevant stakeholders, prior of the validation process. The assessment team checked the relevance of the dates during the validation remote-site inspection.

Local stakeholder consultation was conducted through distributing questionnaires to local stakeholders by the project owner on 30/09/2021. Stakeholder’s feedback has been taken

by the interaction and by a feedback form on MS team platform. The questionnaire was reasonably designed to assess the project impacts on the local environment and social economic development.

Furthermore, a grievance book is put in the communication room at the project owner company. The local stakeholders can provide feedbacks through this way. Also, the village head will reach PO if any comments are received.

Thus, Validation team is of the opinion that the stakeholder meeting was adequate and appropriate. There were no negative comments raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

For the ongoing stakeholder's communication, PP has placed a grievance register onsite, where stakeholder can register their grievance or feedback and the same is reviewed by site manager/site in-charge and if found genuine addressed as per companies policy.

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. 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 25/03/2022/ to 24/04/2022 on its official VERRA/VCS webpage.

The detail was checked by the assessment team in the following web platform: https://registry.verra.org/app/projectDetail/VCS/2645

During the period, no public comments were received.

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3.2.5 AFOLU-Specific Safeguards

The project is not AFOLU project, and thus this section is not required.

3.3 Application of Methodology

3.3.1 Title and Reference

- The assessment team checked that following methodology and tools are applicable for the project activity as below:

  The large-scale methodology ACM0001 Version 19, "Flaring or use of landfill gas"

- Applied tools:

- TOOL02 "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 07.0) (hereafter also referred to as "Additionality tool").

- TOOL03 "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 03.0).

- TOOL04 "Emissions from solid waste disposal sites" (Version 08.0).
- TOOL06 "Project emissions from flaring" (Version 04.0).
- TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0).

- TOOL08 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0):

- TOOL11 "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 03.0.1).

3.3.2 Applicability

The project correctly applies the ACM0001 "Flaring or use of landfill gas" (version 19.0). The project activity meets the criteria defined in the methodology as it ensures that:

(a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or
(b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that: (i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and

(ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available;
(c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways:

(i) Generating electricity;

(ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace;1 and/or

(iii) Supplying the LFG to consumers through a natural gas distribution network;

(iv) Supplying compressed/liquefied LFG to consumers using trucks;

(v) Supplying the LFG to consumers through a dedicated pipeline;

(d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity

By checking the EIA Report and through online interview, the assessment team confirmed that in the absence of the project, LFG from Landfill site is emitted directly into atmosphere. The project activity Installs a new LFG capture system in an existing Landfill site where no LFG capture system was or would have been installed prior to the implementation of the project activity.
The project activity captures and uses LFG for power generation. Electricity generated by LFG will be exported to Grid, which could replace a certain amount of electricity generated by fossil fuel fired power plants. The project does not reduce the amount of organic waste that would be recycled in the absence of the project activity. Therefore, the methodology is applicable.

The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is:

(a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and
(b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln:
(i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or
(ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary;
(c) In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas.
(d) In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.
The most feasible baseline scenario of the project activity is:
- Atmospheric release of the LFG;
- and For electricity generation: that electricity would be generated in the grid.

This methodology is not applicable:

(a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace;

(b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.

The project activity only applies ACM0001. By checking the management manual of Landfill Site and through online interview, the assessment team confirmed that the management of the SWDS in the project activity will not be deliberately changed during the crediting period in order to increase methane generation compared to the situation prior to the implementation of the project activity.

Applicability conditions of "Emissions from solid waste disposal sites"
(a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. "ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS);
(b) Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions.

The project adopts Application A. By checking EIA Report, the assessment team confirmed that the project activity mitigates methane emissions from Landfill site. Methane emissions are mitigated by capturing for power generation (e.g. "ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the project activity. The tool is only applied for an ex ante estimation of emissions in the project description. The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS).

These two types of applications are referred to in the tool for determining parameters.
In the case that: (a) different types of residual waste are disposed or prevented from disposal; or that
(b) both MSW and residual waste(s) are prevented from disposal, then the tool should be applied separately to each residual waste and to the MSW.

Only MSW are disposed in Landfill site.

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.

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 online interview, the assessment team confirmed 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).

By checking the PPA of the project activity, the assessment team confirmed that the electricity supplied by the project was exported to 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.

By checking the PPA of the project activity, the assessment team confirmed that the electricity generated by the project activity was exported to Grid.

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. By checking the Project Approval of the project activity, the assessment team confirmed the project activity is not a CDM project.

Applicability conditions of "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"

Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions.
The project uses landfill gas for power plant. For ex post emission reduction estimation, this tool will be applied.
Methodologies where CO2 is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may not adopt this tool as material balances are the cost effective way of monitoring flow of CO2. The project activity adopts ACM0001, and CO2 is not the particular or only gas of interest. Therefore, the tool is applicable. The underlying methodology should specify:
(a) The gaseous stream the tool should be applied to;
(b) For which greenhouse gases the mass flow should be determined;
(c) In which time intervals the flow of the gaseous stream should be measured; and
(d) Situations where the simplification offered for calculating the molecular mass of the gaseous stream (equations (3) or (17)) is not valid (such as the gaseous stream is predominantly composed of a gas other than N2).

The project activity adopts ACM0001:
(a) the amount of methane in the LFG which is used for electricity generation for the project activity in year y is determined using the tool;
(b) CH4 is the greenhouse gas that the mass flow should be determined;
(c) The mass flow should be calculated on an hourly basis for each hour h in year y;
(d) The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations (3) or (17) in the tool).

Applicability conditions of " TOOL06 “Project emissions from flaring” (Version 04.0.0) "

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.

Project emissions are calculated in relation to the flaring of residual gas (LFG). All the flares in the project activity are enclosed flares, same has been confirmed during the PP interview and with photographs of the site. Hence meeting the criteria.

As per paragraph 3 of TOOL06 “Project emissions from flaring” (Version 04.0.0):

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).

The composition of the Landfill gas is around 60% (Methane) 40% CO2.
The residual gas is a biogenic source, it is a Landfill gas. same has been confirmed during with the PP interview, FSR and with photographs of the site. Hence meeting the criteria.

As per paragraph 4 of TOOL06 "Project emissions from flaring" (Version 04.0.0):

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 and these shall be followed by the project participant

All the flares in the project activity are enclosed flares, Conveco is the manufacturer and the flare specification are cross verified by the DOE.

TOOL11 "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period"

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.

PP will be following the stepwise approach during the renewal of the crediting period same has been confirmed during the interviews.

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 ACM0001, the project boundary includes the site of the project activity where the LFG is captured and destroyed/used, Landfill site and all grid-connected power plants.

The assessment team has applied the GPS instruments to check the project location and geocoordinates, which are consistent with the VCS PD.

The sources and GHG gases involved for the Project activity are as below: -

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from decomposition of waste at the SWDS site	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted since the CO_2 is also released under the project activity
		CH_4	Yes	The major source of emissions in the baseline
		N_2O	No	N_2O emissions are small compared to CH_4 emissions from SWDS. This is conservative.
		Other	-	-
	Emissions from electricity generation	CO_2	Yes	Major source of emissions in the baseline
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
		Other	-	N/A
Project	Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity	CO_2	Yes	Included. This system is used when the grid cannot be utilized in case of power failures.
		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	-	N/A
	Emissions from electricity consumption due to Project activity	CO_2	Yes	The emission from use of electricity is accounted for, since the proposed project may consume electricity for its own operation. However, since the proposed project activity does not involve fossil fuel consumption, the emission form use of fossil fuel (above) is not included.
		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	-	N/A

Source		Gas	Included?	Justification/Explanation
	Emissions from flaring or combustion of the gas stream	CO_2	Yes	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	Emissions are considered negligible
		N_2O	No	Emissions are considered negligible
		Other	-	N/A
	Emissions from distribution of LFG using trucks and dedicated pipelines	CO_2	No	Excluded for simplification since LFG captured at the project site is utilised via gas engines to generate electricity which is directly fed to 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	-	N/A

By checking the information by the document review, TUV SUD 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 that the selected sources and gases are justified for the project.

3.3.4 Baseline Scenario

As per ACM0001, the baseline scenario for LFG is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons. 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 Standard for project activities version 03.0, "where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the proposed CDM project activity in the PDD 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 the project, therefore, no further analysis on baseline is required. The assessment team confirms that the VCS PD confirms to the

guidance given by EB via CDM Validation Standard for project activities version 03.0 and Verra via VCS standard version 4.2.

VVB has confirmed the same by document review and interview with the personals.

The project captures LFG to produce electricity and supplies to the grid. In the absence of the project, LFG from Landfill Site is emitted directly into atmosphere which complies with all national and local regulations, and is the most common case in Turkey, the equivalent amount of power would have been supplied by grid, which is fed mainly by fossil fuel fired plants. The 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 is in complicate with all laws and regulations in Turkey.

3.3.5 Additionality

In the case of the proposed project activity, the Methodology of ACM0001 “Large-scale Consolidated Methodology: Flaring or use of landfill gas”, Version 19.03, is applied to the proposed project activity. Demonstration of additionality is accordingly carried as per the methodological Tool: “Combined tool to identify the baseline scenario and demonstrate additionality”, Version 07.[04.]

The following steps from the Tool are completed below:

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

STEP 1 – Identification of alternative scenarios;

STEP 2 - Barrier analysis;

STEP 3 – Investment analysis;

STEP 4 – Common practice analysis.

- STEP 0 – Demonstration whether the proposed project activity is the First-of-its-kind;
- Since the proposed project activity is not the first that applies biogas technology in Turkey, as the host country. Indeed, other previous projects are able to deliver the same output and have started commercial operation in Turkey before the start date of the proposed project activity.

[3] https://cdm.unfccc.int/methodologies/DB/JPYB4DYQUXQPZLBDVPHA87479EMY9M

[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf

- *The proposed project activity is not the first-of-its-kind.*
- STEP 1 and STEP 2
- *These steps are completed in the, Baseline Scenario. Hence, Step 3 will be completed below.*
- STEP 3 – Investment analysis;
- *Investment analysis is carried as per the methodological Tool:* "Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0[5].
- *Sub-step 3a: Determine appropriate analysis method*
- *There are three options which can be applied for the investment analysis. These are as follow:*
    - *Option I. Simple Cost Analysis;*
    - *Option II. Investment Comparison Analysis;*
    - *Option III. Benchmark Analysis*
- 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. PP has been decided to use the benchmark analysis for the evaluation of the project investment.
- Option III. Benchmark Analysis
- According to the "Tool for demonstration and assessment of Additionality (EB 99, Annex 3)", the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach. Therefore in accordance with the guidance, the relevant financial indicator for project activity has been chosen as post tax equity IRR.

***Choice of approach*:**

As the project generates financial and economic benefits other than VCS related income through the sales of electricity and heat and the alternative for the baseline scenario of the

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf

project does not involve an investment for the project participants, a benchmark analysis is justified for conducting the investment analysis of the project activity.

***Benchmark Selection*:**

As per "Investment Analysis", Version-11, para 15, "*The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or WACC are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate. The DOE shall validate that the benchmarks used are applicable to the project activity and the type of IRR calculation presented".*

PP has chosen Equity IRR for the investment analysis hence benchmark supplied by the World Bank for the similar kind of the project in Turkey has been chosen as the benchmark.

The Benchmark (20%) used for the financial analysis in the FSR was obtained from the World Bank report on financing the RE and EE projects[6]. The equity IRR (after tax) for similar project types (Biomass gas) in Turkey is 20%. As project activity produces electricity from the biomass gas, the equity IRR of the RE and EE projects in Turkey can be applied as the benchmark to this project. Thus, the assessment team was able to confirm the suitability of this benchmark.

The PP has considered parameters (such as PLF, project cost, tariff etc.) for project component. As per the host country requirement, cash flow and tax have been calculated for project. After calculation of post-tax cash flow for project.

Hence, PP has calculated equity IRR is considering net cash flow of project component. As presented in the attached Excel document on the equity IRR for the proposed project activity has been calculated as 14.90%. **Assessment of the sources used for input parameters**

The validation team checked that the input values discussed in the IRR analysis is taken from FSR, which is prepared by the third party "SEF Engineering Germany". The detailed discussion on how the input values were assessed in provided in the table below:

All the data used for the investment analysis were available at the time of the investment decision. The PD and the calculation spreadsheet presented the input parameters, as follows:

Assessment:

The key assumptions used to calculate the Equity IRR of the proposed project are presented in Table:

The assessment team compared the values stated in the PD with values determined in the FSR and was able to confirm that the input values are applied correctly in the PD.

[6] http://documents1.worldbank.org/curated/en/799701498842988254/pdf/ICR00004069-06192017.pdf

No	Parameter	Unit	Value	Source/ Assessment by TUV SUD
1	Gross capacity	MW	14.14[7]	Feasibility Study Report (FSR). Also checked against Commissioning certificate which agree that commercial operation date of the plant and also capacity of the plant.
2	Annual gross electricity generation	GWh	99.06	Feasibility Study Report (FSR). Also checked against Commissioning certificate which agree that annual gross electricity generation of the plant.
4	Equity investment cost	Million dollars	21.10[8]	As per the EPC contract
5	Total annual O&M cost	Dollars	4.49	Feasibility Study Report (FSR).
8	Period of financial assessment	year	20	Feasibility Study Report (FSR).
9	Electricity price	$ Cents/kWh	13.3[9]	As per PPA.
12	Post-tax equity IRR	%	14.90	

Total Investment:

The total investment cost is taken USD 21.10 million, which is based on the actual purchase order, There's no loan in the project activity. By checking the actual EPC contract signed between the project owner and EPC contractors the assessment team confirmed that the

[7] The electricty generation capacity subjected to be fed to the national grid.

[8] IRR Sheet

[9] http://www.lawsturkey.com/law/law-on-utilization-of-renewable-energy-sources-for-the-purpose-of-generating-electrical-energy-5346

investment cost of the project activity was USD 21.10 million, which is based on the actual project cost.

By checking the FSR prepared by the SEF Engineering Germany, the assessment team confirmed that the investment cost of the project activity was assumed USD 20.70 million, which is lower than the value of static total investment in the EPC contract. Therefore, the assessment team was able to confirm that the static total investment in the EPC contract was reasonable.

Therefore, the assessment team was able to confirm that the total investment in the IRR calculation was reasonable.

O & M Cost:

The Operation and Management Costs was estimated as USD 4.49 million in FSR, which accounts for about 12% of fixed asset investment. According to the "Formula of economic evaluation of biomass project" public available at internet that generally a rate of 10% - 35% is used as the ratio of management cost to fixed asset investment in Turkey for the Biomass projects. Thus, the management costs applied in the FSR was reasonable and conservative.

Therefore, the assessment team was able to confirm that the total investment in the FSR was reasonable.

Tariff:

The electricity generated by the LFG generators will be sold to the national grid. The same has been validated by the assessment team against the Commercial Contract for sale of electricity signed between the project owner and Turkish electricity authority. In the PPA, the purchasing price of electricity was estimated as the electricity tariff for financial analysis. Therefore, it's confirmed that the electricity tariff in the project activity is not under estimated. Also, PPA is signed for fixed 10 years and after that in general tariff rate[10] is below USD 7 cents. However, PP has taken a conservative approach and kept the tariff USD 13.30 cents after 11th year onwards. Therefore, the assessment team was able to confirm that the tariff considered for IRR calculation was reasonable.

Power output:

The total installed capacity of the biogas generators are 14.14 MW. The annual operational hours of the generators are about 8,760 hours and the plant load factor is 79.98%. The annual operational hours as well as the plant load factor was determined ex-ante in the FSR completed by an independent and qualified 3rd party SEF Engineering Germany.

[10] https://rapor.epias.com.tr/rapor/xhtml/ptfSmfGunluk.xhtml

Therefore, the assessment team considers that the determination of the plant load factor is in compliance with the guideline in EB 48 Annex 11.

It's considered by the assessment team that the annual operational hours of the project activity are not under estimated, since PP has considered 8760 hours (highest) for IRR calculation and post-tax equity IRR is 14.90 with highest operational hours, still lower than benchmark.

Taxes:

The taxes applied in the financial assessment are listed as:

Corporate income tax rate (up to first $6bln. MNT/year)	22.00%	As Per Income Tax Rule
VAT (%)	18.00%	As Per Income Tax Rule

Value Added Tax (VAT) for electricity is determined as 18% in the FSR which is consistent with an notice issued by Turkish Govt[11].

An income tax of 22% is consistent with the Income Tax Law of the Turkey[12].

Lifetime (20 Years):

The lifetime of the project activity was estimated to be 20 years in the FSR. The lifetime of the project activity has been crosschecked with the Technical specification of generators, in which the lifetime of the biogas generators is 20 years. Therefore, the assessment team was able to confirm that the lifetime estimated in FSR is conservative.

Conclusion:

Based on the information verified, the assessment team confirms that all the input values for investment analysis are in reasonable ranges. In addition, the assessment team was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

[11] https://www.vatupdate.com/2021/04/26/vat-rates-in-turkey/

[12] https://www.pwc.com.tr/en/hizmetlerimiz/vergi/bultenler/2021/corporate-income-tax-rate-increased.html#:~:text=Corporate%20Income%20Tax%20rate%20increases,23%25%20for%20the%20year%202022.

The above table shows that Equity IRRs of the project were lower than the benchmark at the time of decision making which is defined as the date of issuing the decision to invest the project by the Management Board.

Sensitivity analysis

The following parameters are taken as variable factors for sensitive analysis that constitute more than or close to 20% of total project cost.

- Total investment costs
- Electricity generation
- Operating and Management Cost
- Energy Price

The variations in the sensitivity analysis is applied to cover a range of +10% and -10% as it is deemed appropriate limits for the project according to guidelines on the assessment of the financial analysis and TOOL27.

The results of the analysis are given in the following table:

Sensitivity Analysis	Equity IRR			
Variation %	**-10%**	**Normal**	**+10%**	**Breaching Value**
PLF	12.31%	14.90%	17.59%	**22.00%**
O&M	15.21%	14.90%	14.97%	**-800.00%**
Project Cost	16.43%	14.90%	13.91%	**-32.50%**
Tariff Rate	12.31%	14.90%	17.59%	**22.00%**

- The sensitivity analysis shown in the Table above determines that the proposed project activity is additional in the sense that the sensitivity analysis is concluded that the project is unlikely to be (the most) financially/economically attractive.

Therefore, the IRR remains below the benchmark with 10% variations of the key parameters, which can already be considered conservative variations for sensitivity analysis. In addition, an increase or decrease of in these key input parameters that would result in the IRR exceeding the benchmark is highly unlikely to occur for the following reasons:

1. The total investment cost is based on the most recent information available prior to the investment decision date and actual purchase order placed for equipment's and construction by an experienced developer. Investment cost is fixed, therefore unlikely that the investment cost would be lower than 32%.
2. O&M costs are based our experience from other projects. O&M cost is based on the most recent information available prior to the investment decision date and actual purchase order placed with service provider. O&M cost is fixed, therefore unlikely that the investment cost would be lower than 800%.
3. The PPA signed and rate is fixed for the next 10 years, hence change in tariff is highly unlikely scenario.
4. PLF considered in financials for is as per Third Party DPR in line with "Guidelines for the reporting and validation of Plant load factors" stated in EB48 Annex11 option 3(b). Hence,

variation in PLF of more than 22% is unlikely to happen as the PLF has been reported as per the third-party report based on long term data.

Outcome of Step 3:

This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark Equity IRR) for any of the investor. Thus, it can be easily concluded that project activity is additional & is not business as usual scenario.

- Step – 4: Common practice analysis
- Common practice analysis for the proposed project activity is conducted as per the methodological tool: "Common practice", Version 03.1[13]. This methodological tool provides a step-wise approach for the analysis of the extent to which a proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region (pg. 2).
- Step 4.1: 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 14.14MWe/h. Accordingly, the applicable output range is from 7.07 MWe/h to 21,21 MWe/h.
- Step 4.2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

  The applicable geographical area for the proposed project covers the entire host country Turkey. All plants that deliver the same output, within the applicable output range calculated in Step 1, as the proposed project activity and have the same measure and the same energy source are selected. All of the selected plants deliver the same service which is the electricity generation by biogas/biomass. Applicable output range has been determined and all of similar projects applied according to the units those started commercial operation before the start date of project as 27/10/2019.

  It was checked that 10 similar projects has been found.
- Step 4.3: Within the 10 projects identified above, the projects which are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation are found to be 2:
- Hence, $N_{all} = 2$

[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf

- Step 4.4: Amongst the nine projects identified above step, those that apply technologies that are different to the technology applied in the proposed project activity, which is LFG, are as follow:
- *Accordingly, it is noted that*
- $N_{diff} = 0$
- Accordingly, factor $F=1-N_{diff}/N_{all}$ is calculated as follows:
- $F = 1 - 0/2$
- $F = 1$
- Whilst F is equivalent to 1, $N_{all}-N_{diff}$ is equivalent to 2.

  According to "Tool 24, Common Practice", Version 03.1, if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3, then the proposed project is a "common practice".

  Therefore, the project is not a common practice and thus the proposed VCS project activity is 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 Emissions: -

Baseline emissions scenario of the project is the methane from the open-air SWDS, and the electricity supplied by the grid to be substituted, which will be calculated as follows according to the methodology ACM0001 V. 19.

It comprises the following sources:

(a) Methane emissions from the SWDS in the absence of the project activity;

(b) Electricity generation using fossil fuels or supplied by the grid in the absence of the project activity;

(c) Heat generation using fossil fuels in the absence of the project activity; and

(d) Natural gas used from the natural gas network in the absence of the project activity.

$$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$$

Where:

BE_y	=	Baseline emissions in year y (t CO2e/yr)
$BE_{CH4,y}$	=	Baseline emissions of methane from the SWDS in year y (t CO2e/yr)
$BE_{EC,y}$	=	Baseline emissions associated with electricity generation in year y (t CO2/yr)
$BE_{HG,y}$	=	Baseline emissions associated with heat generation in year y (t CO2/yr)
$BE_{NG,y}$	=	Baseline emissions associated with natural gas use in year y (t CO2/yr)

The project does not involve heat and natural gas $BE_{HG,y}$. = 0, $BE_{NG,y}$ = 0. Therefore:

$$BE_y = BE_{CH4,y} + BE_{EC,y}$$

Baseline emissions of methane from the SWDS ($BE_{CH4,y}$)

Baseline emissions of methane from the SWDS are determined as follows, based on the amount of methane that is captured under the project activity and the amount that would be captured and destroyed in the baseline (such as due to regulations). In addition, the effect of methane oxidation that is present in the baseline and absent in the project is taken into account:

$$BE_{CH4} = \left(\left(1 - OX_{top\_layer}\right) \times F_{CH4,PJ,y} - F_{CH,BL,y}\right) \times GWP_{CH4}$$

Where:

$BE_{CH4,y}$	=	Baseline emissions of methane from the SWDS in year y (t CO2e/yr)
OX_{top_layer}	=	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH4/yr)
$F_{CH4,BL,y}$	=	Amount of methane in the LFG that would be flared in the baseline in year y (t CH4/yr)

GWP_{CH4} = Global warming potential of CH4 (t CO2e/t CH4)

Ex post determination of $F_{CH4,PJ,y}$

During the crediting period, $F_{CH4,PJ,y}$ is determined as the sum of the quantities of methane flared and used in power plant(s), boiler(s), etc as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y}$$

Where:

$F_{CH4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH4/yr)

$F_{CH4,flared,y}$ = Amount of methane in the LFG which is destroyed by flaring in year y (t CH4/yr)

$F_{CH4,EL,y}$ = Amount of methane in the LFG which is used for electricity generation in year y (t CH4/yr)

$F_{CH4,HG,y}$ = Amount of methane in the LFG which is used for heat generation in year y (t CH4/yr)

$F_{CH4,NG,y}$ = Amount of methane in the LFG which is sent to the natural gas distribution network and/or dedicated pipeline and/or to the trucks in year y (t CH4/yr)

The working hours of the boiler and power plants are monitored and no emission reduction should be claimed for methane destruction during non-working hours.

The project utilizes the LFG only for power generation. Therefore:

$$F_{CH4,PJ,y} = F_{CH4,EL,y}$$

$F_{CH4,EL,y}$ is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". The following requirements apply:

(e) As per the gaseous stream tool, if the LFG is used for multiple purposes (e.g. flaring or energy generation), and all methane destruction devices are verified to be operational (e.g. by means of flame detectors records, energy generated), a single flow meter may be used to record the flow into multiple destruction devices. The

destruction efficiency of the least efficient among the destruction devices shall be used as the destruction efficiency for all destruction devices monitored by this flow meter. If there are any periods for which one or more destruction devices are not operational, paragraph 5 (a) and (b) of the Appendix of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" tool shall be followed;

(f) CH4 is the greenhouse gas for which the mass flow should be determined;

(g) The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations (3) or (17) in the tool);

(h) The mass flow should be calculated on an hourly basis for each hour h in year y;

(i) The mass flow calculated for hour h is 0 if the equipment is not working in hour h (Opj,h=not working), the hourly values are then summed to a yearly unit basis.

Amount of the methane used for power generation ($F_{CH4,EL,y}$) The “Tool to determine the mass of a greenhouse gas in a gaseous stream” provides following 6 options for measuring mass flow of a greenhouse gas i in a gaseous stream.

Measurement Options and bold option for the project

Option	Flow gaseous stream	Volumetric Fraction
A	**Volume flow – dry basis**	**Dry or wet basis**
B	Volume flow-wet basis	Dry basis
C	Volume flow-wet basis	Wet basis
D	Mass flow- dry basis	Dry or wet basis
E	Mass flow-wet basis	Dry basis
F	Mass flow-wet basis	Wet basis

Ex ante estimation of $F_{CH4,PJ,y}$

An ex ante estimate of $F_{CH4,PJ,y}$ is required to estimate baseline emission of methane from the SWDS (according to equation (2)) in order to estimate the emission reductions of the proposed project activity in the PD. It is determined as follows:

$$F_{CH4,PJ,y} = n_{PJ} \times BE_{CH4,SWDS,y}/GWP_{CH4}$$

Where:

$F_{CH4,PJ,y}$	=	Amount of methane in the LFG which is flared and/or used in the project activity in year y (t CH4/yr)
$BE_{CH4,SWDS,y}$	=	Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (t CO2e/yr)
n_{PJ}	=	Efficiency of the LFG capture system that will be installed in the project activity
GWP_{CH4}	=	Global warming potential of CH4 (t CO2e/t CH4)

$BE_{CH4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites". The following guidance should be taken into account when applying the tool:

(j) fy in the tool shall be assigned a value of 0 because the amount of LFG that would have been captured and destroyed is already accounted for in equation (2) of this methodology;

(k) In the tool, x begins with the year that the SWDS started receiving wastes (e.g. the first year of SWDS operation); and

(l) Sampling to determine the fractions of different waste types is not necessary because the waste composition can be obtained from previous studies.

Application A of the Tool is used (i.e., the project activity mitigates methane emissions from a specific existing SWDS-solid waste disposal site). A yearly selection has been chosen as the Balikesir landfill started receiving wastes in 1994.

The amount of methane that would in the absence of the project activity be generated From disposal of waste at the solid waste disposal site ($BE_{CH4,SWDS,y}$) is calculated with a multi-phase model. The calculation is based on a first order decay (FOD) model.

$$BE_{CH4,SWDS,y} = \varphi y\,(1 - fy\,) * GWP\,CH4 * (1 - OX\,) * 16/12 * F * DOCf,y * MCFy * \sum\sum Wj,x * DOCj * exp(-kj\,(y - x)) * (1 - exp(-kj))$$

Where,

$BE_{CH4,SWDS,y}$	=	Baseline methane emissions occurring in year y generated from waste disposal at the solid waste disposal site (SWDS) during a period ending in year y (tCO2e/y)
φ	=	Model correction factor to account for model uncertainties (default value of 0.75),Option 1 in the Tool has been selected, value as per Table 3 of the Tool (Application A and humid wet conditions).
f	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y. As this is already accounted for in FCH4,BL,y, “f” in the Tool shall be assigned a value of 0.
GWP_{CH4}	=	Global warming potential of CH4 (t CO2e/t CH4)
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
F	=	Fraction of methane in the SWDS gas (volume fraction) (0.5)
$DOCf,y$	=	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction). Default value of 0.5 used as per page 65 of the Tool.
$MCFy$	=	Methane correction factor for year y (1.0)
Wj,x	=	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
DOC	=	Fraction of degradable organic carbon (by weight fraction) in the waste type j
kj	=	Decay rate for the waste type j (1/yr)
j	=	Type of residual waste or types of waste in the MSW

x = Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period (x=1) to year (x = y)

y = Year for which methane emissions are calculated (considering a consecutive period of 12 months)

Determination of $F_{CH4,BL,y}$

This section provides a procedure to determine the amount of methane that would have been captured and destroyed (by flaring) in the baseline due to regulatory or contractual requirements, to address safety and odour concerns, or for other reasons (collectively referred to as requirement in this section). The four cases in Table 10 are distinguished. The appropriate case should be identified, and the corresponding instructions followed.

Cases for determining methane captured and destroyed in the baseline

Situation at the start of the project activity	Requirement to destroy methane	Existing LFG capture and destruction system
Case 1	**No**	**No**
Case 2	Yes	No
Case 3	No	Yes
Case 4	Yes	Yes

Case 1: No requirement to destroy methane exists and no existing LFG capture system

In this situation:

$$F_{CH4,BL,y} = 0$$

Baseline emissions associated with electricity generation ($BE_{EC,y}$)

The baseline emissions associated with electricity generation in year y (BEEC,y) shall be calculated using the "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation". When applying the tool:

(a) The electricity sources k in the tool correspond to the sources of electricity generated identified in the selection of the most plausible baseline scenario; and

(b) ECBL,k,y in the tool is equivalent to the net amount of electricity generated using LFG in year y (EGPJ,y).

Taking into account the approach provided by the tool, baseline emissions are then calculated using the generic approach based on the quantity of electricity dispatched into the National Grid, an emission factor for electricity generation and a factor to account for transmission losses, as follows:

$$BE_{EC,y} = \sum EC_{BL,k,y} * EF_{EL,k,y} * (1 + TDL_{k,y})$$

Where;

$EC_{BL,k,y}$	=	Net amount of electricity generated using LFG in year y (MWh/yr)
$EF_{EL,k,y}$	=	Emission factor for electricity generation for source k in year y (tCO2/MWh)
$TDL_{k,y}$	=	Average technical transmission and distribution losses for providing electricity to source k in year y
k	=	Sources of electricity generated in the baseline

The Emission Factor is given from Turkish National Electricity Network calculated annually and for the year 2019 the combined emission factor is 0.5706 tCO2/MWh[14].

Emission Factor calculation

The Emission Factor is calculated as the Combined Margin (CM), comprised by two components: the Built Margin (BM) and the Operation Margin (OM). The BM evaluates the contribution of the power plants which would have been built if the project plant would not have been implemented. The OM evaluates the contribution of the power plants which would have been dispatched in the absence of the project activity. TOOL07 presents the following steps to calculate the Emission Factor:

- STEP 1: Identify the relevant electricity systems:

The sources of power in the Turkish electric system were taken from the Turkish Electricity transmission corporation. https://www.teias.gov.tr/en-US

- STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

- Option I: Only grid power plants are included in the calculation.
- Option II: Both grid power plants and off-grid power plants are included in the calculation

Option I of the tool is chosen, which is to include only grid power plants in the calculation.

[14] Informing the Turkish national electricity grid emission factor calculated annually. TÜRKİYE ULUSAL ELEKTRİK ŞEBEKESİ EMİSYON FAKTÖRÜ BİLGİ FORMU (2020), EVÇED, Çevre ve İklim Daire Başkanlığı, İklim Grubu Telefon: +90 312 212 64 20 – 6992 e-posta: cevre.iklim@enerji.gov.tr

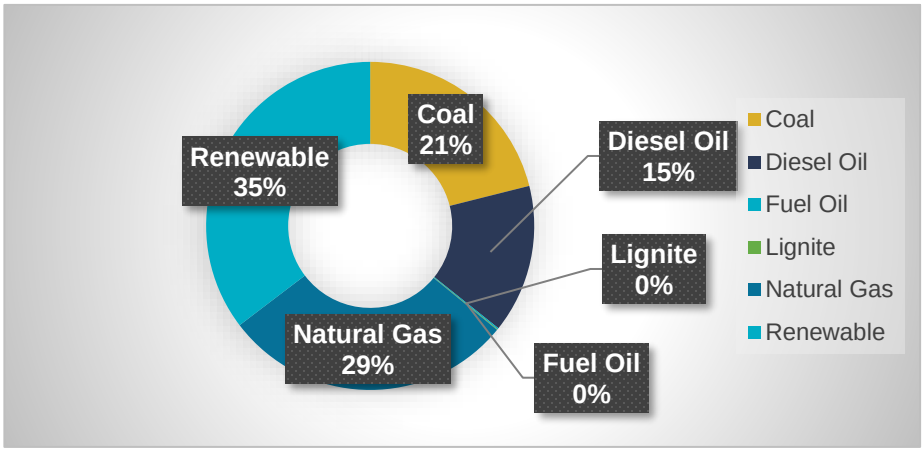
- STEP 3 - Select a method to determine the operating margin (OM). The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM. The simple operating margin can only be used where low-cost/must-run resources15 constitute less than 50% of total grid generation in: 1) average of 5 most recent years, or 2) based on long-term normalities for hydroelectricity production. Figure 10 shows the share of the electricity production in the turkey interconnected system. The results show the applicability of the simple operating margin.



Electricity generation in Turkish interconnected system by source. Source: http://www.teias.gov.tr/sites/default/files/2019-03/56%2893-2017%29.xls

- STEP 4 - Calculate the operating margin emission factor according to the selected method

Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants
serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

(a) Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit[15]; or

(b) Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. Option B can only be used if:

a. The necessary data for Option A is not available; and

b. Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

c. Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2)

Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OM\ simple,y} = \frac{\sum EG_{m,y} * EF_{EL,m,y}}{\sum EG_{m,y}}$$

Where:

$EF_{grid,OM\ simple,y}$	=	Simple adjusted operating margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO2 emission factor of power unit m in year y (t CO2/MWh)
m	=	All power units serving the grid in year y except low-cost/must-run power units
y	=	The relevant year as per the data vintage chosen in Step 3

[15] Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if all power units at the site of the power plant belong to the group of low-cost/must-run units or if all power units at the site of the power plant do not belong to the group of low-cost/must-run units.

- STEP 5 - Calculate the build margin (BM) emission factor The sample group of power units m used to calculate the build margin was determined following the procedure provided by the tool and BM emission factor shall be calculated based on the equation below:

$$EF_{grid,BM\ simple,y} = \frac{\sum EG_{m,y} * EF_{EL,m,y}}{\sum EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$=	=	Build margin CO_2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO2 emission factor of power unit m in year y (t CO2/MWh)
m	=	All power units serving the grid in year y except low-cost/must-run power units
y	=	The relevant year as per the data vintage chosen in Step 3

- STEP 6 – Calculate the combined margin (CM) emissions factor The calculation of the combined margin (CM) emission factor is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

Since power grid is not located in LDC/SIDs/URC and the weighted average CM method (option A) is the preferred option, this method was considered. The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

Where:

$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (%)
$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)

w_{BM}	=	Weighting of build margin emissions factor (%)

The Emission Factor is given from Turkish National Electricity Network calculated annually and for the year 2019 the combined margin Emission factor is 0.5706 tCO2/MWh[16].

PP has used the Grid emission factor available at the time of first submission of the PD. Same has been verified by the VVB. Also, EF was taken from the data published by the TURKEY NATIONAL ELECTRICITY NETWORK. The documents clearly state it has used operating and Build margin to calculate the combined margin. Hence, VVB found it appropriate.

Project Emissions: -

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y} + PE_{FC,j,y} + PE_{flare,y}$$

Where:

PE_y = Project emissions in year y (t CO2/yr)

$PE_{EC,y}$ = Emissions from consumption of electricity due to the project activity in year y (t CO2/yr)

$PE_{FC,y}$ = Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (t CO2/yr)

$PE_{DT,y}$ = Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (t CO2/yr)

$PE_{SP,y}$ = Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (t CO2/yr)

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

The project does not involve the distribution of compressed/liquefied LFG using trucks nor pipelines. Therefore, $PE_{DT,y}$, $PE_{SP,y}$,y will be 0. Hence, PE_y will be equal to $PE_{EC,y}$+$PE_{FC,y}$.

$PE_{EC,y}$ is determined by "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" as follow:

[16] Informing the Turkish national electricity grid emission factor calculated annually. TÜRKİYE ULUSAL ELEKTRİK ŞEBEKESİ EMİSYON FAKTÖRÜ BİLGİ FORMU (2020), EVÇED, Çevre ve İklim Daire Başkanlığı, İklim Grubu Telefon: +90 312 212 64 20 – 6992 e-posta: cevre.iklim@enerji.gov.tr

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

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (tCO2/yr)

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project electricity consumption source j in year y(MWh/yr)

$EF_{EL,j,z}$ = Emission factor for electricity generation for source j in year y(tCO2/MWh)

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

PP has considered the project emission from the captive or DG set in case of emergency. If DG set is used in case of emergency, same will be calculated as per "TOOL03 Methodological tool: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion. Version 03.0"

The "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" provides 3 scenarios for different sources of electricity consumption. Since the electricity generated through the project is partly consumed by the project scenario A is applicable. In the case of applying scenario A, two options are available for determining emission factor. For this project, Option A1 ($\mathrm{EF_{EL,j,y}}$y=$\mathrm{EF_{grid,CM,y}}$) is chosen.

Project emission from flaring can be calculated as follows:

$PE_{flare,y} = GWP_{CH4} * \sum_{m=1}^{525600} F_{CH4,RG,m} * \left(1 - \eta_{flare,m}\right) * 10^{-3}$	Equation 12

Where:

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

GWP_{CH4} = Global warming potential of methane valid for the commitment period (tCO2e/tCH4)

$FCH4,RG,m$ = Mass flow of methane in the residual gas in the minute m (kg)

$\eta flare,m$ = Flare efficiency in the minute m

Since the commission date the working hours of flare have been in zero and data from 2019-2022 has been cross verified and found zero working hour of the flaring system

Therefore:

Flare working hours [17] (h)	0
$PE_{flare,y}$ ((tCO2e))	0

In reality The Balikesir LFG project does not take electrical energy from the grid, since it is not allowed. but the emissions generated by the project are calculated as if they were fed into the grid first and then taken from it.

Project emissions from fossil fuel combustion

CO2 emissions from fossil fuel combustion in process j are calculated based on the quantity of fuels combusted and the CO2 emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_{j} FC_{PJ,j,y} * COEF_{i,y}$$

Where:

$PE_{FC,j,y}$ = Are the CO2 emissions from fossil fuel combustion in process j during the year y (tCO2/yr)

$FC_{PJ,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)

$COEF_{i,y}$ = Is the CO2 emission coefficient of fuel type i in year y (tCO2/mass or volume unit)

[17] See compiled data SD storage system Harmandali 2019/2020/2021/2022.

i = Are the fuel types combusted in process j during the year y

As per tool 3, in order to determine the parameter COEF, option A is the preferred approach as the necessary data is available.$COEF^{18} = 0{,}00268 \frac{\text{tCO2}}{\text{L}} fuel$

Fossil fuel (Diesel) quantity used in the project:

Based on fossil fuel consumption in the last 2 years, PP has calculated the project emissions from fossil fuel for the crediting period:

Emissions from fossil fuel consumption

year	Diesel oil consumption (L , y)	COEF CO2 emission factor (Kg CO2/L)[19]	PE_{FC} (tCO2)
1	1350	2.68	3.61
2	2331	2.68	6.24
3	2586	2.68	6.92
4	1893	2.68	5.07
5	2270	2.68	6.08
6	2270	2.68	6.08
7	2270	2.68	6.08

Leakage

No leakage effects are accounted for under the ACM0001 Methodology.

[18] Source: For Diesel Oil fuel.GHG protocol: Emission Factors from Cross-Sector Tools https://ghgprotocol.org/calculation-tools (consulted 25.07.2022)

[19] Source: For Diesel Oil fuel.GHG protocol: Emission Factors from Cross-Sector Tools https://ghgprotocol.org/calculation-tools (consulted 25.07.2022)

Net GHG Emission Reduction: -

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

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)

The baseline emissions are calculated as follows:

$$BE_y = BE_{CH4,y} + BE_{EC,y}$$

Emissions of methane from the SWDS are calculated as follows:

$$BE_{CH4} = \left((1 - OX_{top\_layer}) \times F_{CH4,PJ,y} - F_{CH,BL,y}\right) \times GWP_{CH4}$$

Year	$F_{CH4,PJ,y}$	$F_{CH4,BL,y}$	GWP_{CH4}	$BE_{CH4,y}$
	(tCH4)	(tCH4)	(tCO_2e/tCH_4)	(tCO_2e/yr)
1	6,006	0	28	1,51,363
2	8,818	0	28	2,22,221
3	10,234	0	28	2,57,903
4	11,607	0	28	2,92,509
5	13,139	0	28	3,31,092
6	14,847	0	28	3,74,140
7	16,754	0	28	4,22,196

-

The ex ante estimate of FCH4,PJ,y is determined as follows:

$$F_{CH4,PJ,y} = n_{PJ} \times \frac{BE_{CH4,SWDS,y}}{GWP_{CH4}}$$

$BE_{CH4,SWDS}$,y is determined using the methodological tool "Emissions from solid waste disposal sites", details please refer to the ER sheet.

Baseline emissions associated with electricity generation in year y (BEEC,y) are calculated as follows:

- $BE_{EC,y} = \sum EC_{BL,k,y} * EF_{EL,k,y} * (1 + TDL_{k,y})$
-
-
-

Year	MWh	TDL k,y	EF grid,CM,y (t CO2/MWh)	$BE_{EC,y}$ (tCO_2e/yr)
1	11.76	0.11	0.5706	58,204
2	11.76	0.11	0.5706	58,204
3	11.76	0.11	0.5706	58,204
4	11.76	0.11	0.5706	59,697
5	14.14	0.11	0.5706	71,778
6	14.14	0.11	0.5706	71,778
7	14.14	0.11	0.5706	71,778

-

Project emissions are calculated as follows:

- $PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y}$

Project emissions from consumption of electricity by the project activity (PEEC,y) are calculated as follows:

- $PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$

year	working hours (h)	Electricity consumption (MWh)	EF grid,CM,y	PE, y ($t CO_2/yr$)

		Gas Engine	Blowers	Chillers	Total	(t CO2/MWh)	
1	1296	3124.40	157.464	513.216	3795.08	0.5706	2408.10
2	7884	28510.12	957.906	3122.064	32590.09	0.5706	20679.45
3	7884	38013.49	957.906	3122.064	42093.46	0.5706	26709.64
4	7884	38013.49	957.906	3122.064	42093.46	0.5706	26709.64
5	7884	38013.49	957.906	3122.064	42093.46	0.5706	26709.64
6	7884	38013.49	957.906	3122.064	42093.46	0.5706	26709.64
7	7884	38013.49	957.906	3122.064	42093.46	0.5706	26709.64

-

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
1	2,09,567	2,412	-	207,155
2	2,80,426	20,686	-	259,740
3	3,16,107	26,717	-	289,390
4	3,52,205	26,715	-	325,491
5	4,02,871	26,716	-	376,155
6	4,45,919	26,716	-	419,203
7	4,93,975	26,716	-	467,259
Total	**25,01,069**	**156,676**	**-**	**2,344,393**

- 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

Not Applicable

3.3.8 Monitoring Plan

- The approved baseline and monitoring methodology ACM0001 (Version 19.0), have 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. VVB has checked all the parameters presented in the monitoring plan against the requirements of the methodology; no deviations relevant to the project have been found in the plan.
- TUV SUD 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 project can be reported ex post and verified.
- Ex-Ante :-

	Data / Parameter	Unit	Value applied	Assessment

/1/	φ	-	*0.75*	PP has chosen a default value of model correction factor. The same is as per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". The justification was accepted by the validation team.
/2/	OX_{top_layer}	-	0.1	Default value from methodological tool "Emissions from solid waste disposal sites" which is based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories. The justification was accepted by the validation team.
/3/	F	-	*0.5*	First order decay model from the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". The justification was accepted by the validation team
/4/	MCF	-	*0.8*	Methane correction factor from "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". The justification was accepted by the validation team
/5/	DOC_f	-	*0.5*	First order decay model from the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". The justification was accepted by the validation team
/6/	DOCj	-	-	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site". The justification was accepted by the validation team

				<table><tr><td>Waste type j</td><td>DOC j (% wet waste)</td></tr><tr><td>Wood and wood products</td><td>43</td></tr><tr><td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr><tr><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>15</td></tr><tr><td>Textiles</td><td>24</td></tr><tr><td>Garden, park and yard waste</td><td>20</td></tr><tr><td>Glass, plastic, metal, other inert</td><td>0</td></tr></table>
/7/	$EF_{CO2,grid,y}$	tCO_2e/MWh	*0.5706*	*Published data from The Ministry of the Energy and Natural Resources in Turkey*20
/8/	$TDL_{j,y}$	-	*0.11*	Calculated from the Data Provided by Turkish Electricity Transmission Corporation (TEİAŞ)21 in accordance with Methodological Tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 3.0
/9/	k	-		Default values of Decay rate for the waste type j. “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”. The justification was accepted by the validation team <table><tr><td>*Type of Waste*</td><td colspan="2">*Climate Zone*</td></tr><tr><td></td><td>*Boreal and Temperate*</td><td>*Tropical*</td></tr><tr><td></td><td>*(MAT ≤ 20 C)*</td><td>*(MAT > 20 C)*</td></tr></table>

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

[21] https://webapi.teias.gov.tr/file/512cbf1d-0ca3-4492-b901-3722c7b682f7?download

						Dry	Wet	Dry	Moist and Wet
						(MAP/PET < 1)	(MAP/PET > 1)	(MAP < 1000 mm)	(MAP >= 1000mm)
						Default	Default	Default	Default
				Slowly degrading waste	*Paper/ textiles waste*	*0.04*	*0.06*	*0.045*	*0.07*
					Wood/ straw waste	*0.02*	*0.03*	*0.025*	*0.035*
				Moderately degrading waste	*Other (non-food) organic putrescible/ Garden and park waste*	*0.05*	*0.1*	*0.065*	*0.17*
				Rapidly degrading waste	*Food waste/ Sewage sludge*	*0.06*	*0.185*	*0.085*	*0.4*
				Bulk Waste		*0.05*	*0.09*	*0.065*	*0.17*
/10/	W_{total}		*ton*	Amount of waste disposal from historical data.					

Year	W_total (t/y)	Year	W_total (t/y)	Year	W_total (t/y)
1992	879,802	**2019**	1,830,183	**2031**	2,534,408
1993	903,997	**2020**	1,880,513	**2032**	2,604,104
1994	928,857	**2021**	1,932,227	**2033**	2,675,717
1995	954,400	**2022**	1,985,363	**2034**	2,749,299
1996	980,646	**2023**	2,039,961	**2035**	2,824,905
1997	1,007,614	**2024**	2,096,060	**2036**	2,902,590
1998	1,035,324	**2025**	2,153,701	**2037**	2,982,411
1999	1,063,795	**2026**	2,212,928	**2038**	3,064,427
2000	1,093,049	**2027**	2,273,784	**2039**	3,148,699
2001	1,123,108	**2028**	2,336,313	**2040**	3,235,288

					2002	1,153,994	**2029**	2,400,561	**2041**	3,324,259	
					2003	1,185,728	**2030**	2,466,577	**2042**	3,415,676	
					2004	1,218,336	**2019**	1,830,183	**2031**	2,534,408	
					2005	1,251,840	**2020**	1,880,513	**2032**	2,604,104	
					2006	1,286,266	**2021**	1,932,227	**2033**	2,675,717	
					2007	1,321,638	**2022**	1,985,363	**2034**	2,749,299	
					2008	1,357,983	**2023**	2,039,961	**2035**	2,824,905	
					2009	1,395,328	**2024**	2,096,060	**2036**	2,902,590	
					2010	1,433,699	**2025**	2,153,701	**2037**	2,982,411	
					2011	1,473,126	**2026**	2,212,928	**2038**	3,064,427	
					2012	1,513,637	**2027**	2,273,784	**2039**	3,148,699	

				2013	1,555,262	**2028**	2,336,313	**2040**	3,235,288	
				2014	1,598,032	**2029**	2,400,561	**2041**	3,324,259	
				2015	1,641,977	**2030**	2,466,577	**2042**	3,415,676	
				2016	1,687,132					
				2017	1,733,528					
				2018	1,781,200					
/11/	GWP_{CH4}	t CO2 e/t CH4	*28*	Decisions under UNFCCC and the Kyoto Protocol. Default value from IPCC-2006.						
/12/	ρ CH4, n	Kg/m^3	*0.716*	Density of methane gas at reference conditions.Default Value of TOOL06						
/13/	$SPEC_{flare}$	- °C m3/h		Stainless steel burner with multiple nozzle • Combustion range: 25-50% methane • Combustion temperature: 850 - 1100 °C Conveco – specialist in Biogas technology						

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Monitored Parameters: -

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:

Sr.No	Monitored Parameter	Unit	Procedure
1	Management of SWDS		Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications
2	$EG_{PJ,y}$	MWh	Monitor net electricity generation by the project activity using LFG. Energy meter will be used
3	Opj,h		For each equipment unit j using the LFG monitor that the plant is operating in hour h by the monitoring any one or more of the following parameters.
4	$v_{i,t,wb}$	m^3 gas i/m^3 wet gas	Volumetric fraction of the green house gas. Infrared Gas Analyzer
5	CAPEX and OPEX	Currency (USD, EUR, etc.)	Engineering, procurement and construction contracts; and maintenance contracts.
6	Tariff or electricity exported	Currency (USD, EUR, etc.)	PPA
7	$EC_{PJ,y}$	MWh	Amount of electricity consumed by the project activity in year y. Energy meter will be used
8	$v_{,t,wb}$	m^3 gas / hours	Volumetric steam flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required
9	Temperature	°C	Flow meter
10	Presurre	Pascal (Pa)	Flow meter
11	FCH4,EG,t	kg	Flow meter
12	ρi,y	Mass/volume	Measurements will be done as per national or international fuel standards
13	NCVi,y	GJ/m^3, GJ/ton	Measurements will be done as per national or international fuel standards

14	EFCO2,i,y	tCO2/GJ	Measurements will be done as per national or international fuel standards
15	TEG,m	°C	Project developer records
16	vi,RG,m	Volumetric fraction of component i in the residual gas on a dry basis in the minute m where i = CH4, CO, CO2, O2, H2, H2S, NH4, N2	Measurement done by wet basis on analyzer
17	vRG,m	m3	Flow meter
18	MRG,m	kg	Flow meter
19	vO2,EG,m	Volumetric fraction of O2 in the exhaust gas on a dry basis	gas analyser will be used
20	fcCH4,EG,m	mg/m3	gas analyser will be used
21	Flamem	Flame on or Flame off (0% or 100%)	flame detector will be used
22	Maintenancey	Calendar days	Project developer records
23	$FC_{i,j,y}$	Weighted average mass fraction of carbon in fuel type i in year y	Onsite measurements by the project developer
24	$W_{c,l,y}$	Weighted average density of fuel type i in year y	Measurements by the project participants

TUV SUD assessment team confirms that the monitoring plan contains all necessary parameters which have been clearly described in VCS PD and that the means of monitoring described in the monitoring plan complies with the requirements of the methodology.

- Data Management and Quality Control Management Structure of the Monitoring Team is provided in the VCS PD. The functions such as data collection, aggregation, verification, calculation, archiving, as well as the maintenance of equipment etc. have been defined. Quality assurance and quality control procedures for recording, maintaining and data archiving etc. will be ensured according to Verra rules. The monitoring system equipment will be implementation properly upon the agreement of the project company and the grid company. The monitoring data would be cross checked by the Electricity Transaction Note of the project for the purpose of quality control. The project owner will record the readings of the meter monthly. The calibration of the meters will be implemented as per relevant national

standards. Data management and quality control system are quoted in the VCS PD. In conclusion, based on document review, remote-site inspection and stakeholder interview, together based on TUV SUD local and sectoral expertise, TUV SUD confirms that: - The monitoring plan is in compliance with the requirements of the methodology. - Monitoring arrangements described in the monitoring plan are feasible within the project design. - The PP's ability to implement the monitoring plan can be guaranteed

3.4 Non-Permanence Risk Analysis

Not Applicable

4 VALIDATION CONCLUSION

TÜV SÜD South Asia Pvt has performed a validation of the project activity "BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT". The validation was performed on the basis of VCS Version 4.1 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

ACM0001: Flaring or use of landfill gas, Version 19.0"

Balıkesir Landfill Gas (LFG) Capture and Utilization Project is being implemented by Landfill Enerji Sanayi ve Ticaret A.Ş. within the boundaries of Balıkesir Solid Waste Disposal Site (SWDS) in Balıkesir province in Turkey.

The proposed project activity has the installed capacity of 14.14 MWe/h.

It is planned to rehabilitate the SWDS that receives around 1,200 tons of municipal waste generated at Balıkesir province per day and to generate renewable electric power by capturing and utilizing landfill gas.

The total net anthropogenic GHG removals from the project are estimated as 2,344,393 tCO2e for the selected first 7-year renewable crediting period, with an average value of 334,913 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 BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT" as described in the PD version 5 dated 06/09/2022 meets all relevant VCS version 4.1 requirements and correctly applies the baseline and monitoring methodology.

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

CL from this validation

CL ID	01	**Section no.**	PD	**Date:** 06/02/2022
Description of CL				
VCS-PD has not followed the report template.				
Project participant response				**Date:** 09/02/2022
The template has been updated in VCS-PD format				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion02				
DOE assessment				**Date:** 12/02/2022
VCS PD has been revised. CL is closed				

CL ID	02	**Section no.**	PD	**Date:** 06/02/2022
Description of CL				
Documentary evidence for the Stakeholder's meeting including photographs has to be submitted for verification. Also, same must be elaborated in the section 2.2.				
Project participant response				**Date:** 09/02/2022
The memories of the local stakeholder meeting that took place on September 30th, 2021. It is updated in the PDD. (section 2.2)				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 section 2.2				
DOE assessment				**Date:** 12/02/2022
Stakeholder meeting information is added in the revised PD. CL is closed				

CL ID	03	**Section no.**	PD	**Date:** 06/02/2022
Description of CL				
Supporting documents has to be submitted for each parameter selected, for IRR calculation. The supporting spreadsheets need to be provided in English.				
Project participant response				**Date:** 09/02/2022
The documents for the IRR calculation are added as source and as an additional document, the spreadsheet is written in English.				
Documentation provided by project participant				
Revised IRR sheet, VCS-PD				
DOE assessment				**Date:** 12/02/2022
Revised IRR sheet has the reference source for each parametersw.CL is closed.				

CL ID	04	**Section no.**	PD	**Date:** 06/02/2022
Description of CL				

Contact details are incomplete in the first table	
Project participant response	**Date:** 09/02/2022
Contact details are added to the PP Table 1	
Documentation provided by project participant	
VCS_BALIKESİR_Project_Description_FinalVersion 02 Table 1	
DOE assessment	**Date:** 12/02/2022
Revised VCS PD received. CL is closed	

CL ID	05	**Section no.**	1.5	**Date:** 06/02/2022
Description of CL				
Contact details are incomplete of PP in the section 1.5				
Project participant response				**Date:** 09/02/2022
Contact details are added to the PP section 1.5				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 section 1.5				
DOE assessment				**Date:** 12/02/2022
Section 1.5 has been revised in the PD. CL is closed				

CL ID	06	**Section no.**	1.11	**Date:** 06/02/2022
Description of CL				
Technical specifications of the Gas engine are missing				
Project participant response				**Date:** 09/02/2022
Technical specifications of the Gas engine are added in the PDD and as attached document: Factsheet Gas engine.				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 section 1.1 Description of the project Activity/ Internal combustion Gas engines				
DOE assessment				**Date:** 12/02/2022
Revised VCS PD received. CL is closed				

CL ID	07	**Section no.**	2.4	**Date:** 06/02/2022
Description of CL				
Section 2.4 should be filled with relevant information.				
Project participant response				**Date:** 09/02/2022
Project is exempted from the public comment period				
Documentation provided by project participant				
Exemption mail from VERRA				
DOE assessment				**Date:** 12/02/2022
Revised VCS PD received. CL is closed				

CL ID	08	Section no.	3.5	Date: 06/02/2022
Description of CL				
Calculated IRR for the project is inconsistent in the PD				
Project participant response				**Date:** 09/02/2022
The calculated IRR for the project activity has been calculated as 15.09% and updated in the PDD. Section Sub-step 3b: Option III. Apply benchmark analysis				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 section Sub-step 3b: Option III. Apply benchmark analysis				
DOE assessment				**Date:** 12/02/2022
Revised VCS PD received. CL is closed				

CL ID	09	Section no.		Date: 06/02/2022
Description of CL				
PP has to submit following documents for the verification: 1. Proof for the start date 2. Electricity generation license 3. EIA clearance 4. Feasibility Study Report 5. Proof for PLF 6. Latest photographs of the plant 7. Proof for no double counting				
Project participant response				**Date:** 09/02/2022
All stated documents submitted to the DOE				
Documentation provided by project participant				
1. Folder PDD docs/Documents: Production License 2. Folder PDD docs/Documents: Commission Certificate.pdf 3. Folder EIA: EIA.pdf & Environmental Permit of Air Emission.pdf 4. Folder: Feasibility Study: Prefeasibility study and roughly planning concept for landfill gas collecting Balikesir.pdf 5. Folder Statements: SEF-declaration-PLF-Balikesir 6. Balıkesir Site Video.mp4 7. Folder Statements: Non-participation in other GHG Statement				
DOE assessment				**Date:** 12/02/2022
All requested documents are received and reviewed. CL is closed				

CARs from this validation

CAR ID	01	Section no.	1.1	Date: 06/02/2022
Description of CAR				
What is the capacity of the project? It's inconsistent throughout the PD.				
Project participant response				**Date:** 09/02/2022
14.14 Mwe. This is the licensed capacity and is the installed capacity with spare engines				

Documentation provided by project participant	
Folder statement: Statement capacity installation.	
DOE assessment	**Date:** 12/02/2022
Capacity made consistent in the PD. CAR is closed	

CAR ID	02	**Section no.**	PD	**Date:** 06/02/2022
Description of CAR				
Value of ERs are inconsistent throughout the PD.				
Project participant response				**Date:** 09/02/2022
The emission reduction was updated through the PD.				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 Excel_Folder PDD Docuemnts: PDD_ER_ACM0001V19 BalıkesirLFG.xls				
DOE assessment				**Date:** 12/02/2022
Revised PD and ER sheet received. CAR is closed				

CAR ID	03	**Section no.**	3.2	**Date:** 06/02/2022
Description of CAR				
PP has to justify the each and every applicability criterion with proper reference.				
Project participant response				**Date:** 09/02/2022
The applicability of the methodology is justified for each criterion in table 4. Section 3.2				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 table 4 section 3.2				
DOE assessment				**Date:** 12/02/2022
Revised PD received. CAR is closed				

CAR ID	04	**Section no.**	3.3	**Date:** 06/02/2022
Description of CAR				
Please clarify whether Grid is part of the project boundary or not?				
Project participant response				**Date:** 09/02/2022
Grid is part of the project boundary.				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 section 3.3 Project Boundary				
DOE assessment				**Date:** 12/02/2022
Revised PD received. CAR is closed				

CAR ID	05	**Section no.**	3.4	**Date:** 06/02/2022
Description of CAR				
PP has to elaborate in section 3.4 that how and why other alternatives are excluded and how PP has arrived on the most plausible baseline scenario.				

Project participant response	**Date:** 09/02/2022
The Baseline scenario was the atmospheric release of the LFG, with no regulatory requirements for destruction through flaring and the project activity produced electricity that would have been generated form the grid. (LFG3, E3) are chosen.	
Documentation provided by project participant	
VCS_BALIKESİR_Project_Description_FinalVersion 02 section 3.4	
DOE assessment	**Date:** 12/02/2022
Revised PD received. CAR is closed	

CAR ID	06	**Section no.**	4.1,4.2, 4.3	**Date:** 06/02/2022
Description of CAR				
PP should mention only those equation which are used in ER calculation.				
Project participant response				**Date:** 09/02/2022
The equation that are mentioned in the PDD are the equations used. For clarification the Emission Factor EF calculation there was a calculation for comparison using BM and OM however the value obtained was higher than the one published by Turkish National Electricity Network. Therefore, the EF published by the company was taken. 0,5706 tCO2/MWh, since with the calculated emission factor the emission would have been more.				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion09.02 section 4 EF: emission Factor.pdf				
DOE assessment				**Date:** 02/02/2022
Revised PD received. CAR is closed				

CAR ID	07	**Section no.**	4.1,4.2, 4.3, 5.1,5.2	**Date:** 06/02/2022
Description of CAR				
These sections are incomplete or has non relevant information. PP has to stick to the template and revise these sections accordingly				
Project participant response				**Date:** 09/02/2022
The sections in sections 4 were adjusted to the VCS template				
Documentation provided by project participant				
VCS_BALIKESİR_Project_Description_FinalVersion 02 section 4				
DOE assessment				**Date:** 12/02/2022
Revised PD received. CAR is closed				