AREL MILAS LFG & BIOMETHANISATION PLANT PROJECT

Document prepared by (*Nazire Gür – Life Climate*)

Name of the project	*Arel Milas LFG & Biomethanisation Plant Project*
Project holder	*Arel Çevre Yatırımları Enerji ve Elektrik Üretimi A.Ş.*
Account holder	*Arel Çevre Yatırımları Enerji ve Elektrik Üretimi A.Ş.*
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Version	*01*
Date	*10/09/2025*

Project type	*Waste Handling and disposal*
Grouped project	*The project is not a grouped project.*
Applied Methodology (ies)	*ACM0001 Flaring or use of landfill gas v.19.0*
Project location (City, Region, Country)	*Milas, Muğla, Türkiye*
Starting date	*06/12/2019*
Quantification period of GHG emissions reduction	*06/12/2019 to 05/12/2026 (twice renewable)*
Estimated total and average annual GHG emission reduction/removals amount	*Total: 300,140 tCO2e* Annual Average: 42,877 *tCO2e*
Sustainable Development Goals	*SDG 7 , SDG 8, SDG 13*
Special category, related to co-benefits	*Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix* *Target 8.5: By 2030, achieve full and productive employment and decent work for all women and men* *Target 8.8: Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.*

	Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

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1 Project type and eligibility

1.1 Scope in the BCR Standard

The project is eligible under the scope of the BCR Standard by meeting one or more of the following conditions:

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O).	x
GHG projects using a methodology developed or approved by BioCarbon, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	
Quantifiable GHG emission reductions and/or removals generated through implementation of GHG removal activities and/or REDD+ activities (AFOLU Sector).	
GHG projects using a methodology developed or approved by BioCarbon, applicable to activities in the energy, transportation and waste sectors.	x
Quantifiable GHG emission reductions generated through implementation of activities in the energy, transportation and waste sectors.	x

The project is designed to utilize the gas produced at the existing landfill for electricity generation, as well as to treat organic waste through anaerobic digestion, resulting in biogas production and its subsequent use for power generation. Consequently, the project reduces methane emissions while generating electricity from the recovered gas. The electricity generated is supplied to the grid, and the facility also uses the electricity produced by the project instead of drawing power from the grid.

The project is eligible according to the BCR standard, as it results in quantifiable CO_2 emission reductions through the electricity generated from the utilization of landfill gas and biogas produced through the anaerobic digestion of organic waste. The project applies ACM0001 Version 19.0 and ACM0022 Version 03.0 methodologies, both of which are approved under the BCR standard.

1.2 Project type

Activities in the AFOLU sector, other than REDD+	
REDD+ Activities	
Activities in the energy sector	
Activities in the transportation sector	
Activities related to Handling and disposing of waste	x

1.3 Project scale

The project activity is considered large-scale, as the annual emission reductions exceed 60 kt CO_2e,

2 General description of the project

Arel Milas LFG & Biomethanisation Plant Project (hereafter referred to as the project) is located at Milas Landfill Site in Yokuşaltı Locality, Burgaz Neighborhood, Milas District, Muğla Province Türkiye. The project is owned by Arel Çevre Yatırımları Enerji ve Elektrik Üretim A.Ş. (hereafter referred to as the project owner). The project includes two components: (i) the capture and extraction of landfill gas (LFG) from the landfill site for electricity generation, and (ii) the anaerobic decomposition of organic waste in an anaerobic digester, leading to biogas generation and its use for electricity generation. Currently, only the first component is operational, while the second component has not yet been commissioned. Therefore, during this crediting period, credits will be claimed only from the electricity generation of the LFG, and no credits will be claimed from the second component. The plant started operation on 06.12.2019 with capacity of 1.45 MWm / 1.41 MWe with one gas engines. The total installed capacity will be 2.90 MWm / 2.82 MWe = (2 x 1.45 MWm / 1.41 MWe) in near future, consisting of 2 sets of gas engines. The

technical lifetime of project activity is 30 years which corresponds to the technical lifetime of the gas engines[1].

Prior to the implementation of the project, there was no managed landfill site in the area, nor were any gas extraction or utilization systems in place. As a result, the landfill gas (LFG) generated from waste was directly emitted into the atmosphere. The project collects and utilizes LFG generated by Milas landfill for power generation. Therefore, the project drastically reduces methane emissions, and at the same time, electricity is generated from the collected gas. Electricity generated is provided to the grid and the plant utilizes electricity generated by the project instead of drawing electricity from the grid.

Project will make positive contributions to at least three Sustainable Development Goals (SDGs). These are:

SDG 7: Affordable and Clean Energy

The proposed Project is a waste to power project that will generate renewable energy by capturing methane from municipal waste and utilizing it to produce thermal and electric energy through gas engine systems. By supplying renewable energy generated at the plant to the national grid, the proposed Project will contribute to increasing the share of renewable energy in the global energy mix and the proportion of the population with primary reliance on clean fuels and technology. The project's estimated annual electricity generation is 19,740 MWh.

SDG 8: Decent Work and Economic Growth

The proposed project activity will contribute to SDG 8 by promoting sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. By generating renewable energy from municipal waste through landfill gas (LFG) technology, the project will support increased economic productivity and resource efficiency. It will create direct and indirect employment opportunities during both construction and operation phases, thereby contributing to a reduction in regional unemployment rates. Furthermore, by reducing dependency on imported energy sources, the project will enhance national economic resilience and support a more sustainable growth model.

[1] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

SDG 13: Climate Action

The proposed project activity will reduce GHG emissions by capturing and utilizing methane, one of the most potent GHGs triggering climate change. It is estimated that the average annual emission reduction that the proposed Project will generate is around 42,877 tCO_2eq.

2.1 GHG project name

Arel Milas LFG & Biomethanisation Plant Project

2.2 Objectives

The Project will contribute to sustainable development in the following ways:

- Increasing labor demand of skilled labor for the fabrication, installation, operation and maintenance of the methane recovery and electricity generation system and thus, contributing to the sustainable economic growth of the region,
- Generating and dispatching electricity from a renewable and sustainable energy source to a grid nowadays reliant on fossil,
- Contributing to the climate change fight by reducing CH_4 emissions.
- Constituting a new, clean and efficient technology model for the disposal and handling of waste
- Improving air quality (i.e. by reducing odor) and therefore having positive effects on the local environment.

2.3 Project activities

Greenhouse gas (GHG) emissions will be reduced by avoiding CO2 emissions from those fossil fuel-based power plants connected to the grid and by avoiding GHG emissions from releasing LFG into atmosphere at the landfill site.

The purpose of the project is to utilize landfill gas (LFG) and biogas from anaerobic digestion, which consists mainly of methane, for electricity generation. It includes mechanical sorting facility, LFG capture and utilization facility, biomethanisation facility, electricity generation system and flare system.

The project involves the integrated operation of a landfill gas (LFG) and biomethanisation plant for renewable electricity generation. Initially, municipal solid waste is delivered to a mechanical sorting facility, where it is separated into biodegradable, recyclable, and residual fractions. The biodegradable portion is transferred to an anaerobic digester,

where it undergoes decomposition under controlled conditions to produce biogas, which is then used for electricity generation. Meanwhile, the residual waste is disposed of in the landfill, where it gradually decomposes and generates landfill gas. This gas is collected through a network of pipes and directed to treatment units before being utilized in gas engines to produce electricity. The facility maximizes energy recovery from waste while contributing to sustainable waste management and greenhouse gas emission reduction.

Steps in the Landfill Gas and Biomethanation Project:

1. **Mechanical Sorting Facility**
   Municipal solid waste is delivered and separated into biodegradable, recyclable, and residual waste fractions. This step ensures that organic waste is directed to the anaerobic digestion system, while non-organic materials are either recycled or sent to the landfill.

2. **Biodegradable Waste to Biogas Process:**
   a. Transfer of separated biodegradable waste to the anaerobic digester
   b. Generation of biogas through anaerobic digestion
   c. Treatment of biogas if required
   d. Electricity generation from biogas in gas engines
   e. Feeding the generated electricity into the national power grid

3. **Residual Waste to LFG Process:**
   a. Disposal of residual waste in the landfill site
   b. Generation of landfill gas (LFG) over time
   c. Collection of LFG via a pipeline network
   d. Extraction of LFG using a booster system
   e. Treatment of LFG via a chiller unit
   f. Electricity generation from LFG in gas engines
   g. Feeding the generated electricity into the national power grid

4. **Flaring System**
   Excess gas that cannot be utilized in the engines is safely combusted in the flare system.

The working principles of landfill gas are as follows. The LFG caused by the organic content of the landfill is collected by pipelines connected to the booster system. The gas which Booster collects also blew the gas to the engine to be burnt down. If there is a failure

of the engines, the collected gas is directed to the flare system. In the system, there is no need for auxiliary fuels for the start-up of the engines. The LFG can be burnt directly.

2 motor engines and 1 main meter and 1 back up meter are fed with the LFG and biogas to generate electricity, which is then exported to the grid. Technical parameters of the motor engines and generators are given below Table.

Table 1. Technical parameters of the meters

Main Equipment	Parameter	Value
Main Electricity meter	Type	AEL.TF.21
	Manufacturer	Köhler
	Serial Number	21009417
	Rated Power	3x57.7/100V -3x230/400 V
	Class	0.5s
	Calibration Date	23.10.2019
Back-up Electricity meter	Type	AEL.TF.21
	Manufacturer	Köhler
	Serial Number	21009780
	Rated Power	3x58/100V -3x230/400 V
	Class	0.5s
	Calibration Date	23.10.2019
Generators[2]	Type	LSA 52.3 S7 / 4P
	Manufacturer	Leroy Somer Nidec
	Rated Power	1750 kVA
	CosØ	0.8
	Frequency	50 Hz
Motor Engines[3]	Type	J420GS-B25
	Manufacturer	GE Jenbacher
	Rated Power	1414 kW
	Rev	1500 rpm/min

[2] Please see; Provisional Acceptance Document
[3] Please see; Provisional Acceptance Document

2.4 Project location

The project activity is located at Milas Landfill Site in Yokuşaltı Locality, Burgaz Neighborhood, Milas District, Muğla Province Türkiye. The coordinates of the plant are given below.

Table 2. Coordinates of the Project Site

Corner No	Latitude (N)	Longitude (E)
1	37° 19′ 59″	27° 44′ 40″
2	37° 20′ 00″ N	27° 44′ 41″ E
3	37° 20′ 01″ N	27° 44′ 41″ E
4	37° 20′ 00″ N	27° 44′ 42″ E
5	37° 19′ 59″ N	27° 44′ 41″ E

Figure 1. Location of the Project

2.5 Additional information about the GHG Project

N/A

3 Quantification of GHG emissions reduction

3.1 Quantification methodology

Methodology: ACM0001 - Flaring or use of landfill gas (Version 19.0)

Sectoral Scope: 1 Energy Industries (renewable-/non-renewable sources)

Sectoral Scope: 13 Waste Handling and Disposal

The methodology refers to the latest version of the following tools:

- Tool 02 - Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)
- Tool 04 - Emissions from solid waste disposal sites (Version 08.0)
- Tool 05 - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)
- Tool 06 - Project emissions from flaring (Version 04.0)
- Tool 07 - Tool for calculation of emission factor for electricity systems (Version 07.0)
- Tool 08 - Tool to determine the mass flow of a greenhouse gas in a gaseous stream (Version 03.0)
- Tool 32: Positive list of technologies (Version 04.0)

3.1.1 Applicability conditions of the methodology

Methodology ID	**Applicability condition**	**Justification of compliance**
ACM0001	The methodology is applicable under the following conditions: (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	In the absence of the project, there was no LFG capture system at Milas landfill site and LFG was emitted directly into atmosphere. The project will install a new LFG capture system at Milas landfill site and capture and use LFG for power generation. 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

	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; 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.	organic waste that was brought to the site was sent to the landfill and was not used for any purpose, as such there was no recycling of organic waste prior to project implementation.
ACM0001	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	The most feasible baseline scenario of the project is as follows: Atmospheric release of the LFG; and for electricity generation: that electricity would have been generated with existing/new power plants in the absence of the project

	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.	activity (the dominant source of energy is coal in Turkey[4]).
ACM0001	This methodology is not applicable: (a) In combination with other approved methodologies. For instance, ACM0001 cannot be used	Only ACM0001 is applied in the project. The management of the SWDS in the project activity will not be deliberately

[4] https://enerji.gov.tr/bilgi-merkezi-enerji-elektrik#:~:text=2022%20y%C4%B1l%C4%B1nda%20elektrik%20%C3%BCretimimizin%2C%20%34,g%C3%BCc%C3%BC%20105.964%20MW'a%20ula%C5%9Fm%C4%B1%C5%9Ft%C4%B1r.

	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.	changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity. Also, the responsibility of transporting MSW to the project site belongs to Milas Municipality.
TOOL02	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 methodology does not specify any adjustments or additional explanations for this tool. This tool can be applied to the project activity.
TOOL04	The tool can be used to determine emissions for the following types of applications: (a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are	Application A has been selected since methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. "ACM0001: Flaring or use of landfill gas").

	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 o when calculating baseline emissions.	

TOOL04	These two types of applications are referred to in the tool for determining parameters.	Application A has been selected; therefore, parameters have been determined accordingly.
TOOL04	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 have been disposed, thus this condition is not applicable.
TOOL05	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	Scenario A has been selected since electricity is purchased from the grid only and there is no existing captive power plant in the site.

	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 TOOL05 Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation Version 03.0 4 of 25 (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.	
TOOL05	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;	Scenario I is applicable since electricity is supplied to grid only.

	(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.	
TOOL05	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 CO_2 emissions.	There is no existing captive power plant in the site. So, this condition is not applicable.
TOOL07	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).	The relevant OM and BM values are taken from Ministry of Energy and Natural Sources[5] to calculate the combined margin for the project activity.
TOOL07	Under this tool, the emission factor for the project electricity system can	The project activity is a grid power plant only.

5 https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf

	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.	
TOOL07	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.	Even Turkey is an Annex I country, it is not meet the conditions of Annex I countries. Therefore, this tool can be applied.
TOOL07	Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	Biofuels are not used in the project activity.

TOOL08	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.	For the emergency cases, flare will be used. The relevant project emissions will be calculated by using this tool.
TOOL08	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.	CO_2 is not the only gas of interest.
TOOL08	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).	a) The gaseous stream to the flare b) CH_4 c) In minute basis d) MM_{CH4} will be taken as 16.04 kg/kmol.
TOOL32	The use of this methodological tool is not mandatory for the project	Since the installed capacity of the project activity is less than

	participants of a CDM project activity or CDM PoA for demonstrating their additionality.	10 MWe, Tool 32 is applied to demonstrate that the project activity is deemed additional.
TOOL32	This methodological tool shall be applied in conjunction with a small-scale or large-scale methodology which refers to this tool.	It is implemented together with the methodology ACM0001 (V.19.0) that refers to this tool. Thus, it is applicable.
TOOL32	The positive lists as contained in section 5 of this tool are valid up to 10 March 2025. Notwithstanding the provisions on the validity of new, revised and previous versions of methodologies and methodological tools in the "Procedure: Development, revision and clarification of baseline and monitoring methodologies and methodological tools", there will be no grace period for the application of this tool and the validity of the positive list after this date, including in cases where further technologies are added to the positive list through revisions of this tool before this date.	It is valid for the specified date Thus, it is applicable.
TOOL06	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 flare is an enclosed flare, therefore, it is applicable.

TOOL06	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).	(a) Methane has the highest concentration and (b) Source of the residual gas is landfill gas So, it is applicable.
TOOL06	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.	There is not auxiliary fuels and residual has enough flammable gas. Also, the flare is an enclosed flare.

3.1.2 Methodology deviations (if applicable)

N/A

3.2 Project boundaries, sources and GHGs

3.2.1 Spatial limits of the project

Steps in the landfill gas to electricity project:

1. Storage of waste in landfill
2. Generation of LFG at the landfill
3. Collection of LFG via pipelines

4. Booster system that draws collected LFG
5. Treatment of LFG via Chiller Unit
6. Electricity and thermal energy generation in gas engines
7. Electricity feeding to national power grid
8. Flaring process of extra gas that is not burnt in the engines.

The working principles of landfill gas are as follows. The LFG caused by the organic content of the landfill is collected by pipelines connected to the booster system. The gas which Booster collects also blew the gas to the engine to be burnt down. If there is a failure of the engines, the collected gas is directed to the flare system. In the system, there is no need for auxiliary fuels for the start-up of the engines. The LFG can be burnt directly.

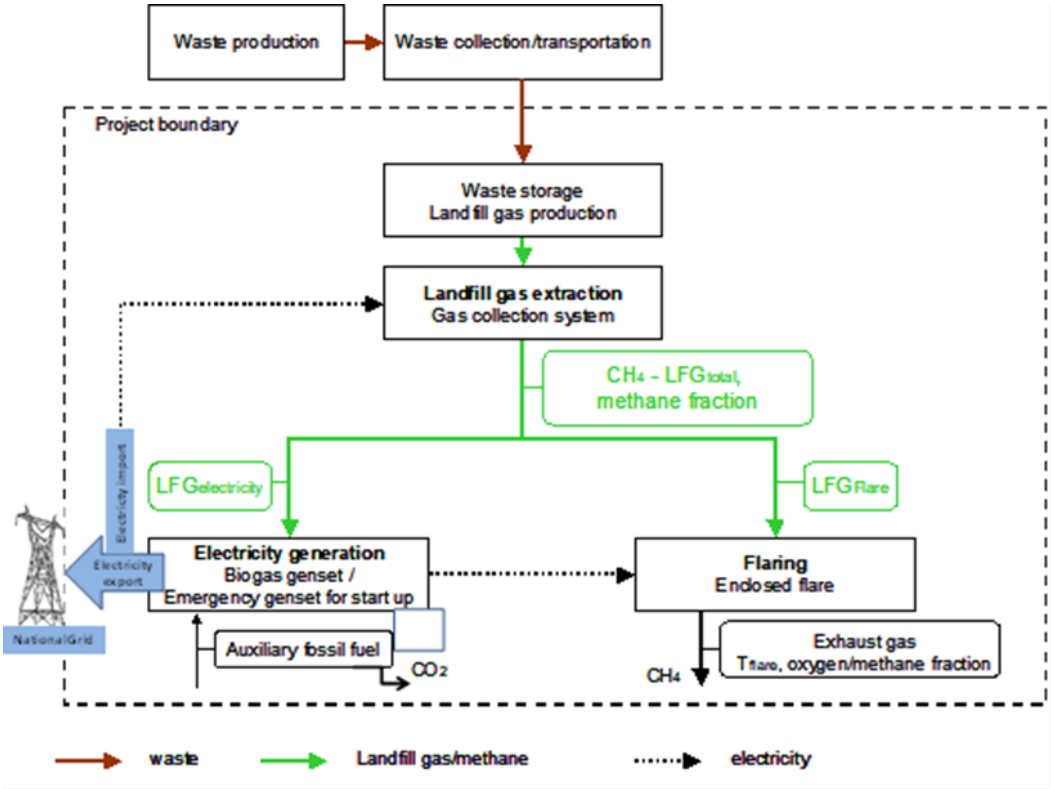

Figure 2. Boundary of the Project Activity

3.2.2 Carbon reservoirs and GHG sources

	Source	Gas	Included?	Justification/Explanation
Baseline	Emissions from	CH_4	Yes	Major source of emissions in the baseline.

Source		Gas	Included?	Justification/Explanation
	decomposition of waste at the SWDS site	N_2O	No	N_2O emissions are small compared to CH_4 emissions from SWDS. This is conservative
		CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted for since the CO_2 is also released under the project activity
	Emissions from electricity generation	CO_2	Yes	Major emission source if power generation is included in the project activity
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Emissions from heat generation	CO_2	Yes	Major emission source if power generation is included in the project activity
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Emissions from the use of natural gas	CO_2	No	Excluded for simplification. This is conservative
		CH_4	Yes	Major emission source if power generation is included in the project activity

Source		Gas	Included?	Justification/Explanation
		N_2O	No	Excluded for simplification. This is conservative
Project	Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity	CO_2	Yes	It is an important emission source.
		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
	Emissions from electricity consumption due to the Project activity	CO_2	Yes	It is an important emission source.
		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
	Emissions from Flaring	CO_2	No	Emissions are considered negligible
		CH_4	Yes	When flare does not operate, methane emissions are subtracted.
		N_2O	No	Emissions are considered negligible
	Emissions from distribution of LFG using	CO_2	Yes	It is an important emission source.
		CH_4	Yes	It is an important emission source.

Source		Gas	Included?	Justification/Explanation
	trucks and dedicated pipelines	N_2O	No	Emissions are considered negligible

3.2.3 Time limits and analysis periods

As per BCR Standard v4.0 Section 11.5, "renewable quantification period may be at most seven years and shall be renewed two, for a maximum total length of 21 years;". As a result, the project timeframe corresponds to a 7-year period for quantifying GHG emission reductions.

3.2.3.1 Project start date

The start date of the project activity is 06/12/2019, which corresponds to the commencement of electricity generation resulting in GHG emission reductions/removals.

3.2.3.2 Quantification period of GHG emission reductions/removals

The first quantification period is for 7 years, from 18.02.2020 to 17.02.2027, including both dates.

3.2.3.3 Monitoring periods

The first monitoring period of the project will cover the dates between 06.12.2019 to 31.12.2024. Subsequent monitoring periods are planned to occur every 2 years.

3.3 Identification and description of the baseline or reference scenario

Procedures for the selection of most plausible baseline scenario

According to ACM0001: Flaring or use of landfill gas - Version 19.0, the baseline scenario is identified using the Tool 02 "Combined tool to identify the baseline scenario and demonstrate additionality. – Version 07.0.0".

Step 0: Demonstration whether the proposed project activity is the First-of-its-kind

This step is not applied.

Step 1: Identification of alternative scenarios

This step serves to identify all alternative scenarios to the proposed project activity which can be the baseline scenario following the sub-steps:

Step 1a: Define alternative scenarios to the proposed project activity:

In line with ACM0001 Flaring or use of landfill gas - Version 19.0, alternative scenarios that

are available to the project participant, b) cannot be implemented in parallel to the proposed project activity, and c) provide outputs and with comparable quality, properties and application areas as the proposed project activity.

In line with the requirements of ACM0001, these alternatives are defined as follows:

LFG 1: The project activity implemented without being registered as a VER project activity;

LFG 2: Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, or to address safety and odor concerns;

LFG 3: LFG is partially not generated because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS;

LFG 4: LFG is partially not generated because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS;

LFG 5: LFG is partially not generated because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS.

Since LFG is used for generating electricity for export to the grid, the following alternatives have been also analyzed:

E1: Electricity generated from LFG undertaken without being registered as a VER project activity;

E2: Electricity generation in existing or new renewable or fossil fuel based captive power plant;

E3: Electricity generation in existing and/or new grid connected power plants;

As the proposed project does not involve thermal energy generation, all the alternatives for heat generation are not included in the analysis.

Alternatives LFG 3, 4 and 5 as well as E 2 has been excluded from further consideration as a realistic alternative, which is explained as follows:

Reference	Alternative	Justification
LFG 3	LFG is partially not generated because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS.	It is not realistic to consider recycling of solid waste which has been subject to decomposition for over 15 years as a realistic and credible alternative. Alternative LFG 3 has been excluded from further evaluation.
LFG 4	LFG is partially not generated because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS.	It is not realistic to consider aerobic treatment of solid waste which has been subject to decomposition for over 15 years as a realistic and credible alternative. Alternative LFG 4 has been excluded from further evaluation
LFG 5	LFG is partially not generated because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS.	It is not realistic to consider incineration of solid waste which has been subject to decomposition for over 15 years as a realistic and credible alternative. Alternative LFG 4 has been excluded from further evaluation.

E 2	Electricity generation in existing or new on-site or offsite renewable based captive power plant.	There is no existing electricity generation in the SWDS. Also, there are no available renewable energy resources (hydro, geothermal, wind etc.) in or close to the vicinity of the SWDS. Alternative E 2 has been excluded from further evaluation.

Outcome of Step 1a: *Based on the above arguments, two alternatives' scenarios could be identified:*

Scenario	**Alternatives**			**Description of situation**
	Landfill Gas	**Electricity**	**Heat**	
1	LFG 1	E 1	N/A	Project activity including power generation from LFG without being registered as a VER project activity.
2	LFG 2	E 3	N/A	Atmospheric release of the LFG and electricity would have been generated by the existing grid connected power plants as continuation of the situation before the project activity.

Step 1.b: Consistency with mandatory laws and regulations

Related laws and regulations to the proposed project activity are as followed:

- *Electricity Market Law*[6] *[Law Number: 4628 Ratification Date: 20/02/2001 Enactment Date: 03/03/2001]*

- *Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy*[7] *[Law Number: 5346 Ratification Date: 10/05/2005 Enactment Date: 18/05/2005]*

- *Environmental Law*[8] *[Law Number: 2827 Ratification Date: 09/08/1983 Enactment Date: 11/08/1983]*

    - *Regulation on Solid Waste Control*[9] *[Last updated on 05/04/2005]*

    - *Regulation on Managed Waste Land Filling*[10] *[Regulation number 27533 Enactment Date: 26/03/2010]*

Relevance Of Mentioned Laws and Regulations

Electricity Market Law: The purpose of this Law is to ensure the development of financially sound and transparent electricity market operating in a competitive environment under provisions of civil law and the delivery of sufficient, good quality, low cost and environment-friendly electricity to consumers and to ensure the autonomous regulation and supervision of this market. Among others, the scope of the law also covers generation of electricity. As one of the important aspects of the proposed project activity is electricity generation, the Electricity Market Law is one of the regulating legislations regarding the project activity.

Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy: The purpose of this Law is to expand the utilization of renewable energy resources for generating electrical energy, to benefit from these resources in secure, economic and qualified manner, to increase the diversification of energy resources, to reduce greenhouse gas emissions, to assess waste products, to protect the environment and to develop the related manufacturing sector for realizing these objectives. At the time of the investment decision, the law guaranteed a tariff range of 5 – 5.5 €cent/kWh for 10

[6] https://www.mevzuat.gov.tr/mevzuatmetin/1.5.6446.pdf
[7] https://www.mevzuat.gov.tr/mevzuatmetin/1.5.5346.pdf
[8] https://www.mevzuat.gov.tr/mevzuatmetin/1.5.2872.pdf
[9] https://www.resmigazete.gov.tr/eskiler/2015/04/20150402-2.htm
[10] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=13887&MevzuatTur=7&MevzuatTertip=5

years. On 29/12/2010 the Law has been revised and the guaranteed tariff has been amended as 13.3 $cent/kWh for electricity production based on LFG. As one of the important aspects of the proposed project activity is electricity generation from renewable energy sources the "Renewable Energy Law" is one of the regulating legislations regarding the project activity.

Environmental Law: This law outlines Turkey's environmental policy in general terms. It aims to protect the environment and Turkey's natural resources for the benefit of future generations. It includes the polluter pays principle. Regulations have been issued on air quality protection, water pollution control, environmental impact assessment, waste control, noise control, and the control of hazardous materials. The Environmental Law is one of the main legislations regarding the project activity as it relates to waste management activities. The following two sub regulations of this law are specifically related to the Project Activity:

Regulation on Solid Waste Control: Summarizing, the regulation mentions the obligation of the party undertaking the solid waste management to respect the human health and welfare of the society. However, it doesn't prescribe any technology to achieve this (article 5 and article 27), nor does it mention any sanction or penalty if solid waste management projects are implemented otherwise. As such the regulation is instructive on the issue of solid waste management rather than normative. It does not mandate the destruction of methane. Although semi-controlled release of landfill gas to the air (a.k.a. 'venting') occurs at several landfills (also see B.5 step 4), the law and regulations does not mandate the destruction of methane.

Regulation on Sanitary Landfilling: The newly enacted regulation (26/03/2010) on sanitary waste landfilling aims to (1) minimize the impact of leachate and LFG on soil, air and water quality; (2) regulate waste acceptance to the landfill area; and (3) provide procedures for opening and closure of a landfill area.

In summary: although solid waste management regulation is being implemented in Turkey, it is neither compiled to nor enforced. The regulations don't define sanctions or penalties. In practice none of the landfill areas comply with these regulations, as indicated in statistics on landfill areas. The majority of landfill areas in Turkey are actually 'waste dumps' where no waste management (including covering of the landfill) implemented.

Outcome of Step 1b:

Both Scenario 1 and Scenario 2 as defined under table 5 "Alternative scenario combinations applicable to the project activity" are in consistency with mandatory laws and regulations

and remain as credible and realistic alternative scenarios to the proposed project activity for further evaluation on identification of the baseline scenario.

Step 2: Barrier Analysis

Since the "Combined tool to identify the baseline scenario and demonstrate the additionality" version 07.0.0 is used to identify the baseline scenario, a barrier analysis has to be conducted to assess which alternative scenarios are prevented by defined barriers. When applying this step "Guidelines for objective demonstration of and assessment of barriers" version 01 has been taken into account.

Sub-step 2a: Identify barriers that would prevent the implementation of alternative scenarios

This step has been explained in detail under section B.5 "Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality)" of this PD. Only the outcome of this step has been presented in order to identify the baseline scenario.

Outcome of Step 2a:

Realistic and credible barriers that would prevent alternative scenarios to occur have been identified under the generic topic "Investment Barriers".

Sub-step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

This step has been explained in detail under section 3.5 "Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality)" of this PD. Only the outcome of this step has been presented in order to identify the baseline scenario.

Table 3 . Assessment of alternative scenarios against the impact of identified barriers

Scenario	**Identified Barriers**
	Investment Barrier

	One of the major barriers related with project activity is defined as "limited access to finance".
Scenario 1: Project activity including power generation from LFG without being registered as a VER project activity	Waste management projects need a high level of financing and limited access to finance represents a real and credible barrier that would prevent the project activity invested without the VER revenues.
Scenario 2: Atmospheric release of the LFG and electricity would have been generated by the existing grid connected power plants as continuation of the situation before the project activity.	Since this scenario is the continuation of the current practice, it does not require any investment and therefore is not affected by the identified barrier.

Outcome of Step 2a: Based on the above arguments, the following scenarios are not prevented by any identified barriers.

Scenario	**Alternatives**			**Description of situation**
	Landfill Gas	**Electricity**	**Heat**	
2 (Identified as the baseline scenario)	LFG 2	E 3	N/A	Atmospheric release of the LFG and electricity would have been generated by the existing grid connected power plants as continuation of the situation before the project activity. This scenario also represents the continuation of the situation before the implementation of the proposed project activity.

Outcome of Step 2:

There is only one alternative scenario that is not prevented by any barrier, which is Scenario 2; Atmospheric release of the LFG and electricity would have been generated by

the existing grid connected power plants as continuation of the situation before the project activity. In line with the requirements of Tool 02 "Combined tool to identify the baseline scenario and demonstrate the additionality" version 07.0.0, Scenario 2 has been identified as the baseline scenario.

Assessment of the validity of the original baseline in accordance with Tool for "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

Condition	**Assessment of compliance**
Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies	The current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period.
Step 1.2: Assess the impact of circumstances. In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period. Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions;	Factors other than the grid emission factor used for estimation of baseline emissions are valid at the point of renewal of crediting period. The grid emission factor (presented below) is revised at the point renewal.
Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario	The baseline to the project activity as identified during validation was disposal of the waste at a landfill without the

for the crediting period for which renewal is requested. This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology. Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project activity, as determined in the CDMPDD or CDM-PDD-REN, exceeds the crediting period for which renewal is requested. Take into consideration the market penetration of different technologies. Evaluate the penetration rate of different technologies that are available in the marketand evaluate how they could affect the baseline.	capture and/or flaring of landfill gas. The electricity is generated by existing grid-connected power plants and not continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later. Hence the sub-step is not applicable.
Step 1.4: Assessment of the validity of the data and parameters	IPCC Default value for GWP of methane has been changed based on IPCC AR5. In the context of the present project activity the emission factor of electricity has been updated.

Since the assessment of the above sub-steps outlines changes of baseline emission factor and IPCC value of GWP the current baseline data parameters relating to baseline grid emission factor and GWP is being modified in accordance to step 2 of the applied tools.

3.4 Additionality

For demonstrate additionality, section 5.3.1 Simplified procedures to identify the baseline scenario and demonstrate additionality of ACM0001, Version 19.0 was followed. According to paragraph 21: "For the simplified procedure to demonstrate additionality, the project proponent shall refer to the methodological tool "TOOL32: Positive lists of technologies"

According to Section 5.1.1 of Tool 32 "Positive lists of technologies", "The project activities and PoAs at new or existing landfills (greenfield or brownfield) are deemed automatically additional, if it is demonstrated that prior to the implementation of the project activities and PoAs the landfill gas (LFG) was only vented and/or flared (in the case of brownfield projects) or would have been only vented and/or flared (in the case of greenfield projects) but not utilized for energy generation, and that under the project activities and PoAs any of the following conditions are met:

(a) The LFG is used to generate electricity in one or several power plants with a total nameplate capacity that equals or is below 10 MW;

(b) The LFG is used to generate heat for internal or external consumption;

(c) The LFG is flared."

According to the descriptions above, the total capacity of the project activity is currently 2.90 MWm / 2.82 MWe i.e. below 10 MW. Therefore, the project is deemed automatically additional as per Tool 32, v04.0.

3.5 Uncertainty management

Emission reduction calculations of the project were made according to the guideline in ACM0001 v19.0. As per the methodology, the calculations should be based on a conservative approach and the monitoring parameters should be described clearly. In accordance to this, the monitoring parameters are described in Section 16.

For the emission factors, that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources which is indicating Turkey's National Electric Grid Emission Factor for the year of 2019 was used. Publication includes calculated Emission Factor values that are Operating Margin (OM), Growth Based Margin (Build Margin-BM) and Combined Margin (CM) Emission Factors, for the relevant year with usage of the IPCC's Clean Development Methodology Tool 07-V06.0. For this calculation, information regarding used data set is given below in detail;

- TEİAŞ Turkey's electricity generation-consumption and loss statistics,
- Common prepared report under Turkey's National Greenhouse Gas Inventory Reporting Format. - Common Reporting Format (CRF) tables for electricity generation (1.A.1.a.i) emission values
- Chronological order of power generation plants from TEİAŞ Load Dispatch Department with commissioning dates, plant names, fuel types, installed power values, electricity generation for the calculated year
- From Clean Development Mechanism (CDM) Tool 009- V2.0, Power plant efficiency figures are used

According to this publication;

- Operating Margin-OM; 0.7108 tCO_2/MWh
- Build Margin-BM; 0.3721 tCO_2/MWh
- Combined Margin-CM (other renewables); 0.5415 tCO_2/MWh[11]

3.6 Leakage and non-permanence

As per ACM0001 (version 19.0), no leakage emissions are considered under this methodology. The project does not involve activities that pose a risk of non-permanence.

3.7 Mitigation results

3.7.1 Eligible areas within GHG project boundaries (AFOLU sector projects)

N/A

[11] https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Sebeke_EF_Bilgi_Formu_2022.pdf

3.7.2 *Stratification (Projects in the AFOLU sector)*

N/A

3.7.3 *GHG baseline emissions*

According to the methodology ACM0001 (V19.0), baseline emissions are determined according to Equation (1) and comprise the following sources:

$$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y} \quad \text{(Equation 1)}$$

Where:

BE_y = Baseline emissions in year y (t CO_2e/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 is not involved in heat generation and natural gas use; thus, the baseline emissions is calculated as follows:

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

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 considered as per Equation (2) of ACM0001, v19.0:

$$BE_{CH4} = ((1 - OX_{top\_layer}) \times F_{CH4,PJ,y} - F_{CH4,BL,y}) \times GWP_{CH4} \quad \text{(Equation 2)}$$

Where:

$BE_{CH4,y}$ = Baseline emissions of methane from the SWDS in year y (t CO_2e/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 CH_4/yr)

$F_{CH4,BL,y}$ = Amount of methane in the LFG that would be flared in the baseline in year y (t CH_4/yr)

GWP_{CH4} = Global warming potential of CH_4 (t CO_2e/t CH_4)

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), air heater(s), glass melting furnace(s), kiln(s) and natural gas distribution, as per Equation (3) of ACM0001, v19.0, as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y} \quad \text{(Equation 3)}$$

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 CH_4/yr)

$F_{CH4,flared,y}$ = Amount of methane in the LFG which is destroyed by flaring in year y (t CH_4/yr)

$F_{CH4,EL,y}$ = Amount of methane in the LFG which is used for electricity generation in year y (t CH_4/yr)

$F_{CH4,HG,y}$ = Amount of methane in the LFG which is used for heat generation in year y (t CH_4/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 CH_4/yr)

The flare will not be used when the power plant is in normal operation, thus, the project proponent decides not to claim the emission reduction from the flare, even if any methane is destroyed by flare during the crediting period. Meanwhile, the project is not involved in heat generation and natural gas use, thus,

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

$F_{CH4,EL,y}$ is determined using the TOOL 08: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (v03.0) and monitoring the working hours of the

power plant(s), boiler(s), air heater(s), glass melting furnace(s) and kiln(s), so that no emission reduction are claimed for methane destruction during non-working hours. This is taken into account by monitoring the hours that the equipment utilizing the LFG is operating in year y ($Op_{j,h,y}$).

For the project, the flow of gaseous stream is volume flow-wet basis, and the volumetric fraction is wet basis, thus, as per the "Tool08 to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0), Option C is applied to determine the parameter of $F_{CH4,EL,y}$.

Option C The mass flow of greenhouse gas i ($F_{i,t}$) is determined as per Equation (9) and Equation (10) of Tool 08, v03.0

$F_{i,t} = V_{t,wb,n} \times \nu_{i,t,wb} \times \rho_{i,n}$ (Equation 9)

With:

$$\rho_{i,n} = \frac{P_n \times MM_i}{R_u \times T_n}$$ (Equation 10)

Where:

$F_{i,t}$ = Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)

$V_{t,wb,n}$ = Volumetric flow of the gaseous stream in time interval t on a wet basis at normal conditions (m^3 wet gas/h)

$\nu_{i,t,wb}$ = Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a wet basis (m^3 gas i/m^3 wet gas)

$\rho_{i,n}$ = Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas i/m^3 wet gas i)

P_n = Absolute pressure at normal conditions (Pa)

T_n = Temperature at normal conditions (K)

MM_i = Molecular mass of greenhouse gas i (kg/kmol)

R_u = Universal ideal gases constant (Pa.m^3 /kmol.K)

The Equation (11) of Tool 08, v03.0 should be used to convert the volumetric flow of the gaseous stream from actual conditions to normal conditions of temperature and pressure:

$$V_{t,wb,n} = V_{t,wb} \times [(T_n / T_t) \times (P_t / P_n)] \quad \text{(Equation 11)}$$

Where:

$V_{t,wb,n}$ = Volumetric flow of the gaseous stream in a time interval t on a wet basis at normal conditions (m^3 wet gas/h)

$V_{t,wb}$ = Volumetric flow of the gaseous stream in time interval t on a wet basis (m^3 wet gas/h)

P_t = Pressure of the gaseous stream in time interval t (Pa)

T_t = Temperature of the gaseous stream in time interval t (K)

P_n = Absolute pressure at normal conditions (Pa)

T_n = Temperature at normal conditions (K)

The following requirements apply:

(a) CH_4 is the greenhouse gas for which the mass flow will be determined;

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

(c) The mass flow calculated for hour h is 0 if the equipment is not working in hour h ($Op_{j,h}$=not working), the hourly values are then summed to a yearly unit 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 in order to estimate the emission reductions of the proposed project activity in the JPD-MR. It is determined as follows:

$$F_{CH4,PJ,y} = \eta_{PJ} \times BE_{CH4,SWDS,y} / GWP_{CH4} \quad \text{(Equation 5)}$$

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 CH_4/yr)

η_{PJ} = Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year y (t CO_2e/yr)

$BE_{CH4,SWDS,y}$ = Efficiency of the LFG capture system that will be installed in the project activity

GWP_{CH4} = Global warming potential of CH_4 (t CO_2e/t CH_4)

$BE_{CH4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites" (version 08.0). The following guidance should be taken into account when applying the tool:

a) 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;

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

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

The $BE_{CH4,SWDS,y}$ is calculated as per Equation (1) of Tool 04 v08.1

$$BE_{CH4,SWDS,y} = \varphi_y \times (1 - f_y) \times GWP_{CH4} \times (1 - OX) \times \frac{16}{12} \times F \times DOC_{f,y} \times MCF_y \times \sum_{x=1}^{y} \sum_{j} \left(W_{j,x} \times DOC_j \times e^{-k_j (y-x)} \times (1 - e^{-k_j}) \right)$$

(Equation 1)

Where:

$BE_{CH4,SWDS,y}$ = Baseline methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO_2e/yr)

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 y (x = y)

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

$DOC_{f,y}$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)

$W_{j,x}$ = Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)

ϕ_y = Model correction factor to account for model uncertainties for year y

f_y = 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

GWP_{CH4} = Global Warming Potential of methane

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)

MCF_y = Methane correction factor for year y

DOC_j = Fraction of degradable organic carbon in the waste type j (weight fraction)

k = Decay rate for the waste type j (1 / yr)

j = Type of residual waste or types of waste in the MSW

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 4 are distinguished. The appropriate case should be identified, and the corresponding instructions followed.

Table 4. 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

There was no regulation or standard that enforces methane destruction in LFG when Milas Landfill site started operation. However, there was no existing LFG capture system& destroy system at Milas landfill site prior to the implementation of the project activity. Therefore, this project is in line with case 1.

In this situation, as per Equation (11) of ACM0001, v19.0:

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 ($BE_{EC,y}$) 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) $EC_{BL,k,y}$ in the tool is equivalent to the net amount of electricity generated using LFG in year y ($EG_{PJ,y}$).

According to Equation (2) of methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0).

$$BE_{EC,y} = \sum_{k} EC_{BL,k,y} \times EF_{EL,k,y} \times (1 + TDL_{k,y}) \quad \text{(Equation 2)}$$

Where:

$BE_{EC,y}$ = Baseline emissions from electricity consumption in year y (t CO_2 / yr)

ECBL,k , y = Quantity of electricity that would be consumed by the baseline electricity consumer k in year y (MWh/yr)

$EF_{EL,k,y}$ = Emission factor for electricity generation for source k in year y (t CO_2/MWh)

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

k = Sources of electricity consumption in the baseline

According to the tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0), annual average value based on the most recent data available within the host country Turkey for baseline emission, i.e., $TDL_{k,y}$ =10%[12].

Determination of the emission factor for electricity generation ($EF_{grid,y}$)

For the emission factors for electricity generation, the publication of the Turkish Ministry of Energy and Natural Resources, which indicates Turkey's National Electric Grid Emission Factor for 2019, was used. The publication includes calculated Emission Factor values that

[12] Obtained from https://webapi.teias.gov.tr/file/9248a331-e529-47ca-8c49-22f8705f5810?download

are Operating Margin (OM), Growth Based Margin (Build Margin-BM) and Combined Margin (CM) Emission Factors, for the relevant year with the usage of the IPCC's Clean Development Methodology Tool 07-V06.0. For this calculation, information regarding the data set employed is given below in detail;

- TEİAŞ Turkey's electricity generation-consumption and loss statistics,
- Commonly prepared report under Turkey's National Greenhouse Gas Inventory Reporting Format. - Common Reporting Format (CRF) tables for electricity generation (1.A.1.a.i) emission values
- Chronological order of power generation plants from TEİAŞ Load Dispatch Department with commissioning dates, plant names, fuel types, installed power values, electricity generation for the calculated year
- Checking off Volunteers from the websites of Gold Standard (GS) and Verified Carbon Standard (VCS) for the ownership status of the carbon reduction certificate and,
- From Clean Development Mechanism (CDM) Tool 009- V2.0, Power plant efficiency figures are used

As per the applied methodology, the emission factor for the electricity generation $EF_{grid,CM,y}$ is determined according to "Tool to calculate the emission factor for an electricity system", version 07.0. According to the Tool, the "combined margin" emission factor is calculated through the following six steps as per the "Tool to calculate the emission factor for an electricity system", version 07.0:

Step (1): Identify the relevant electricity system;

Step (2): Choose whether to include off-grid power plant in the project electricity system (optional);

Step (3): Select a method to determine the operating margin (OM);

Step (4): Calculate the operating margin emission factor according to the selected method;

Step (5): Calculate the build margin (BM) emission factor;

Step (6): Calculate the combined margin (CM) emission factor

Step 1: Identify the relevant electricity system

According to the applicability of "Tool to calculate the emission factor for an electricity system", version 07.0, the relevant project electricity system should be identified by the project owners. The chosen electric power system is the Turkish National Grid, which is physically connected through transmission and distribution lines to the project activity. National grid is dominated by fossil fuels such as coal, diesel and natural gas.

Step 2: Choose whether to include off-grid power plants in the project electricity system

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, project owners may choose between the following two options to calculate the operating margin and build margin emission factor:

- 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

The project participants choose Option I and therefore only grid power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, 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 OM method has been selected for calculation.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/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:

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

Option B: Based on the total net electricity generation of all power plants serving and the fuel types and total fuel consumption of the project electricity system.

Ministry of Energy and Natural resources of Turkey has published the data for OM using simple OM calculation following the option A.

$EF_{grid,OM,y}$ = 0.7108 tCO_2e/MWh

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units. In addition, project owners has chosen to apply ex-post option for OM emission factor as described in the paragraph 42(b) of Tool 07, v07.0

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: for the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of PDD submission to the VVB for the project verification.

Option 2: for the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available.

For the proposed project activity, the project participants choose Option 1 in terms of availability of vintage of data. Based on 2022 data, Ministry of Energy and Natural resources of Turkey has calculated build margin and published the data:

$EF_{grid,OM,y}$ = 0.3721 tCO_2e/MWh

Step 6: Calculate the combined margin emissions factor

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, the calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

The combined margin emissions factor is calculated as follows:

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

where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2e/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2e/MWh)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor in year y (tCO_2e/MWh)

w_{OM} = Weighted of operating margin emissions factor (per cent)

w_{BM} = Weighted of build margin emissions factor (per cent)

As per the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, the default weights for the operating margin and build margin emission factors for the proposed project activity is defined as:

$w_{OM} = 0.5$

$w_{BM} = 0.5$

Therefore,

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

$EF_{grid,CM,y} = 0.7108 \times 0.5 + 0.3721 \times 0.5 = 0.5415 \ tCO_2e/MWh$

According to this publication;

- Operating Margin-OM; 0.7108 tCO_2/MWh
- Build Margin-BM; 0.3721 tCO_2/MWh

- Combined Margin-CM (for other renewable than solar and wind); 0.5415 tCO_2/MWh[13]

3.7.4 GHG project emissions

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y} \quad \text{(Equation 22)}$$

Where:

PE_y = Project emissions in year y (t CO_2/yr)

$PE_{EC,y}$ = Emissions from consumption of electricity due to the project activity in year y (t CO_2/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 CO_2/yr)

$PE_{DT,y}$ = Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (t CO_2/yr)

$PE_{SP,y}$ = Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (t CO_2/yr)

The project is only included the emissions from consumption of electricity, not involved in the emissions from consumption of fossil fuels, the distribution of compressed/liquefied LFG using trucks and the supply of LFG to consumers through a dedicated pipeline, thus,

$$PE_y = PE_{EC,y}$$

[13] Please see; https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf

The project emissions from consumption of electricity by the project activity ($PE_{EC,y}$) 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) $EC_{PJ,j,y}$ in the tool is equivalent to the amount of electricity consumed by the project activity in year y ($EG_{EC,y}$); and

(b) If in the baseline a proportion of LFG is destroyed ($F_{CH4,BL,y}>0$), then the electricity consumption in the tool ($EC_{PJ,j,y}$) should refer to the net quantity of electricity consumption (i.e. the increase due to the project activity). The determination of the amount of electricity consumed in the baseline shall be transparently documented in the PD.

The calculation equation is as per Equation (1) of Tool 05, v03.0:

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

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (t CO_2 / yr)

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

$EF_{EL,j,y}$ = Emission factor for electricity generation for source j in year y (t CO_2/MWh)

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

j = Sources of electricity consumption in the project

As stated above, according to the tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"(version 03.0), for the project is in the case of Scenario A: Electricity consumption from the grid, the project participants choose Option A1: Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system" (version 07.0) ($EF_{EL,j,y}$ = $EF_{grid,CM,y}$).

According to the tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0), annual average value based on the most recent data available within the host country Turkey for project emission, i.e ,$TDL_{j,y}$ =10%[14].

$EC_{PJ,j,y}$ is ex ante determined as 0 in the PD and will be monitored ex post in the verification period.

The flare unit will only be used in emergency situations and has not been operated since the start of the project activity. Therefore, there are no project emissions from the flare.

3.7.5 GHG leakages.

As per ACM0001 (version 19.0), no leakage emissions are considered under this methodology.

Year	GHG emission reductions/removals in the baseline scenario (tCO_2e)	GHG emission reductions/removals in the project scenario (tCO_2e)	GHG emissions attributable to leakages (tCO_2e)	Estimated Net GHG Reduction/Removals (tCO_2e)
06.12.2019 - 31.12.2019	2,019	0	0	2,019
Year 2020	32,628	0	0	32,628
Year 2021	36,678	0	0	36,678
Year 2022	40,504	0	0	40,504

[14] Obtained from https://webapi.teias.gov.tr/file/9248a331-e529-47ca-8c49-22f8705f5810?download

Year	GHG emission reductions/removals in the baseline scenario (tCO2e)	GHG emission reductions/removals in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG Reduction/Removals (tCO_{2e})
Year 2023	43,867	0	0	43,867
Year 2024	46,837	0	0	46,837
Year 2025	49,474	0	0	49,474
01.01.2026 - 05.12.2026	48,133	0	0	48,133
Total	**300,140**	**0**	**0**	**300,140**

The total estimated emission reductions/removals during the project's quantification period is 300,140 tCO2e and the estimated annual average is 42,877 tCO2e.

4 Compliance with Laws, Statutes and Other Regulatory Frameworks

Milas LFG complies with all applicable laws and regulations such as;

1 – Electricity Market Law (Law Number: 6446, ratified 14-March-2013, enacted 30-March-2013)[15]

The Law aims to ensure the development of a financially sound and transparent electricity market operating in a competitive environment under civil law provisions and the delivery of sufficient, good quality, low cost and environment-friendly electricity to consumers and to ensure the autonomous regulation and supervision of this market.

No regulatory requirement for destruction of landfill gas.

2 – Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy (Law Number: 5346, ratified 10-May-2005, enacted 11-August-1983)[16]

[15] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6446.pdf
[16] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.5346.pdf

The purpose of this Law is to expand the utilization of renewable energy resources for generating electrical energy, to benefit from these resources in a secure, economical and qualified manner, to increase the diversification of energy resources, to reduce greenhouse gas emissions, to assess waste products, to protect the environment and to develop the related manufacturing sector for realizing these objectives.

The Law brings an incentive for the electricity production. It also brings incentives for local equipment purchases such as turbines, engines, cogeneration.

3 – Energy Efficiency Law (Law Number: 5627, ratified 18-April-2007, enacted 02-May-2007)[17]

The purpose of this law is; to use energy effectively, prevent its waste, alleviate the burden of energy costs on the economy, and increase efficiency in the use of energy resources and energy to protect the environment.

4 – Environment Law (Law Number: 2872, ratified 09-August-1983, enacted 11-August-1983)[18]

This Law addresses the ecological security of the population, the rational use of natural resources, nature conservation and environmental protection. Additional Article 6 says that clean air policies should be applied in provinces and districts, and air quality should be monitored. Methodologies for determination, monitoring and measurement of air quality, air quality limit values, precautions to prevent air pollution and public awareness are responsibilities of the Ministry of Environment and Forestry.

No regulatory requirement for destruction of landfill gas.

5 Carbon ownership and rights

5.1 Project holder

Individual or organization	Arel Çevre Yatırımları Enerji ve Elektrik Üretimi A.Ş.

[17] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.5627.pdf
[18] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=2872&MevzuatTur=1&MevzuatTertip=5

Contact person	Damla Yiğit
Job position	Public Relations and Environmental Management Director
Address	Mutlukent Mahallesi 1977. Sokak No:15 06810 Ümitköy / Çankaya / ANKARA
Phone number	+90 312 435 80 32
Email	*damla@arelenerji.com*

5.2 Other project participants

Individual or organization	Life İklim ve Enerji Ltd. Şti.
Contact person	Nazire Gür
Job position	Project Coordinator
Address	Oğuzlar Mahallesi, 1377. Sk. No:19, Balgat, 06520, Çankaya, Ankara, Türkiye
Phone number	+90 312 481 21 42 Ext: 112
Email	*nazire.gur@life-climate.com*

5.3 Agreements related to carbon rights

The project activity has been developed and is operated by its legal owner, Arel Çevre Yatırımları Enerji ve Elektrik Üretimi A.Ş. Carbon ownership and rights are exclusively assigned to the same legal owner.

5.4 Land tenure (Projects in the AFOLU sector)

N/A

6 Climate change adaptation

In accordance with the BCR STANDARD, use appropriate criteria and indicators to demonstrate that the project is undertaking climate change adaptation activities and that these are derived from the GHG project activities.

7 Risk management

Risk Type	Potential Risk	Mitigation Measures
Environmental – Natural	High summer temperatures, heavy winter rains, flooding risk	Weather-resistant equipment, proper drainage, flood prevention infrastructure
Environmental – Anthropogenic	Contaminated feedstock, operational errors causing methane leakage	Strict feedstock quality control, staff training, leak detection systems, regular maintenance
Financial	Revenue fluctuation due to electricity price volatility	Long-term PPAs, additional income from digestate/fertilizer sales
Financial	Unexpected O&M cost increases	Preventive maintenance plan, fixed-price supplier contracts, contingency budget
Social	Odour, noise, and increased traffic affecting nearby communities	Odour control systems, noise insulation, transport during off-peak hours
Social	Lack of community support or misunderstanding of project	Stakeholder engagement, transparent communication, grievance mechanism

7.1 Reversal Risk

For the Milas LFG project, long-term operational continuity is ensured through contractual provisions, including, power purchase agreements, and operator contracts with clauses on continuous operation and maintenance. A preventive maintenance plan, and emergency response procedures are implemented to address technical and environmental risks. Direct and indirect risks are regularly assessed, with mitigation measures integrated into an adaptive management approach. Annual reviews, stakeholder engagement, and financial monitoring support the sustained delivery of GHG emission reductions throughout the crediting period.

7.1.1 Loss Event Report

If an event occurs that will cause loss or reduction of VCCs, a report regarding this situation will be prepared and submitted within a year.

8 Sustainable development safeguards (SDSs)

Project will make positive contributions to at least three Sustainable Development Goals (SDSs). These are:

Environment

1. **Land Use: Resource Efficiency and Pollution Prevention and Management**

- During the construction and operation phases, potential negative impacts related to land use were prevented by complying with applicable land regulations and maintaining continuous communication with affected local communities.
- Organic and other wastes generated at the LFG facility are properly segregated, stored, and disposed of in accordance with relevant waste management regulations.
- Wastewater from employees is collected in impermeable septic tanks and periodically transported to licensed wastewater treatment plants.
- Used oil and hazardous waste are stored in closed containers and safely transported by licensed carriers to authorized disposal and recycling facilities.

2. Water

Due to the nature of the LFG project, it does not cause harm to surrounding water

resources. Wastewater disposal is managed as described above, with collection in impermeable septic tanks and periodic transfer to licensed treatment facilities.

3. Biodiversity and Ecosystems
An ecological assessment was conducted to evaluate impacts on local wildlife, including birds and bats. No significant negative impacts on carcasses, nests, or habitats were identified. The project site is located away from critical habitats and protected areas.

4. Climate Change
The LFG plant contributes to climate change mitigation by capturing methane from organic waste and converting it into renewable energy. This reduces greenhouse gas emissions compared to uncontrolled decomposition and decreases reliance on fossil fuels for electricity generation.

Social

1. Human Rights
a. **Labor and Working Conditions**
Employee rights are protected under Turkish Labor Law, which includes:

- Prohibition of forced labor and child labor.
- Employer responsibility for occupational health and safety (OHS), with mandatory annual OHS training for employees working in hazardous environments such as biogas facilities.
- Employers are required to provide all rights and protections as defined by law to their employees.

b. Gender Equality and Women Empowerment
The project holder ensures non-discriminatory recruitment practices with respect to gender. There is no gender discrimination in interactions with local communities.

c. Land Acquisition, Restrictions on Land Use, Displacement, and Involuntary Resettlement
During construction, any potential negative effects related to land use were prevented by complying fully with expropriation laws and maintaining continuous communication with affected local residents. No forced displacement occurred as a result of the project activities.

d. Indigenous Peoples and Cultural Heritage
The project activity did not cause damage to cultural heritage sites nor harm indigenous peoples in the project area.

e. Community Health and Safety
Hazardous and domestic wastes generated by the biogas plant are managed and disposed of properly following Waste Management Regulations, preventing risks to local health. Areas with potential safety risks are securely fenced, with clear warning signs to protect the community.

2. Corruption
The project activity maintains full integrity with no misuse of funds, fraudulent reporting, conflicts of interest, lack of transparency, weak regulatory oversight, or corruption related to environmental permitting or subcontractors.

3. Economic Impact
During both construction and operation, the project has generated employment opportunities for the local community. It contributes to the regional economic development by providing a sustainable energy source. Positions within the LFG plant require skilled workers, supported through appropriate training programs. The project ensures a safe and healthy working environment, strictly avoiding any unsafe working conditions.

9 Stakeholder engagement and consultation

The project activity involves the installation of a LFG power plant supplying electricity to the grid. Stakeholders are defined as individuals, groups, or communities potentially affected by the project.

A stakeholder consultation meeting is planned to be organized in Milas, at a central and accessible community location such as a local coffeehouse or community center near the project site. The meeting will be open to local residents and other relevant stakeholders to inform them about the project and address any concerns they may have.

Invitations will be extended through multiple channels, including public notices, personal invitations, phone calls, and emails. Local community leaders, including the mukhtar of the nearest village or neighborhood, will be contacted directly and requested to inform residents about the meeting. Printed invitations will be posted in frequented local places such as the mukhtar's office, coffeehouses, marketplaces, and places of worship.

The agenda of the meeting will include:

- Welcome and introduction
- Overview of climate change, the Clean Development Mechanism, and project objectives
- Presentation of the biogas project activity
- Open discussion and Q&A session with stakeholders
- Closing remarks

To ensure ongoing communication, a grievance mechanism will be established with the support of the local mukhtar. A logbook will be placed in the mukhtar's office for community members to submit comments or complaints related to the project. The mukhtar will act as a focal point, monitoring and forwarding issues to the project management team. Contact information of responsible project personnel will be provided to the mukhtar to enable direct and timely response to any concerns raised.

This approach is designed to promote transparency, foster community engagement, and ensure that any issues are addressed promptly and effectively throughout the project lifecycle.

9.1 Summary of comments received

Local people were employed during both the construction and ongoing operation phases of the project. This has contributed positively to the local economy and helped improve living standards. Stakeholders expressed their support for these benefits during the consultation meeting, with no negative comments raised by participants.

9.2 Consideration of comments received

The contact information of the plant responsible and the mukhtar was shared with the stakeholders, emphasizing that the project owner, the mukhtar, and the local community will maintain ongoing communication. Additionally, participants were informed about the established grievance process.

10 Sustainable Development Goals (SDGs)

Project will make positive contributions to at least three Sustainable Development Goals (SDGs).

These are:

SDG 7: Affordable and Clean Energy

The proposed Project is a waste to power project that will generate renewable energy by capturing methane from municipal waste and utilizing it to produce thermal and electric energy through gas engine systems. By supplying renewable energy generated at the plant to the national grid, the proposed Project will contribute to increasing the share of renewable energy in the global energy mix and the proportion of the population with primary reliance on clean fuels and technology. The project's estimated annual electricity generation is 19,740 MWh.

SDG 8: Decent Work and Economic Growth

The demand for electric energy is rapidly increasing in Turkey for various reasons, such as industrialization, urbanization, economic development, and population growth. Turkey, which cannot meet its increasing electricity demand due to the deprivation of conventional resources used to generate energy, such as coal, oil, and natural gas, has also become foreign-dependent on energy. Through its implementation, the proposed project activity will contribute to reducing Turkey's foreign dependency by generating renewable energy out of municipal wastes. In addition, as an LFG-based renewable energy technology implementation, the proposed project activity will achieve higher levels of economic productivity; hence, increasing the annual growth rate of real GDP per employed person. Moreover, it will increase the region's employment capacity while decreasing the unemployment rate.

SDG 13: Climate Action

The proposed project activity will reduce GHG emissions by capturing and utilizing methane, one of the most potent GHGs triggering climate change. It is estimated that the average annual emission reduction that the proposed Project will generate is around 35,264 tCO_2eq.

11 REDD+ Safeguards (For REDD+ projects)

N/A

12 Special categories, related to co-benefits (optional)

N/A

13 Grouped projects (if applicable)

N/A

14 Other GHG program

The project is not registered under any other GHG program. Therefore, the conditions related to cancellation of previous registrations, exclusivity of GHG reductions, and compliance with national legal frameworks and BIOCARBON rules do not apply.

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

Compliance with the "BCR Standard Operating Procedures" is ensured throughout the project development and registration process.

15 Double counting avoidance

The project is not included in any Emissions Trading Scheme (ETS) or other GHG trading mechanism. Since an ETS has not been implemented in Türkiye, there is no emission reduction cap enforced on any sector. Therefore, no risk of double counting exists for Türkiye or this project.

This is confirmed by a no-double counting declaration to be provided by the project owner.

16 Monitoring plan

16.1 Description of the monitoring plan

Monitoring will be carried out following the procedures set by applicable methodology and all applicable tools of the above explained parameters. The monitoring consists of:

Responsibilities for monitoring

The project owner is responsible for the operation and maintenance of the landfill and the installed equipment. The project owner is also responsible for the administration of the data, setting up a VER team who will be responsible for monitoring all data required to estimate emission reductions.

Registration of the monitored data

The Milas LFG VER-Team will be responsible for quality assurance and quality control of the monitoring equipment. The data measured by the monitoring equipment will be stored and will be processed into a monitoring report, which will be submitted by the project owner. All the

monitored data will be stored during the crediting period and for at least two years after the end of the crediting period, whichever occurs later.

Corrective actions and emergency preparedness

The VER-Team will regularly check the monitoring system for errors. In the case of errors, corrective actions will be undertaken by the VER-Team, or if required, by the supplier of the monitoring equipment.

QA/QC procedure

Strong quality assurance and quality control procedures will be taken to monitor the equipment and data collection. Equipment and facilities will be subject to a regular maintenance and testing regime to ensure accuracy following the supplier's manual. In case of data deficiency or in correct data reading, the data will be crosschecked with other parameters and data leading to the most conservative emission reductions will be considered for the calculation of the emission reductions.

Measuring of exported and imported electricity

The main meter that monitors electricity import and export is placed at the grid connection. Monthly protocols based on the readings that are confirmed by the project participant are prepared by the end of each month and stored. These protocols are also the basis of invoicing for the electricity sales from the proposed project activity. The electricity meters are bidirectional and will measure both the imported and exported electricity from and to the grid.

16.2 Data and parameters determined at registration and not monitored during the quantification period, including default values and factors

Data / Parameter	$OX_{top\ layer}$
Data unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data used	*Consistent with how oxidation is accounted for in the methodological Tool 04 (v08.1) "Emissions from solid waste disposal sites"*
Value (s)	*0.1*

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*
Justification of choice of data or description of measurement methods and procedures applied	Default value as per Tool 04 (v08.1)
Additional comments	-

Data / Parameter	GWP_{CH4}
Data unit	t CO_2e/t CH_4
Description	Global warming potential of CH_4
Source of data used	*IPCC AR5*[19]
Value (s)	*28*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Calculation of baseline emission*
Justification of choice of data or description of measurement methods and procedures applied	Default value of 28 from IPCC fifth Assessment Report (AR5). Shall be updated according to any future COP/MOP decisions.
Additional comments	-

Data / Parameter	η_{PJ}
Data unit	Dimensionless

[19]Please see; https://www.ipcc.ch/report/ar5/syr/

Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data used	*Feasibility Study*
Value (s)	*0.75*[20]
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*
Justification of choice of data or description of measurement methods and procedures applied	Technical specifications of the installed LFG capture system
Additional comments	-

Data / Parameter	ϕ_y
Data unit	Dimensionless
Description	Default value for the model correction factor to account for model uncertainties
Source of data used	*TOOL 04 Version 08.1*
Value (s)	*0.75*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*
Justification of choice of data or description of measurement methods and procedures applied	The project selects Option 1 :Use a default value to determine ϕ_y in the tool "Emissions from solid waste disposal sites" (version 08.1), and the project belongs to the situation of Application A: The project activity mitigates methane

[20] Please see; Feasibility Report

	emissions from a specific existing SWDS, thus 0.75 is chosen for ϕ_y
Additional comments	-

Data / Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data used	*IPCC 2006 Guidelines for National Greenhouse Gas Inventories*
Value (s)	0.50
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*
Justification of choice of data or description of measurement methods and procedures applied	Default value as per IPCC 2006
Additional comments	-

Data / Parameter	$DOC_{f,y}$
Data unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS
Source of data used	*IPCC 2006 Guidelines for National Greenhouse Gas Inventories*
Value (s)	0.5
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*
Justification of choice of data or description of	Default value as per IPCC 2006

measurement methods and procedures applied	
Additional comments	-

Data / Parameter	MCF_y
Data unit	-
Description	Methane correction factor
Source of data used	*IPCC 2006 Guidelines for National Greenhouse Gas Inventories*
Value (s)	*1.0*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*
Justification of choice of data or description of measurement methods and procedures applied	The landfill is controlled, including the following activities: (i) cover material; (ii) mechanical compacting; (iii) levelling of the waste. Therefore, 1.0 for anaerobic managed solid waste disposal sites is recommended by "Emissions from solid waste disposal sites (Version 08.1)."
Additional comments	-

Data / Parameter	**DOC_j**
Data unit	-
Description	Fraction of degradable organic carbon in the waste type j (weight fraction)
Source of data used	*IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)*
Value (s)	**Waste type j** / **DOCj (% wet waste)** Wood and wood products / 43 Pulp, paper and cardboard (other than sludge) / 40

	Food, food waste, beverages and tobacco (other than sludge)	15
	Textiles	24
	Garden, yard and park waste	20
	Glass, plastic, metal other inert waste	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Baseline emission calculation*	
Justification of choice of data or description of measurement methods and procedures applied	-	
Additional comments	-	

Data / Parameter	k_j					
Data unit	1/yr					
Description	Decay rate for the waste type j					
Source of data used	*IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)*					
Value (s)	Waste type j		Boreal and Temperate (MAT≤20°C)		Tropical (MAT>20°C)	
			Dry (MAP/ PET<1)	Wet (MAP/PET >1)	Dry (MAP 1000mm)	Wet (MAP > 1000mm)
	Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07

		Wood, wood products and straw	0.02	0.03	0.025	0.035
	Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculation					
Justification of choice of data or description of measurement methods and procedures applied	Default values as per IPCC 2006					
Additional comments	*Climatic conditions for Milas where project site located in:* *MAT – mean annual temperature: 18.5 °C* *MAP – Mean annual precipitation: 861.9 mm* *PET – potential evapotranspiration: 180 mm* *Therefore, Boreal (MAT≤20°C) and wet (MAP/PET >1) conditions are observed in the project site.* *Sources: https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=undefined&m=MUGLA* https://www.mgm.gov.tr/arastirma/buharlasma.aspx?s=2020					

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2e/MWh
Description	Operating margin CO2 emission factor for grid connected power generation in year y in Turkey
Source of data used	Calculated by Turkish Ministry of Energy and Natural Resources.
Value (s)	0.7108 tCO_2e/MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*For the calculation of the Baseline Emission*
Justification of choice of data or description of measurement methods and procedures applied	The data was obtained from Turkish Ministry of Energy and Natural Resources.
Additional comments	This parameter is fixed ex-ante for the first crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2e/MWh
Description	Build Margin emission factor for Turkey's national grid.
Source of data used	Calculated by Turkish Ministry of Energy and Natural Resources.
Value (s)	0.3680 tCO_2e/MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*For the calculation of the Baseline Emission*
Justification of choice of data or description of	The data was obtained from Turkish Ministry of Energy and Natural Resources.

measurement methods and procedures applied	
Additional comments	This parameter is fixed ex-ante for the first crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year y
Source of data used	Calculated by Turkish Ministry of Energy and Natural Resources. Also, "Tool to calculate the emission factor for an electricity system (Version 07.0)"is applied.
Value (s)	0.5415 tCO_2e/MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*For the calculation of the Baseline Emission*
Justification of choice of data or description of measurement methods and procedures applied	The data was obtained from Turkish Ministry of Energy and Natural Resources.
Additional comments	This parameter is fixed ex-ante for the first crediting period.

Data / Parameter	Ru
Data unit	$Pa.m^3/kmol.K$
Description	Universal ideal gases constant
Source of data used	Tool to determine the mass flow of a greenhouse gas in a gaseous Stream (Tool 8 Ver 03.0)
Value (s)	8,314
Indicate what the data are used for (Baseline/	*For the calculation of the Baseline Emission*

Project/ Leakage emission calculations)	
Justification of choice of data or description of measurement methods and procedures applied	Default value as per Tool 08 (v03.0)
Additional comments	-

Data / Parameter	MM_i
Data unit	kg/kmol
Description	Molecular mass of greenhouse gas CH_4
Source of data used	Tool 08 v03.0 : Tool to determine the mass flow of a greenhouse gas in a gaseous stream
Value (s)	16.04
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*For the calculation of the Baseline Emission*
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	P_n
Data unit	Pa
Description	Total pressure at normal conditions
Source of data used	Tool 08 v03.0 : Tool to determine the mass flow of a greenhouse gas in a gaseous stream
Value (s)	101,325

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*For the calculation of the Baseline Emission*
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	W_y
Data unit	tons
Description	Total amount of waste disposed in a SWDS in the year y
Source of data used	Operating Plan report (OPR) has been used for the waste amount. Waste compositions study of incoming waste to the landfill has been used for waste composition.
Value (s)	<u>Waste Amount:</u>

Year	Total (tonnes)
2017	55,651
2018	55,930
2019	56,212
2020	56,494
2021	88,267
2022	92,245
2023	92,706
2024	93,169
2025	93,635
2026	94,103
2027	94,574

	2028 | 95,047 Waste Composition: Waste Type | Weight Fraction (%) Food | 48.10% Paper & Cardboard | 10.00% Wood | 0.00% Textile | 9.00% Garden, Yard and Park Waste | 2.90% Inerts, Plastic, Metals and Others | 30.00% Total | 100%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Ex-ante calculation of baseline emissions*
Justification of choice of data or description of measurement methods and procedures applied	It is calculated as total waste amount dumped in the landfill site in the year y from OPR. For waste composition, sample amount of waste from different areas classed according to their wealth is taken and studied to determine waste composition by weight.
Additional comments	The waste projection for the years 2020–2022 has been made using actual weighbridge data. For the other years, it has been assumed that the amount will increase by 0.5% compared to the previous year.Starting from 2021, wastes from the Bodrum district have also been disposed of at the Milas SWDS. Therefore, there is a significant difference between the years 2020 and 2021.

Data / Parameter	T_n
Data unit	K
Description	Temperature at normal conditions

Source of data used	Tool 08 v03.0 : Tool to determine the mass flow of a greenhouse gas in a gaseous stream
Value (s)	273.15
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*For the calculation of the Baseline Emission*
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	$TDL_{j,y}$ and $TDL_{k,y}$
Data unit	%
Description	Average technical transmission and distribution losses
Source of data used	Obtained from https://webapi.teias.gov.tr/file/9248a331-e529-47ca-8c49-22f8705f5810?download
Value (s)	10.0%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	As per https://webapi.teias.gov.tr/file/9248a331-e529-47ca-8c49-22f8705f5810?download
Additional comments	-

16.3 Data and parameters monitored

<table>
<tr><td>Data / Parameter</td><td>$EG_{PJ,y}$</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Quantity of net electricity generated using LFG by the project activity in year y</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Electricity meter
<table>
<tr><td></td><td>Brand</td><td>Model</td><td>Serial Number</td><td>Calibration Date</td></tr>
<tr><td>Main Electricity Meter</td><td>Köhler</td><td>AEL.TF.21</td><td>21009417</td><td>26-10-2019</td></tr>
<tr><td>Back-up Electricity Meter</td><td>Köhler</td><td>AEL.TF.21</td><td>21009417</td><td>26-10-2019</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td>19,740</td></tr>
<tr><td>Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Monitoring frequency</td><td>Monthly</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency</td><td>Continuously measured and monthly recorded</td></tr>
<tr><td>Measurement/Calculation method (if applicable)</td><td>The quantity of electricity generated by the project plant will be monitored based on the main meter readings and/or through protocols where and when appropriate.</td></tr>
<tr><td>QA/QC procedures applied</td><td>The electricity meters are used to measure the net electricity exported to the grid and used for billing purposes. Therefore, the meters are sealed by TEİAŞ (Turkish Electricity Transmission CO) and/or through protocols where and whenappropriate. The grid company is responsible for maintenance and calibrationof the device. In accordance with the “Regulation on “Measurement and Measuring Tools”, electricity meters have to be calibrated</td></tr>
</table>

	within a frequency of once per 10 years. The accuracy class of the device is 0.5.

Data / Parameter	$EC_{pj,y}$
Data unit	*MWh*
Description	*Quantity of electricity consumed by the project activity in year y*
Measured /Calculated /Default:	Measured
Source of data	Electricity meter

	Brand	Model	Serial Number	Calibration Date
Main Electricity Meter	Köhler	AEL.TF.21	21009417	23-10-2019
Back-up Electricity Meter	Köhler	AEL.TF.21	21009780	23-10-2019

Value(s) applied	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	Monthly
Measuring/ Reading/ Recording frequency	Continuously measured and monthly recorded
Measurement/Calculation method (if applicable)	The quantity of electricity consumed by the project plant will be monitored based on the main meter readings and/or through protocols where and when appropriate.
QA/QC procedures applied	The electricity meters are used to measure the net electricity exported to the grid and used for billing purposes. Therefore, the meters are sealed by TEİAŞ (Turkish Electricity Transmission

	CO) and/or through protocols where and whenappropriate. The grid company is responsible for maintenance and calibrationof the device. In accordance with the “Regulation on “Measurement and Measuring Tools”, electricity meters have to be calibrated within a frequency of once per 10 years. The accuracy class of the device is 0.5.

Data / Parameter	Management of SWDS
Data unit	-
Description	Management of SWDS
Measured /Calculated /Default:	-
Source of data	Use different sources of data: (a) Original design of the landfill; (b) Technical specifications for the management of the SWDS; (c) Local or national regulations
Value(s) applied	During this monitoring period, no changes took place in the management of the landfill. By the end of this monitoring period, the regulations and provisions on LFG recovery and utilization have not changed in the current effective laws and standards in Turkey.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	*Annually*
Measuring/ Reading/ Recording frequency	-
Measurement/Calculation method (if applicable)	Project participants will 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
QA/QC procedures applied	-

Data / Parameter	$F_{CH4,sent\ flare,y}$
Data unit	tCH_4 /y
Description	Quantity of methane in LFG sent to the flare in year y
Measured /Calculated /Default:	Measured
Source of data	Calculated based on the flow of LFG and the concentration of methane in the LFG that will be sent to the flare(s)
Value(s) applied	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of project emissions
Monitoring frequency	Annually
Measuring/ Reading/ Recording frequency	Continuously measured and monthly recorded
Measurement/Calculation method (if applicable)	Flow meter will be subject to regular (in accordance to the manufacturer) maintenance and testing to ensure accuracy.
QA/QC procedures applied	Flow meter (located before flare unit) and gas analyzer (located before gas engines). Data to be aggregated monthly and yearly. Measured by a flow meter and a gas analyser. Data to be aggregated monthly and yearly.

Data / Parameter	Opj,h
Data unit	h
Description	Operation of the equipment that consumes the LFG

Measured /Calculated /Default:	Measured
Source of data	Project participants
Value(s) applied	*Will be monitored ex-post*
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Hourly
Measurement/Calculation method (if applicable)	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 three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PD; (b) Flame. Flame detection system is used to ensure that the equipment is in operation; (c) Products generated. Monitor the generation of steam for the case of boilers and air-heaters and glass for the case of glass melting furnaces. This option is not applicable to brick kilns. Opj,h=o when: (a) One of more temperature measurements are missing or below the minimum threshold in hour h (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute);

	(c) No products are generated in the hour h. Otherwise, Opj,h=1
QA/QC procedures applied	When there is no flow recorded by flowmeter that is located before flare or gas engines, equipment that destroys methane is not working and Opj,h=0.

Data / Parameter	$F_{CH4,PJ.y}$
Data unit	m^3/y
Description	Methane captured and destroyed/gainfully used by the project activity in the year y
Measured /Calculated /Default:	Calculated
Source of data	*Calculated based on the flow of LFG and the concentration of methane in the LFG that will be sent to the genset*
Value(s) applied	Will be monitored ex-post
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	-
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Data / Parameter	$F_{CH4,EL,y}$
Data unit	tCH_4 /year

Description	*Amount of methane in the LFG which is used for electricity generation in year y*
Measured /Calculated /Default:	Calculated
Source of data	*Calculated based on the flow of LFG and the concentration of methane in the LFG that will be sent to the genset*
Value(s) applied	Will be monitored ex-post
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	*Flow meter will be subject to regular (in accordance to the manufacturer). Maintenance and testing to ensure accuracy.*
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Data / Parameter	w_{CH_4}
Data unit	% (m^3CH_4/m^3LFG)
Description	Methane fraction in the landfill gas in the year y
Measured /Calculated /Default:	Measured
Source of data	Gas anlayzer
Value(s) applied	50% *(*Will be monitored ex-post)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation

Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	Measured by using a methane analyser which is located before gas engines (measuring methane content directly)
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Data / Parameter	$V_{t,wb}$
Data unit	m^3 wet gas/h
Description	Volumetric flow of the gaseous stream in time interval t on a wet basis
Measured /Calculated /Default:	Measured
Source of data	Flow meter
Value(s) applied	Will be monitored ex-post
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Data / Parameter	$V_{i,t,wb}$
Data unit	m^3 gas i/m^3 wet gas
Description	Volumetric fraction of greenhouse gas i in a time interval t on a wet basis
Measured /Calculated /Default:	Calculated
Source of data	Gas Analyzer (located before gas engines)
Value(s) applied	Will be monitored ex-post
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	Calculated based on the wet basis analysis plus water concentration measurement or continuous in-situ analyzers if not specified in the underlying methodology
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Data / Parameter	T_t
Data unit	K
Description	Temperature of the gaseous stream in time interval t
Measured /Calculated /Default:	Measured
Source of data	Thermometer
Value(s) applied	Will be monitored ex-post
Indicate what the data are used for (Baseline/	Baseline emission calculation

Project/ Leakage emission calculations)	
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	Measured by Instruments with recordable electronic signal (analogical or digital)
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Data / Parameter	P_t
Data unit	Pa
Description	Presssure of the gaseous stream in time interval t
Measured /Calculated /Default:	Measured
Source of data	Pressure transmitter
Value(s) applied	Will be monitored ex-post
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Monitoring frequency	Hourly
Measuring/ Reading/ Recording frequency	Continuous
Measurement/Calculation method (if applicable)	Measured by Instruments with recordable electronic signal (analogical or digital)
QA/QC procedures applied	Calibration and frequency of calibration is according to manufacturer's specifications or applicable law and regulations.

Appendix 1. Post-registration changes summary.

N/A

NOTE: This Project Document (PD) shall be completed following the instructions included. However, it is important to highlight that these instructions are complementary to the BCR STANDARD, and the Methodology applied by the project holder, in which more information on each section can be found.