BALIKESİR LANDFILL GAS (LFG) CAPTURE AND UTILIZATION PROJECT

Project Title	Balıkesir Landfill Gas (LFG) Capture and Utilization Project
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1 PROJECT DETAILS

1.1 Summary Description of the Project

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.

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

- preventing GHG emissions, methane in particular, from being emitted directly to the atmosphere from waste at the Balıkesir SWDS that would be otherwise left to be decomposed;

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

The project has begun to generate electricity on October 27th, 2019, which is regarded as the project start date.

This project adopts a fixed crediting period of 10 years. The expected average annual emission reductions are 185,502 tCO2eq/y. Accordingly, the project is expected to generate 1,855,020 tCO2eq emissions reduction throughout the crediting period.

1.2 Sectoral Scope and Project Type

The project falls into sectoral scope 01: Energy industries (renewable - / non-renewable sources) (Type I Component), sectoral scope 13: Waste handling and disposal (Type III Component). The project is not a grouped project.

1.3 Project Eligibility

The project is an LFG power generation, utilizing landfill gas (LFG), which consists mainly of methane, for electricity generation, which is eligible under the scope of the Version 4.1 of VCS Standard[1].

1.4 Project Design

The project is not a grouped project.

1.5 Project Proponent

Organization name	BIOTREND Çevre ve Enerji Yatırımları Anonim Şirketi
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Organization name	BIO SOLUTIONS Yenilenebilir Enerji ve Danışmanlık Hizmetleri Sanayi ve Ticaret Limited Şirketi (LLC.)

[1] https://verra.org/wp-content/uploads/2021/04/VCS-Standard_v4.1.pdf

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1.6 Other Entities Involved in the Project

NA

1.7 Ownership

The Electricity Generation License (EGL) issued by the Energy Market Regulatory Authority (EMRA) in Turkey on October 17th, 2019, established the project ownership to Balıkesir Landfill Gas (LFG) Capture and Utilization project to Landfill Enerji Sanayi ve Ticaret A.Ş. of which Biotrend Çevre ve Enerji Yatırımları A.Ş., as the project proponent, is a shareholder. These official documents are accordingly establishing the property and contractual right both in the plant and equipment that generate GHG emission reductions.

1.8 Project Start Date

The project start date is 27/10/2019, as the operation start date on which the project began to eliminate the negative effects of municipal solid wastes on environment and human health, but also to generate emission reductions, to create economic value and to establish a sustainable waste management system.

1.9 Project Crediting Period

This project adopts the fixed crediting period of 10 years from 27/10/2019 to 26/10/2029 (the start and end dates are included)

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 1	185,502
Year 2	185,502
Year 3	185,502
Year 4	185,502
Year 5	185,502
Year 6	185,502
Year 7	185,502
Year 8	185,502
Year 9	185,502
Year 10	185,502
Total estimated ERs	1,855,020
Total number of crediting years	10
Average annual ERs	185,502

1.11 Description of the Project Activity

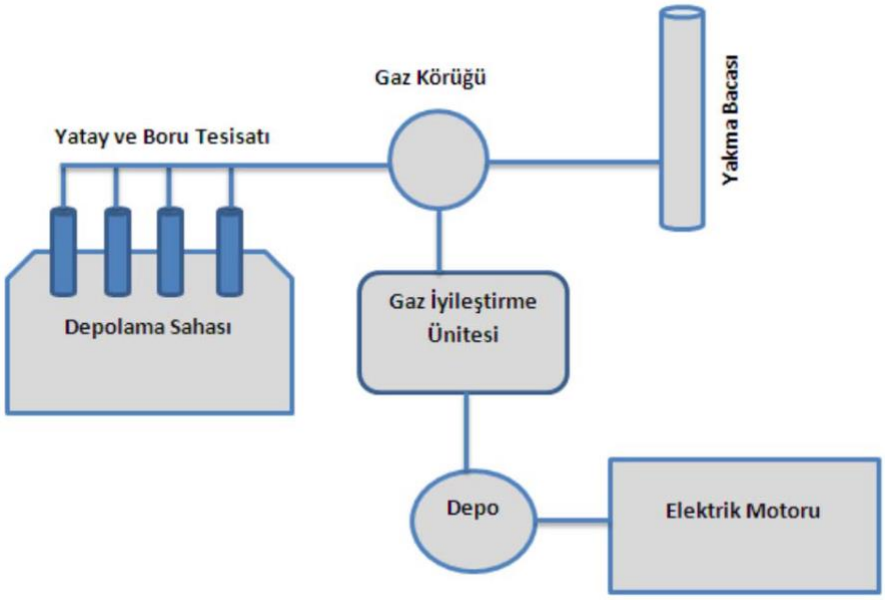
For the purpose of a sustainable waste management in which municipal solid waste will be evaluated, it was planned to rehabilitate the Balıkesir Solid Waste Disposal Site (SWDS) and with the completion of the rehabilitation project by phases and the commissioning of the Landfill Gas Power Generating Plant, electric power will be generated from landfill gas and a significant investment will be realized in terms of renewable energy resources and an ecologic and economic value will be created on a regional and global scale.

Rehabilitation of Balıkesir Solid Waste Landfill Area and Electric Power Generation from Landfill Gas" work has been delivered by Balıkesir Metropolitan Municipality to Enerji Sanayi ve Ticaret A.Ş. on 31.05.2018 with site delivery protocol.

Methane Gas Power Generating Plant Flow Process Chart:

The process of power generation from landfill gas is composed of some phases. Firstly, the landfill gas is collected in sanitary landfill areas. Then, the collected landfill gases are absorbed by the blowers and transferred to gas cooling and gas cleaning unit of the facility. In gas cleaning unit, landfill gas is processed and cleared of particles and moisture inside. Following the necessary enhancement processes, the landfill gas is burnt in engine-generator groups and then proceeded to the power generation phase. Finally, such generated power is delivered to the consumers through power transmission lines.

The facility will have gas-burning (Flare) flues to prevent the release of the landfill gas in case of any breakdown or failure in the facility or when the facility is out of service. There will be gas storage balloons to enable the constant volume. In some facilities, cogeneration power generation is performed using the heat generated from exhaust gas of the gas motors. The flow process chart for the landfill gas facilities is as follows:



Flow Process Chart for Power Generation from Landfill Gas

Generating Power by Burning of the Landfill Gas in Engine-Generator Groups :

The landfill gas obtained is burnt in electric motors and converted into electric power. The generated electric power is transmitted to local electric network. Internal combustion motors will be used to generate electric power.

Since the internal combustion motors require less gas flow rate and are easier to switch on and off when compared to the gas turbines, they are more suitable for landfill gas power plants. All of the landfill gas power plants in our country consist of internal combustion motors.

Internal Combustion Gas Motors

Internal combustion motors are the most suitable method for the utilization in in landfill gas power plants. In these motors, average quality landfill gas is burnt and converted into electric power.

Internal combustion motors are proven and cost-effective technologies. Because of their flexibilities against low production capacities, they are unique power generating option for such landfill areas.

1.12 Project Location

The project will be implemented in totally 137 hectares of area within acceptance boundary of Balıkesir Solid Waste Landfill Facility in Balıkesir Province, Altıeylül District, Gökköy village.

The central coordinated of the project location are longitude of +27.853139 and latitude of +39.612806.


Balıkesir LFG Capture and Utilization Project Site
Legend
Google Earth
Image © 2021 Maxar Technologies
500 m
N

1.13 Conditions Prior to Project Initiation

The scenario existing prior to the start of the implementation of the project activity is:

Before the project activity, Solid Waste was dumped into landfill, unattended. Hence, greenhouse gases generated from solid waste were released directly into atmosphere. In addition, the quantity of electricity produced using LFG would have been produced by power plants connected to the national grid in Turkey which is heavily dependent on fossil fuel resources.

The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity. Please refer to Section 3.4 (Baseline Scenario) for details.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The two of main regulatory approvals for such project types to prove that they are in compliance with relevant laws, statues and regulatory frameworks in Turkey are the Environmental Impact Assessment and the Electricity Generation License whose obtainments are required for projects being in compliance with other relevant legal requirements. *Environmental Permit and License application will be made within the scope of Environmental Permits and Licenses Regulation and Communique on Mechanical Sorting, Biodrying and Biomethanization Facilities and Fermented Product Management.*

The project has obtained the approval of Environmental Impact Assessment (EIA) issued by the Ministry of Environment and Urbanization in Turkey on May 26th, 2008, and the Electricity Generation License (EGL) issued by the Energy Market Regulatory Authority (EMRA) in Turkey on October 17th, 2019.

Hence, the project is in compliance with laws, status and other regulatory frameworks.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered or is seeking registration under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related credit or renewable energy certificates.

1.17 Additional Information Relevant to the Project

Leakage Management

In accordance with the methodologies applied to the project, no leakage effects are accounted for.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

The PPs shall submit the proposed project activity's Sustainable Development Contribution Report before the first verification of the project.

On the table below, it is possible to see some of the SDG indicators on which the project creates a positive impact. The Contribution Report will consist detailed information on

- the project's net impact on these SDG indicators, along with the ones not shared on the table below,
- current project contributions;
- contributions over project lifetime;
- together with supporting evidences.

Row number	SDG Target	SDG Indicator
1)	3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
2)	3.d	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks
3)	6.3	6.3.1 Proportion of domestic and industrial wastewater flows safely treated
4)	7.2	7.2.1 Renewable energy share in the total final energy consumption
5)	7.b	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support
6)	8.2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high- value added and labour-intensive sectors
7)	8.8	Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
8)	11.6	11.6.1 Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities

9)	11.6	11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)
10)	12.a	12.a.1 Installed renewable energy- generating capacity in developing countries (in watts per capita)
11)	13.0	Tonnes of greenhouse gas emissions avoided or removed
12)	17.15	17.15.1 Extent of use of country- owned results frameworks and planning tools by providers of development cooperation

Further Information

N/A

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment (EIA) Report has been approved and issued by the Ministry of Environment and Urbanization in Turkey on May 26th, 2008. 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.

2.2 Local Stakeholder Consultation

The proposed project's local stakeholder consultation meeting will take place on September 30th, 2021. Its final report will be inserted to the PDD in time of validation.

2.3 Environmental Impact

The environmental matters in Turkey are jurisdiction of the Ministry of Environment and Urbanization. The Law defines among others the general requirements of the Environmental Impact Assessment (EIA) states specific requirements according to the type of project, location, size and other characteristics. The Environmental Impact Assessment and any and all administrative and technical procedures and principles to be followed within the scope of this process are regulated by the Environmental Law No: 2872 and by the Regulation on Environmental Impact Assessment published in Official Gazette dated 25.11.2014 and numbered 29186 based on such Law. To carry out environmental impact assessment of the

project intended to be implemented, it is required to initiate the environmental impact assessment process in accordance with the application process mentioned in relevant articles of the Regulation on Environmental Impact Assessment.

The Environmental Impact Assessment (EIA) certificate has been approved and issued by the Ministry of Environment and Urbanization in Turkey on May 26th, 2008. 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.

2.4 Public Comments

To be reported.

2.5 AFOLU-Specific Safeguards

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

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Applied approved baseline and monitoring methodologies:

The large-scale methodology ACM0001 Version 19, "Consolidated baseline and monitoring methodology for landfill gas project activities[2]" has been employed in the project activity.

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).

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

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

3.2 Applicability of Methodology

The project meets the applicability conditions of the selected methodologies, standardized baseline and tools as demonstrated in the following table:

Ref.	Application Criteria	Applicability
1.	As per paragraph 3.a of ACM0001: 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 instance. The project design consists of the development of new LFG capture systems. The baseline scenario at all five sites is the atmospheric release of LFG. The project the	The project design consists of the development of new LFG capture systems. The baseline scenario at landfill site is the atmospheric release of LFG. The project therefore complies with this criterion.
2.	As per paragraph 3.b of ACM0001: 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 instance; 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 instance and its efficiency is not impacted	The baseline scenario is the atmospheric release of LFG at site, was vented and not used prior to the implementation of the project activity. The project design consists of the installation of new extraction infrastructure to recover LFG at site. The project therefore complies with criterion (i). Criterion (ii) does not apply because there was no existing active LFG capture system prior to the implementation of the project activity.

	on by the project system: historical data on the amount of LFG capture and flared is available.	
.	As per paragraph 3.c of ACM0001: Flare 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; 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.	The project design consists of LFG flaring and electricity generation only The project therefore complies with these criteria, specifically (i).
	As per paragraph 3.d of ACM0001: Do not reduce the amount of organic waste that would be recycled in the absence of the project activity instance.	The project does not reduce the amount of organic waste that would be recycled in the absence of the project activity. Prior to the project being implemented, the organic waste that was brought to the site was sent to landfill and was not used for any purpose. As such there was no diversion of organic waste prior to project implementation. Furthermore, no diversion of organic waste has occurred during the project implementation. Based on the report there are therefore no major organic waste recycling practices within the province. The project therefore complies with this criterion.
	As per paragraph 4.a of ACM0001: 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.	In this project the baseline scenario is the total atmospheric release of the gas (see further explanation below) and in the current project activities, the captured gas is being flared and used to produce electricity. Therefore, the project complies with this criterion.

	As per paragraph 4.b of ACM0001: In the case that the LFG is used in the project activity instance 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;	The electricity generated from the project activity is supplied to the grid. The generated electricity displaces electricity generated by the fossil fuel fired power plants in the grid. The project therefore complies with these criterion (i). Criterion (ii) does not apply because the project does not generate heat.
•	As per paragraph 4.c of ACM0001: 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.	This criterion is not applicable. The project does not supply LFG to the end user(s) through a natural gas distribution network, trucks or dedicated pipeline.
	As per paragraph 4.d of ACM0001: 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.	This applicability criterion does not apply to the project activity instance because the LFG arises from existing SWDSs. Furthermore, there are no requirements to capture LFG or destroy LFG through flaring in order to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.
	As per paragraph 4 of TOOL02 “Combined tool to identify the baseline scenario and demonstrate additionality” (Version 07.0): The tool is applicable to all types of proposed project activities. However, in some cases, methodologies referring to this tool may require adjustments or additional explanations as per the guidance in the respective methodologies. This could include, inter alia, a listing of relevant alternative scenarios that should be considered in Step 1, any relevant types of barriers other than those presented in this tool and guidance on how common practice should be established.	The project activity complies with this criterion. Additionality was proven by using the TOOL02 “Combined tool to identify the baseline scenario and demonstrate additionality”.

	As per paragraph 5 of ACM0001, this methodology is not applicable: a) In combination with other approved methodologies. b) If the management of the SWDS in the project activity instance is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity instance.	a) The project only utilises one methodology which is ACM0001 version 19. b) The project retains the same waste disposal practices for waste and the management of the landfill remains unchanged. The project therefore complies with these criteria.
	As per paragraph 2 of TOOL03 "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 03.0): This tool provides procedures to calculate project and/or leakage CO2 emissions from the combustion of fossil fuels. It can be used in cases where CO2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. Methodologies using this tool should specify to which combustion process j this tool is being applied.	The project activity complies with this criterion. The tool is applicable to the project as diesel may be used in generators for on-site power backup for the flares. This tool is used to calculate project and/or leakage CO2 emissions from the combustion of diesel in backup generations. It is used in cases where CO2 emissions from fossil fuel combustion are calculated based on the quantity of diesel combusted.
	As per paragraphs 3.a and 3.b of TOOL04 "Emissions from solid waste disposal sites" (Version 08.0), the tool can be used to determine emissions for the following types of applications: 3 (a) Application A: The project 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" version 19). 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); 3 (b) Application B: The project 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	The project activity complies with paragraph 3 (a) Application A because the project mitigates methane emissions from specific existing SWDSs. The tool is applied for the exante estimation of emissions in the project description. Emissions will be monitored during the crediting period using the appropriate approaches referenced in the methodology ACM0001 Version 19.0. The project therefore complies with this criterion. Application B is not applicable because the project mitigates emissions from an existing SWDS, not the avoidance of waste at a SWDS.

	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.	
	As per paragraph 4 of TOOL04 "Emissions from solid waste disposal sites" (Version 08.0): These two types of applications are referred to in the tool for determining parameters.	The project activity meets the applicability criterion Application A, as described above.
	As per paragraph 5 of the tool TOOL04 "Emissions from solid waste disposal sites" (Version 08.0): 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.	Not applicable because the existing SWDSs are classified as general waste sites, meaning that they comprise of MSW and do not accept residual waste. Therefore the tool is applied only to the MSW in the absence of residual waste.
	As per paragraph 5 of TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0): 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	The tool is applicable to the project since the tool is used to estimate project CO2 emissions associated with the consumption of electricity. Scenario C applies to the project. The landfills may use standby diesel generators (captive power plants) for on-site power backup for the flares. The diesel generators. Hence, the project can be provided with electricity from the captive power plant(s) and the grid. The project therefore complies with this criterion.

	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.	
	As per paragraph 6 of TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0): 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	The project complies with Scenario 1: all generated electricity is supplied to the national grid in Turkey.
	As per paragraph 7 of TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0): 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.	The project complies with this criterion: There are no captive renewable power generation technologies installed to provide electricity in the project activity in the baseline scenario or to sources of leakage. Only CO2 emissions are accounted for.

	As per paragraph 2 of TOOL06 "Project emissions from flaring" (Version 03.0.0): 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.	The project complies with this criterion: project emissions are calculated in relation to the flaring of residual gas (LFG). All the flares in the project activity are enclosed flares, as documented in this PDD.
	As per paragraph 3 of TOOL06 "Project emissions from flaring" (Version 03.0.0): 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 project complies with paragraph 3 (a): methane is the highest component of the residual gas (LFG). 3(b) does not apply.
	As per paragraph 4 of TOOL06 "Project emissions from flaring" (Version 03.0.0): 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. For the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare.	The project complies with this criterion: no auxiliary fuels are used to sustain flare combustion. All the enclosed flares are operated in accordance with the specifications provided by the manufacturer of the flares.
	As per paragraph 5 of TOOL08 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0): 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 methodological tool ACM0001 Version 19.0 refers to this tool for measurement of flow and composition of the residual or flared gases to determine baseline and project emissions. The tool is applicable to the project as the flow and composition of residual or flared gases will be measured for the determination of baseline or project emissions. The gaseous stream that the tool will be applied to is the LFG delivery pipeline to each item of equipment at each site. The greenhouse gas for which the mass flow will be determined is methane.

	As per TOOL08 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0): 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.	This criterion is not applicable as CO2 is not the only gas of interest in the project activity
	As per TOOL08 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0): 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 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 complies with these criteria: (a) The tool is applied to the residual gas stream in the landfill. The option F of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0) is used to calculate the mass flow of the gaseous stream. (b) The mass flow is determined for methane. (c) Monitoring is continuous.
	As per section I of 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: 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.	The project activity complies with the applicability criteria of this tool. The steps to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period have been undertaken in the baseline selection section of the PD.

3.3 Project Boundary

In accordance with these Methodologies, the project boundary includes:

- Waste management systems;
- Facilities which recover and flare/combust or use LFG;
- The project power plant and all power plants connected physically to the electricity system that the proposed project power plant is connected to.

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

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from decomposition of waste at the SWDS site	CO_2	No	CO_2 emissions from 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	-	N/A
	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	No	Excluded for simplification. This emission source is assumed to be very small
		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 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 from the national grid. 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
	Emissions from flaring or combustion of the gas stream	CO_2	No	The flare system would be used only in exigencies. In case the flare operation, the emission reduction will be excluded during this period, and thus emission source is not included.
		CH_4	No	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

3.4 Baseline Scenario

ACM0001, Large-scale Consolidated Methodology: Flaring or use of landfill gas, Version 19.0, states that 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.*

In accordance with the applied methodology, baseline alternatives for the destruction of LFG, shall take into consideration inter alia, the following alternatives:

Alternatives to LFG Component	*Alternatives to Electricity Generation Component*
LFG1: The project activity (LFG capture and utilization) implemented without being registered as a VCS project activity	E1: Electricity generation from LFG, undertaken without being registered as VCS project activity
LFG2: *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*	E2: Electricity generation in existing or new renewable or fossil fuel based captive power plant(s)

address safety and odour concerns, or for other reasons	
LFG3: *Atmospheric release of the LFG or capture of LFG in an unmanaged SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons*	E3: Electricity generation in existing and/or new grid-connected power plants
LFG4: *LFG generation is partially avoided because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS*	
LFG5: *LFG generation is partially avoided because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS*	
LFG6: *LFG generation is partially avoided because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS*	

Balıkesir SWDS has been receiving municipal solid waste since 2014. Considering that there is no regulation or law mandating the capture and utilization of the LFG in a SWDS in Turkey, the most plausible baseline scenario to the implementation of the Balıkesir LFG Capture and Utilization Project is the continuum of atmospheric release of the LFG generated at the Balıkesir SWDS. In other words, LFG3 and E3 represent the baseline scenario.

3.5 Additionality

Section 3.13 in VCS v4.1[3] states that "A project activity is additional if it can be demonstrated that the activity results in emission reductions or removals that are in excess of what would be achieved under a 'business as usual' scenario and the activity would not have occurred in the absence of the incentive provided by the carbon markets" (2021:33). Moreover, Section 3.13.1

[3] https://verra.org/wp-content/uploads/2021/04/VCS-Standard_v4.1.pdf

clearly mandates that "Additionality shall be demonstrated and assessed in accordance with the requirements set out in the methodology applied to the project" (ibid.)

In the case of the proposed project activity, the Methodology of ACM0001 "Large-scale Consolidated Methodology: Flaring or use of landfill gas", Version 19.0[4], 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 07.0[5].

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

The proposed project activity shall not be considered as the first-of-its-kind in accordance with the methodological tool: "Additionality of first-of-its-kind project activities", Version 03.0[6], since the proposed project activity is not the first that applies LFG capture and utilization 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.

Outcome of Step 0:

Conclusion: The proposed project activity is not the first-of-its-kind.

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

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

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-23-v1.pdf

Step 1 and Step 2

These steps are completed in the Section 3.4 of the PDD, 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[7]. In addition, the latest approved version of the "Methodological tool: Investment analysis", version 10.0[8], is also considered as per the methodological Tool: "Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0.

The "Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0, states that *"the choice between the Benchmark Analysis versus the Investment Comparison Analysis and Simple cost analysis is determined by whether the output can only be provided by the project proponent" (pg. 13).*

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. In this regard, it has been decided to use the

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

[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v10.0.pdf

benchmark analysis for the evaluation of the project investment. To conclude, the benchmark analysis will be used to identify whether the financial indicators (Equity IRR in this case) of the proposed project is better than relevant benchmark value in compliance with the latest approved version of the "Methodological tool: Investment analysis", version 10.0.

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

While applying the Benchmark Analysis, Option III, the Equity IRR is selected as the financial indicator for the demonstration of the additionality of the project as permitted in the additionality tool.

In the Section of Selection and Validation of Appropriate Benchmarks of the "Methodological tool: Investment analysis", version 10.0, it is stated that "*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" (pg. 5).* In addition, the methodological Tool: "Tool for the demonstration and assessment of additionality", Version 07.0[9] also states that benchmarks shall be derived from (b) "Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects" (pg. 10).

In the Table 3.3, titled as 'Prototype Sub-projects for CTF Financing', in the report on 'Private Sector Renewable Energy and Energy Efficiency Project in Turkey' published by the World Bank in 2017[10] , the threshold IRR on Equity (%) for similar project types (Biomass gas) is given as 20% (pg. 40). For the benchmark analysis conducted here, this figure is taken as a benchmark. Taking this figure as a benchmark is in compliance not only with the latest version of UNFCCC's "Guidelines on the assessment of investment analysis"[11], version 05.0, but also with the latest

[9] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

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

[11] https://cdm.unfccc.int/Reference/Guidclarif/index.html

approved version of the "Methodological tool: Investment analysis", version 10.0 and the methodological Tool: "Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0.

The guaranteed tariff of USD $13.3 per MWe/h is provided by the Turkish state during only 10 years following the proposed project's commissioning date. After the subjected ten years, such projects are expected to directly sell the electricity they generate to the secondary market whose prices[12], as mentioned above, are way lower than the guaranteed tariff. Nevertheless, in the project's IRR calculations the guaranteed tariff has been remained even after the ten years of the project's operation to be conservative in the additionality analysis.

As seen on the proposed project activity's IRR Excel documentation which will be submitted to the Designated operational Entities (DoEs) in time of validation and verification, the project's additionality is demonstrated in line with the applied Tool's additionality requirement.

Parameters	***Unit***	***Data Value***
Installed Capacity	*MWe/*h	*14.14*[13]
Equity Investment	*Million $*	*15.50*[14]
Income tax rate	*%*	*20*[15]
Expected Feed-in-Tariff	*$ Cents/kWh*	*13.3*[16]
Operation & Maintenance Cost	*Million $ / Year*	*4,49*[17]

Calculation and estimations have been made conservatively, therefore IRR value represents the most optimistic scenario in terms of capital investment and electricity generation. Capital investment involves the construction works, generator costs, other equipment and

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

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

[14] IRR Sheet

[15] http://www.invest.gov.tr/en-US/investmentguide/investorsguide/Pages/Taxes.aspx

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

[17] IRR Sheet

commissioning, consultancy and contingency. Construction costs have been determined as per construction tender, generator set costs have been determined as per the gas engines tender and other costs were estimated by using separate contracts for other equipment, as well as the revenue share to the Balıkesir Metropolitan Municipality which is 10% in accordance with the contract between Landfill Enerji Sanayi Ticaret A.Ş. and Balıkesir Municipality. The IRR is calculated as equity IRR.

The equity IRR for the proposed project activity has been calculated as 16.64%.

Sub-step 3c: Sensitivity Analysis

Sensitivity analysis has been carried out as per three main parameters identified:

- *Operational Cost,*
- *Project Cost*
- *Annual Generation.*
- *Tariff*

In accordance with the paragraph 27 of methodological tool: "Investment Analysis", Version 10.0[18], for a range of ±10% fluctuations in parameters, Tariff, Project costs, operational costs and annual generation, the Table below shows sensitivity analysis for the proposed project activity without VCU revenue:

Sensitivity Analysis	Equity IRR			
Variation %	**-10%**	**Normal**	**+10%**	**Breaching Value**
PLF	13,58%	16,64%	19,40%	**12,50%**
O&M	16,77%	16,64%	16,50%	**-360,00%**
Project Cost	18,38%	16,64%	15,15%	**-18,00%**
Tariff Rate	13,58%	16,64%	19,40%	**12,50%**

[18] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v10.0.pdf

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 18%.*
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 360%.*
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 12,5% 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[19]*. 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:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measures as the proposed project activity;

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

(d) The plants in which the projects are implemented produce goods and services with comparable quality, properties and application areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 4.1.;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

According to the official report of "Final List on Renewable Energy Plants, 2020"[20], published by Republic of Turkey Energy Market Regulatory Authority (EPDK), there are only 18 operational biogas/biomass plants whose installed capacities are within the proposed project activity's

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

[20] https://www.epdk.gov.tr/Detay/DownloadDocument?id=FLl6KOxdaT8= (EPDK 2020 yılı YEKDEM listesi)

applicable capacity range calculated in Step 4.1. (19.845 MWe/h to 59.535 MWe/h) in 2021. The list of the plants is given in the Table below:

No.	*Name of the Plant*	*Total Installed Capacity[21] (MWe)*	*Voluntary Emission Reductions Certification Scheme(s) Registry[22] (ID No.)*
1	*Afyon Biyogaz Elektrik Üretim Tesisi*	*7.8*	*GS11144*
2	*Bientaş Kaşınhanı Elektrik Üretim Tesisi*	*9.36*	*N/A*
3	*Karatepe Biyokütle Elektrik Üretim Tesisi*	*8.49*	*N/A*
4	*Adana Enerji Üretim Tesisi*	*15.56*	*GS715*
5	*Bursa Hamitler Tesisi*	*9.8*	*GS1068*
6	*Mamak Katı Atık Alanı Enerji Üretim Tesisi*	*16.95*	*GS440*
7	*Bergama Çöp Gaz Elektrik Üretim Tesisi*	*9.89*	*Under Development*
8	*Kömürcüoda Çöp Gazı Santralı*	*19.81*	*GS707*
9	*Samsun Avdan Biyogaz Tesisi*	*8.4*	*GS935*
10	*Sakarya Biyogaz Enerji Üretim Tesisi*	*9.36*	*GS6193*

Step 4.3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

Within the projects identified in the Table above, the projects which are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation are as follow:

1) Bientaş Kaşınhanı Elektrik Üretim Tesisi

[21] please see the official search engine of the authorized office, EPDK, : http://lisans.epdk.org.tr/epvys-web/faces/pages/lisans/elektrikUretim/elektrikUretimOzetSorgula.xhtml

[22] Search via Gold Standard Project Registry; accessed on 08 October 2020 https://registry.goldstandard.org/projects

2) Karatepe Biyokütle Elektrik Üretim Tesisi

Accordingly, it is noted that

$N_{all} = 2$

Step 4.4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

Amongst the ten projects identified in Step 4.3 above, those that apply technologies that are different to the technology applied in the proposed project activity, which is LFG capture and utilization, are none.

Accordingly, it is noted that

$N_{diff} = 0$

Step 4.5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

In Step 4.3., N_{all} is noted as 2

In Step 4.4., N_{diff} is noted as 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.

Outcome of Step 4:

The paragraph 18 of the methodological tool "Common practice", Version 03.1[23] *states that*

"the proposed project activity is a 'common practice' within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all}-N_{diff}f is greater than 3" (pg. 5).

For the proposed project activity, F=1 is greater than 0.2, whilst N_{all}-N_{diff}=2 which is not greater than 3. Hence, the proposed project activity shall be considered as not a common practice in the region.

Hence, in accordance with the methodological tools, the proposed project activity shall be considered additional.

3.6 Methodology Deviations

No methodology deviation is applied in the project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

4.2 Project Emissions

4.3 Leakage

4.4 Net GHG Emission Reductions and Removals

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

To Be Calculated (TBC)

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)
Year 1			0	
Year 2			0	
Year 3			0	
Year 4			0	
Year 5			0	
Year 6			0	
Year 7			0	
Year 8			0	
Year 9			0	
Year 10			0	
Total			**0**	

5 MONITORING

5.1 Data and Parameters Available at Validation

5.2 Data and Parameters Monitored

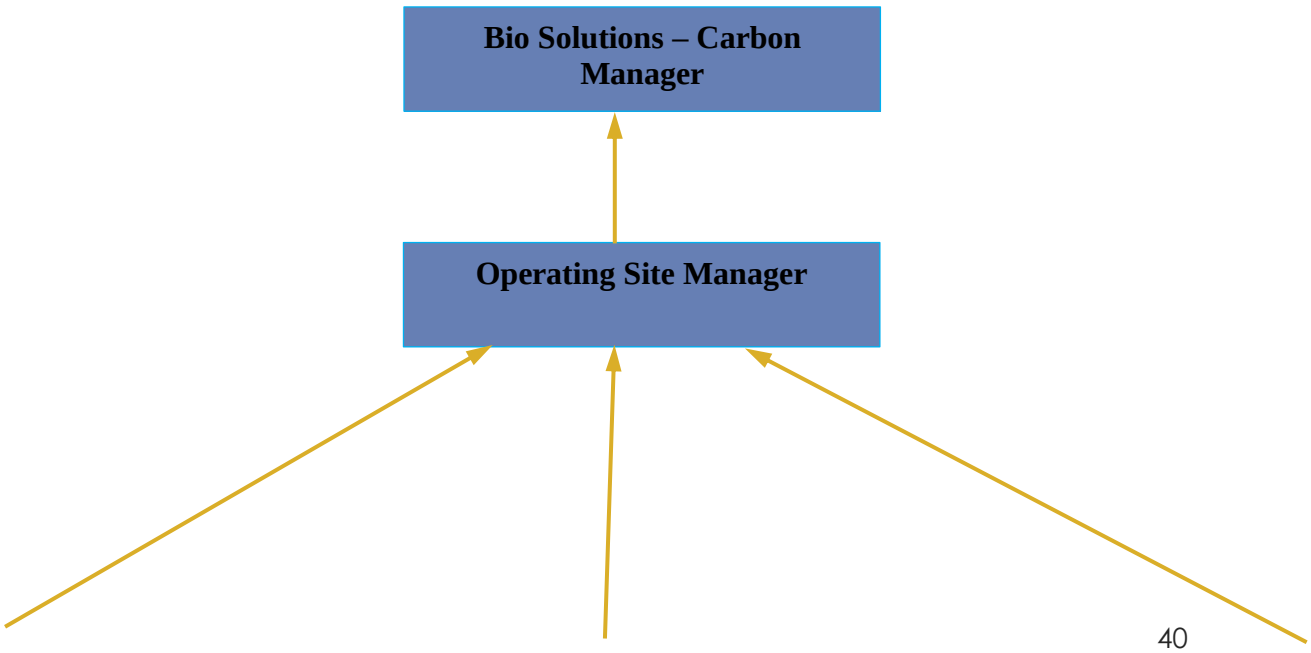
5.3 Monitoring Plan

Methods for measuring, recording, storing, aggregating, collating and reporting data and parameters:

The LFG plant is computerized management and control system includes: the management of the automatic loading of the fermenters, including the management of the quantities; monitoring of level management in gas meters through the level indicators; monitoring and control of the heating system; alarm management of minimum and maximum levels and security; and monitoring of the data analysis of the LFG analysis. With regards to the electricity generation component of the project, given that it dispatches electricity to the National Grid, measuring, recording, storing, aggregating, collating and reporting data and parameters will follow the procedure described by the authorities.

Organizational structure, responsibilities and competencies of the monitoring personnel:

The operators of the LFG recovery and electricity generation system will be responsible for collecting all data monitored on-site. The operating and maintenance personnel will be skilled technicians, with extensive experience in equipment operation, maintenance and calibration, and emergency procedures. Overall responsibility for the monitoring and maintenance of all required tasks and their adequate management lies with the project manager. Detailed roles and responsibilities of the relevant staff involved in VCS monitoring are placed. Furthermore, this staff will receive relevant training, if required, to ensure that monitoring duties will be performed by trained staff.



Raw Material, Final Product and Field Operator	Electrical & Mechanical Operator	Laboratory Operator

Quality Assurance and Quality Control:

Quality control and quality assurance procedures will guarantee the quality of monitored data. All data will be archived electronically, and backed up regularly.

All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. Regarding the monitoring equipment of the methane recovery component of the project, maintenance and calibration will be performed in line with manufacturers' recommendations. With regards to the electricity meter, as mentioned above, it is a high accuracy measurement device/s and meets all relevant metrological requirements prescribed by the state authority. Procedures for maintenance of the meter will be conducted in accordance with national procedures and standards.

6 APPENDIX