ASKOC DIYARBAKIR BIOGAS PLANT

Document prepared by Nazire Gür – Life İklim ve Enerji Ltd. Şti.

Name of the project	*Askoc Diyarbakir Biogas Plant*
Project holder	*Termopet Akaryakıt Anonim Şirketi*
Account holder	*Termopet Akaryakıt Anonim Şirketi*
Legal representative	*Fikrican Okan*
Project holder's contact information	*fokan@askoc.com.tr* *Mutlukent Mahalllesi 2007. Cadde No: 60 Çankaya/Ankara/Türkiye*
Other project participants	*Consultant:* *Life Climate (Life İklim ve Enerji Ltd. Şti.)* *+90 312 481 21 42* *info@life-climate.com* *Oğuzlar Mahallesi, 1377. Sk. No:19, Balgat, 06520, Çankaya/ Ankara* *Nazire Gür – nazire@life-climate.com*
Version	*01*
Date	*31/07/2025*
Project type	*Waste Handling and disposal*

Grouped project	*The project is not a grouped project.*
Applied Methodology (ies)	*ACM0010 Version 08.0 - GHG emission reductions from manure management systems*
Project location (City, Region, Country)	*Diyarbakır, Türkiye*
Starting date	*18.02.2020*
Quantification period of GHG emissions reduction	*18.02.2020-17.02.2027 (twice renewable)*
Estimated total and average annual GHG emission reduction/removals amount	*Total: 2,139,765 tCO2e* Annual Average: 311,517 *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 (see section 6) 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 process animal waste through anaerobic digestion, resulting in the production of biogas, which is subsequently utilized for electricity generation. Consequently, the project reduces methane emissions from the uncontrolled decomposition of animal waste while generating renewable electricity from the recovered biogas. The electricity generated is supplied to the grid, and the plant also uses the electricity produced by the project to meet its own demand, thereby reducing reliance on grid electricity.

The project is eligible under the BCR standard, as it results in quantifiable CO_2 emission reductions through the generation of electricity from biogas produced via the anaerobic digestion of animal waste. The project applies ACM0010 Version 08.0 methodology, which is approved under the BCR standard.

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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

Termopet Akaryakıt Anonim Şirketi (hereafter referred to as the "project owner" or "Termopet") has invested into a new Biogas power project called Diyarbakır Biogas Plant (hereafter referred to as the "Project" or "Diyarbakir Plant"), which involves installation and operation of 5.6560 MWm/4.7240 MWe biogas plant. The project consists of 4 units, each having 1.544 MWm/ 1.500 MWe installed power. The project licence was granted by the Energy Market Regulatory Authority (EMRA) to Askoç Enerji Tar. Hay. Gıda İnş. San. ve Tic. A.Ş. on 20/09/2018. On 06/02/2025, the company's name changed from Askoç Enerji Tar. Hay. Gıda İnş. San. ve Tic. A.Ş. to Termopet Akaryakıt A.Ş. (Termopet) in the license. The original licence was terminated and reissued to Termopet Akaryakıt A.Ş. as a continuation of the former licence. The generated energy is fed into the grid at Diyarbakır-4 TM substation.1

[1] Please see Generation License.

An estimated electricity net generation of 33,068 MWh2 per year by the efficient utilization of the available energy from biogas by project activity will replace the grid electricity, which is constituted of different fuel sources, mainly fossil fuels. The electricity produced by project activity will result in a total emission reduction of 311,517 tonnes of CO2e/year.

The project will help Turkey to stimulate and commercialize the use of grid connected renewable energy technologies and markets. Furthermore, the project will demonstrate the viability of grid connected Biogas projects which can support improved energy security, improved air quality, alternative sustainable energy futures, improved local livelihoods and sustainable renewable energy industry development. The specific goals of the project are to:

- reduce greenhouse gas emissions in Turkey compared to the business-as-usual scenario;
- help to stimulate the growth of the biogas power industry in Turkey;
- create local employment during the construction and the operation phase of the Plant;
- reduce other pollutants resulting from power generation industry in Turkey, compared to a business-as-usual scenario;
- help to reduce Turkeys increasing energy deficit;
- and differentiate the electricity generation mix and reduce import dependency.

As the project owner, Termopet believes that efficient utilization of all kinds of natural resources with a harmony coupled with responsible environmental considerations is vital for sustainable development of Turkey and the World. Other than the objective of climate change mitigation through significant reduction in greenhouse gas (GHG) emissions, the project has been carried out to provide social and economic contribution to the region in a sustainable way. The benefits that will be gained by the realization of the project compared to the business-as-usual scenario can be summarized under four main indicators:

Environmental

The project activities will replace the grid electricity, which is constituted of different fuel sources causing greenhouse gas emissions. By replacing in the consumption of these fuels, it contributes to conservation of water, soil, flora and faunas and transfers these natural

[2] Annual Generation value is taken from the Electricity Generation License.

resources and also the additional supply of these primary energy sources to the future generations. In the absence of the project activity, an equivalent amount of electricity would have been generated from the power plants connected to the grid, majority of which are based on fossil fuels. Thus, the project is replacing the greenhouse gas emissions (CO_2, CH_4) and other pollutants occurring from extraction, processing, transportation and burning of fossil-fuels for power generation connected to the national grid.

Economical

Firstly, the project will help to accelerate the growth of the biogas power industry and stimulate the designation and production of renewable energy technologies in Turkey. Then, other entrepreneurs irrespective of sector will be encouraged to invest in biogas power generations. It will also assist to reduce Turkey's increasing energy deficit and diversify the electricity generation mix while reducing import dependency, especially natural gas. Importantly, rural development will be maintained in the areas around the project site by providing infrastructural investments to these remote villages.

Social

Local employment will be enhanced by all project activities during construction and operation of the Plant. As a result, local poverty and unemployment will be partially eliminated by increased job opportunities and project business activities. Construction materials for the foundations, cables and other auxiliary equipment will preferentially be sourced locally. Moreover as contribution of the project to welfare of the region, the quality of the electricity consumed in the region will be increased by local electricity production, which also contributes decreasing of distribution losses.

Technological

Implementation of the proposed project will contribute to wider deployment of biogas power technology in local and national level. It will demonstrate the viability of larger grid connected Biogas farms, which will support improved energy security, alternative sustainable energy, and also renewable energy industry development. This will also strengthen pillars of Turkish electricity supply based on ecologically sound technology.

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

<u>SDG 7: Affordable and Clean Energy</u>

The proposed Project is a waste to power project that will generate renewable energy by capturing biogas from animal waste and utilizing it to produce 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 33,068 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 animal waste through biogas 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.

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 311,517 tCO_2eq.

2.1 GHG project name

Askoc Diyarbakir Biogas Plant

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 CO_2 emissions from fossil fuel-based power plants connected to the grid and by avoiding methane emissions from the anaerobic digestion process.

The purpose of the project is to utilize biogas produced through anaerobic digestion of organic waste, which consists mainly of methane, for electricity generation. The project includes an organic waste reception and pre-treatment system, anaerobic digestion facility, biogas upgrading and utilization system, electricity generation system, and flare system for excess gas management.

The project involves the operation of an anaerobic digestion-based biogas plant for renewable electricity generation. Organic waste is delivered to the facility, where it undergoes reception, sorting, and pre-treatment to remove contaminants and prepare the feedstock for digestion. The biodegradable fraction is then fed into anaerobic digesters, where it decomposes under controlled, oxygen-free conditions to produce biogas, consisting mainly of methane. The produced biogas is collected and directed to treatment units if required, before being utilized in gas engines to produce electricity. The facility is designed to maximize renewable energy recovery from organic waste while contributing to sustainable waste management and greenhouse gas emission reduction.

Steps in the Biogas Project:

1. **Waste Reception and Pre-treatment**
   Organic waste is delivered to the facility, weighed, and subjected to initial sorting. This step ensures that the feedstock entering the digester is suitable for optimal biogas production.
2. **Anaerobic Digestion Process**
   Prepared biodegradable waste is transferred to anaerobic digesters, where it undergoes decomposition under controlled temperature and mixing conditions to generate biogas. The produced biogas, consisting primarily of methane, is then treated as necessary to remove moisture, hydrogen sulfide, and other impurities before utilization.
3. **Electricity Generation from Biogas**
   The produced biogas is utilized in gas engines to generate electricity, which is subsequently fed into the national power grid. A portion of the generated electricity and heat is used to meet the operational energy requirements of the plant.
4. **Flaring System**
   Excess or unusable biogas is safely combusted in a flare system to prevent uncontrolled methane emissions.

The plant operates with high energy efficiency and is designed to run gas engines without the need for auxiliary fuels. Multiple gas engines are connected to main and backup meters to ensure continuous operation and uninterrupted electricity export to the grid. Technical parameters of the electricity meters, gas engines and generators are given below Table.

Table 1. Technical parameters of the meters, gas engines and generators

Main Equipment	**Parameter**	**Value**
Main Electricity meter	Type	AEL.TF.21
	Manufacturer	Köhler
	Serial Number	21009956
	Rated Power	3x230/400V-3x57.7/100V
	Class	0.2s
	Calibration Date	14.03.2018
Back-up Electricity meter	Type	AEL.TF.21
	Manufacturer	Köhler
	Serial Number	21009956
	Rated Power	3x230/400V-3x57.7/100V
	Class	0.2s
	Calibration Date	13.03.2018
Generators[3]	Type	MJB 500 MB4 B20
	Manufacturer	MarelliMotori
	Rated Power	1900 kVA
	CosØ	0.8
	Frequency	50 Hz
Motor Engines[4]	Type	TCG2020V12
	Manufacturer	Caterpiller
	Rated Power	1200 kW
	Rev	1500 rpm/min

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

2.4 Project location

The project activity is located at Övündüler Neighborhood, Bağlar District, Diyarbakır 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° 53′ 18″ N	39° 54′ 56″ E
2	37° 53′ 25″ N	39° 54′ 54″ E
3	37° 53′ 25″ N	39° 54′ 56″ E
4	37° 53′ 25″ N	39° 54′ 59″ E
5	37° 53′ 20″ N	39° 55′ 03″ E
6	37° 53′ 18″ N	39° 55′ 02″ E

Figure 1. Location of the Project Area

2.5 Additional information about the GHG Project

N/A

3 Quantification of GHG emissions reduction

3.1 Quantification methodology

Methodology: ACM0010 - GHG emission reductions from manure management systems (Version 08.0)

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 03 - Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (Version 03.0)
- Tool 05 - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)
- Tool 08 - Tool to determine the mass flow of a greenhouse gas in a gaseous stream (Version 03.0)
- Tool 14 - Project and leakage emissions from anaerobic digesters (Version 03.0)
- Tool 07 - Tool for calculation of emission factor for electricity systems (Version 07.0)
- Tool24 – Common practice (Version 03.1)

3.1.1 Applicability conditions of the methodology

The following table summarize the justification of the applicability conditions*:*

Methodology ID / Tool ID	Applicability Criteria	Justification
ACM0010	This methodology is applicable to manure management on livestock farms where the existing anaerobic manure treatment system, within the project boundary, is replaced by one or a combination of more than one	In the baseline scenario, cattle manure is disposed of in pits or uncovered anaerobic lagoons, causing soil, air, and water pollution. With the facility

	animal waste management systems (AWMSs) that result in less GHG emissions compared to the existing system. The methodology is also applicable to Greenfield facilities.	in place, the manure is processed in an anaerobic digester to produce biogas, capturing methane and reducing greenhouse gas emissions. Also, the project is the greenfield activity. This condition is applicable.
ACM0010	This methodology is applicable to manure management projects under the following conditions: (a) Farms where livestock populations, comprising of cattle, buffalo, swine, sheep, goats, and/or poultry, is managed under confined conditions; (b) Farms where manure is not discharged into natural water resources (e.g. rivers or estuaries); (c) In case of anaerobic lagoons treatments systems, the depth of the lagoons used for manure management under the baseline scenario should be at least 1 m; (d) The annual average ambient temperature at the site where the anaerobic manure treatment facility in the baseline existed is higher than 5°C; (e) In the baseline case, the minimum retention time of manure waste in the	The following demonstrates the applicability of these conditions to the project activity: (a) The farms maintain a cattle population under confined management conditions. (b) At the project site, manure is fed into anaerobic digesters and is not discharged into any natural water resources. (c) In the baseline scenario, the depth of the anaerobic lagoons used for manure management exceeds 1 m. (d) The annual average ambient temperature at the project site is 15.9 °C which is above 5 °C. [5]

[5] https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=DIYARBAKIR

	anaerobic treatment system is greater than one month; (f) The AWMS(s) in the project case results in no leakage of manure waste into ground water, for example the lagoon should have a non-permeable layer at the lagoon bottom.	(e) In the baseline scenario, the retention time of manure waste in the anaerobic treatment system is greater than one month. (f) The anaerobic manure treatment system implemented under the project ensures no leakage into groundwater; lagoons are equipped with a non-permeable layer at the bottom.
ACM0010	In addition, the applicability conditions included in the tools referred to above apply.	The applicability conditions outlined in the referenced tools are also met by the project activity.

3.1.2 Methodology deviations (if applicable)

N/A

3.2 Project boundaries, sources and GHGs

3.2.1 Spatial limits of the project

The project boundary includes the physical, geographical sites of:

- The livestock;
- Animal manure management systems (including centralised manure treatment plant);
- Facilities which recover and flare/combust or use methane. For the proposed project, biogas and electricity generation units will be located within own land of project owner near their existing farms.
- All power plants connected physically to the electricity system (grid) that the project plant is connected to.

A general operation diagram of the project is given in figure below.

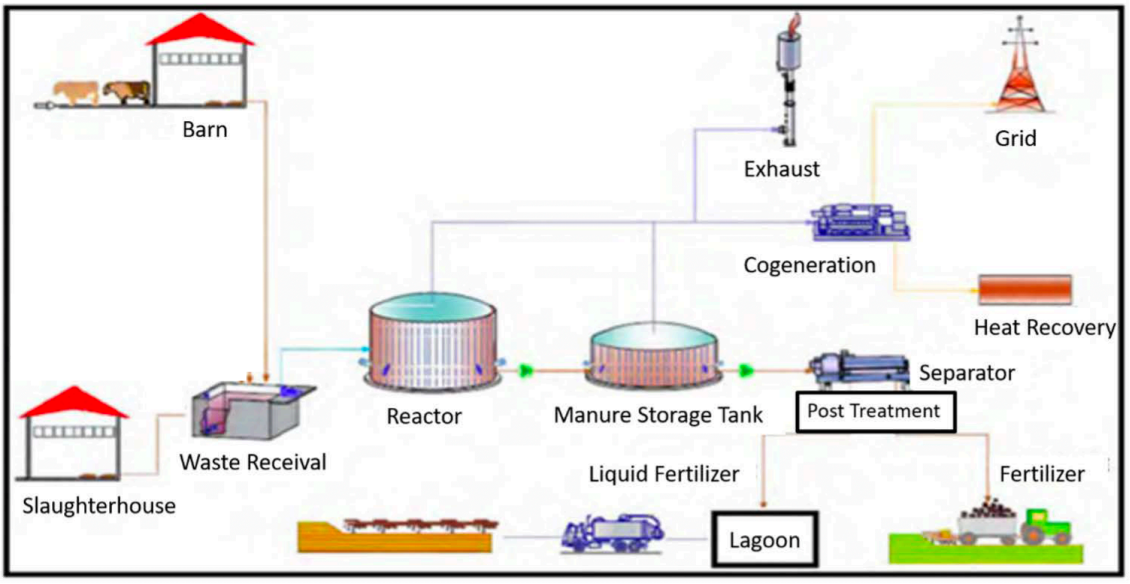

Figure 2. The operation diagram of Diyarbakır Bioags Plant

3.2.2 Carbon reservoirs and GHG sources

Identify GHG sources and reservoirs relevant to the project. Consider the pools and sources included in the methodology(ies) applied in the project scope.

Source or reservoir	**GHG**	**Included (Yes/No/Optional)**	**Justification**
Baseline Emissions from the waste treatment processes	CO_2	No	CO2 emissions from the decomposition of organic waste are not accounted
	CH_4	Yes	The major source of emissions in the baseline
	N_2O	Yes	Direct and indirect N2O emissions are accounted
Baseline Emissions from electricity consumption/ generation	CO_2	Yes	Electricity may be consumed from the grid or generated onsite in the baseline scenario
	CH_4	No	Excluded for simplification. This is conservative
	N_2O	No	Excluded for simplification. This is conservative

Baseline Emissions from thermal energy generation	CO_2	No	Excluded for simplification. This is conservative
	CH_4	No	Excluded for simplification. This is conservative
	N_2O	No	Excluded for simplification. This is conservative
Project Emissions from thermal energy use	CO_2	No	There is no external heat consumption in the project activity.
	CH_4	No	Excluded for simplification. This is conservative
	N_2O	No	Excluded for simplification. This is conservative
Project Emissions from on-site electricity use	CO_2	Yes	Internal electricity use has determined.
	CH_4	No	Excluded for simplification. This is conservative
	N_2O	No	Excluded for simplification. This is conservative
Project Emissions from the waste treatment processes	CO_2	No	CO2 emissions from the decomposition of organic waste are not accounted
	CH_4	Yes	The emission from anaerobic digesters and aerobic treatment are accounted
	N_2O	Yes	Direct and indirect N2O emissions are accounted

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 18/02/2020, which is the commissioning date of the first gas engine/generator that result in reductions/removals of GHG emission begins.

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 18.02.2020 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

The baseline scenario is identified according to "Combined tool to identify the baseline scenario and demonstrate additionality Version 07.0[6]". The project activity is greenfield project. According to the applied methodology for greenfield projects the baseline scenario is selected from the complete set of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 10, Table 10.17)[7] .

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

[7] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf

No.	IPCC Alternatives	Applicability	Justification
1.	The manure is collected from the pasture/Range/Paddock.	Not Applicable	Considered not to be realistic alternative according to the analysis in Section 3.4
2.	Manure removed from confinement and applied to pasture within 24 hours of excretion	Not Applicable	Not applicable because all the cow are raised in the well-managed animal farms. The manure will be collected from the animal farms, rather than pasture.
3.	The manure is disposed by solid storage.	Not Applicable	Not realistic because of the manure removal periods and also limited capacity of pasture lands to apply high amount of manure.
4.	Confinement area where manure can be removed periodically	Not Applicable	Not realistic because the storage of manure in unconfined piles or stacks is not allowed. According to the Air Quality Regulation of Turkey, solid manures shall be stored in impermeable platforms and there shall be measures taken to get rid of odour, flies, etc. (article 1.2.4-1.2.6).
5.	The manure is disposed as liquid/slurry.	Not Applicable	Not be realistic because the manure storage as excreted or with some minimal addition of water in either tanks or earthen ponds outside the animal housing is not allowed. According to the Air Quality Regulation of Turkey, Liquid wastes shall be stored in impermeable storage areas and transmitted with closed channels to outside of the cattle shed in closed containers or similar measures shall be taken (article 1.2.4-1.2.6).
6.	The manure is disposed in an uncovered anaerobic lagoon;	Applicable	considered as a credible alternative

7.	The manure is disposed by pit storage below animal confinements.	Not Applicable	Not realistic because the animal farms that supply manure to the project activity do not have the slatted floor through which the manure will be collected.
8.	The manure is disposed by anaerobic digester.	Not Applicable	Not realistic since there is no regulation for installation of ADs and also since the installation of AD requires large investments compared to investment size of farms. Individual AD installation for each farm requires heavy investment and would not be preferred unless it is obliged.
9.	Excreted dungs on fields are dried and burned as fuel	Not Applicable	Not considered as realistic since the manure has high water content and it is not possible to dry them sufficiently to burn as fuel within reasonable periods.
10.	The manure is disposed by deep bedding.	Not Applicable	Not realistic due to high water content of manure
11.	Composting via different methods	Not Applicable	Not realistic since it requires significant investment compared to size of the farms and since there is no legal or regulatory requirement.
12.	The manure is disposed with litter.	Not Applicable	Not be realistic because of the possible problem of the dust (dry organic partial in

13.	The manure is disposed without litter.	Not Applicable	animal manure) caused by the treatment (similar with bedding). According to guideline of Good Agriculture Applications in Turkey, an animal farm should store its inorganic manure and organic manure in a manner that environmental pollution is decreased if an animal farm wants to get the second degree (95% of compliance). Regarding the storage of inorganic manure, dust, granules and liquid inorganic manures shall be stored in such a manner that minimum risk for environmental pollution is posed.
14.	The manure is disposed via aerobic treatment.	Not Applicable	Not to be realistic alternative because the natural aeration cannot be realised in Turkey due to the limited land for wetland system or aerobic and facultative ponds
15.	The project activity is undertaken without being registered as a proposed CDM project activity	Not Applicable	Not found attractive as proved by the investment analysis.

In addition to the scenarios identified by the IPCC Guidelines, the applied tool also suggests taking into account the following alternatives:

No.	Alternatives´ Description	Applicability	Justification
S1	The proposed project activity undertaken without being registered as a CDM project activity	Not Applicable	Not an attractive option as demonstrated by the IRR analysis.
S2	Where applicable, no investment is undertaken by the project participants but third party(ies) undertake(s) investments or actions which provide the same output to users of the project activity, for example: In the case of a Greenfield power project, an alternative scenario may be that the project participants would not invest in another power plant but that power would be generated in existing and/or new power plants in the electricity grid.	Not Applicable	Not realistic as the project aims to contribute to waste handling and methane capture. Due to the increasing electricity demand in Turkey, new investments should be realized. In the baseline scenario, Turkish Grid is mainly dominated by the thermal power plant which is expected to continue[8]. This will cause further increase in electricity related emissions and also cause continuation of methane emissions. Proposed project will therefore be additional to baseline scenario due to not only avoided electricity related emissions but also due to methane abatement.
S3	Where applicable, the continuation of the current situation, not requiring any investment or expenses to maintain the current situation, such as, inter alia • The continued venting of methane from a landfill; • The continued release of N2O from adipic or nitric acid production	Applicable	This is the continuation of the current situation is the most credible baseline scenario.
S4	Where applicable, the continuation of the current situation, requiring an investment or expenses to maintain the current situation, such as, inter alia:	Not Applicable	Not realistic as maintaining the current situation would not require any expenses

	• The continued use of an existing boiler involving expenses for operation and maintenance; • The continued use of a specific fuel mix for power generation in an existing power plant.		
S5	Other plausible and credible alternative scenarios to the project activity scenario, including the common practices in the relevant sector, which deliver the same output, taking into account, where relevant, examples of scenarios identified in the underlying methodology;	Not Applicable	Not realistic as there are no other credible alternative scenarios which could provide same outputs with the proposed project. Some of the alternatives have been discussed as per the IPCC Guidelines.
S6	Where applicable, the "proposed project activity undertaken without being registered as a CDM project activity" to be implemented at a later point in time(e.g. due to existing regulations, end-of-life of existing equipment, financing aspects)	Not Applicable	Not applicable as the feasibility studies have been performed taking into account the carbon credits revenues all along the technical lifetime.

As per the regulations in Turkey about protection of air quality, solid and liquid wastes should be treated in non-permeable structures and stored in closed containers to prevent odour , flies etc. Hence, most of the alternatives above are either against the regulations or not mandated by them. Therefore, alternatives to the baseline scenario are identified as;

S3: Where applicable, the continuation of the current situation, not requiring any investment or expenses to maintain the current situation by the tool and

Scenario 6: "The manure is disposed in an uncovered anaerobic lagoon" by the IPCC Guidelines.

[8] See, https://www.epdk.gov.tr/Detay/DownloadDocument?id=GTRjtj8aTa8=_ (page 103)

In line with the applied methodology, alternatives for electricity generation in the baseline can be listed as below:

- E1: Electricity generation from biogas, undertaken without being registered as CDM project activity;
- E2: Electricity generation in existing or new renewable based captive power plant(s);
- E3: Electricity generation in existing and/or new grid-connected power plant;
- E4: Electricity generation in an off-grid fossil fuel fired captive power plant;
- E5: Electricity generation in existing and/or new grid-connected power plant and fossil fuel fired captive power plant(s).

Scenario E1 is not considered as a credible alternative due to financial reasons as proved by IRR calculations. Scenario E2, E4 and E5 are not considered as credible alternatives as the project requires revenues from electricity generation which can only be achieved by grid connection; therefore these alternatives are not comparable in terms of quantity and quality of services delivered. E5 also suggests implementing a fossil fuel fired captive plant which will lead to higher emissions compared to the proposed project.

Baseline scenario for electricity generation has been identified as "E3: Electricity generation in existing and/or new grid-connected power plant" among the alternatives defined in applied methodology".

3.4 Additionality

For the explanation of how and why the project activity leads to emission reductions that are additional to what would have occurred in the absence of the project activity, the Baseline Methodology refers to the "Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0[9], which defines a step-wise approach to be applied to the proposed project.

Step 0: Demonstration whether the proposed project activity is the first-ofits-kind

The project is not first-of its-kind project.

[9] Please See; https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf

Step 1. Identification of alternative scenarios

Step 1a. Define alternative scenarios to the proposed CDM project activity

To identify the realistic and credible alternative scenario(s) for project participants, scenarios in the Tool are assessed:

S1: The proposed project activity undertaken without being registered as a CDM project activity;

This alternative is realistic and credible as Termopet may undertake project activity if it sees no risk for project and/or if the project turns out to be financially attractive without carbon credit income. However, investments analysis shows that the project is not economically feasible without carbon credit income. Detailed information is given in Step-3.

S2: Where applicable, no investment is undertaken by the project participants, i.e., the same output as that produced by the proposed CDM project activity can also be provided by others than the project proponent (i.e., the PP is not the only output provider). For example:

(i) In the case of a Greenfield power project, an alternative scenario may be that the project participants would not invest in the Greenfield power plant but that power would be generated in existing and/or new power plants in the electricity grid;

The Project is a power generation activity without any greenhouse gas emission harnessing the energy of the Biogas. Being a private entity, Termopet will not have to invest power investments even proposed project activity. Also, since Termopet has licence only for Biogas power investment and since in the proposed project area there is no hydro or other sources for electricity generation, other project activities delivering same electricity in the same project area is not realistic for project participant.

S3: Where applicable, the continuation of the current situation, not requiring any investment or expenses to maintain the current situation, such as, inter alia:

(ii) The continued venting of methane form uncovered anaerobic lagoons/ponds.

The decision in favour or against a project investment depends on the expected revenues and risks, like for every other private investment. Investment decisions other than Diyarbakır Biogas Plant are independent from the question whether Diyarbakır Biogas Plant is built or not. This alternative is also realistic and credible.

According to baseline scenario, which is described in 3.3, there is a need for energy investment to satisfy increasing demand and if the Diyarbakır Plant is not built, the same amount of energy will be supplied by other private investors to the grid. Forecasts shows that electricity supplied in the absence of Diyarbakır Plant will be mainly and potentially based on fossil fuels as the projections for the year of 2022 forecasts 66.6% share for fossil fuels in the energy mix.

Outcome of Step 1.a:

Therefore, two realistic and credible alternative scenarios are identified for the project activity:

a) **The proposed project activity undertaken without being registered as a CDM project activity.**
b) **Where applicable, the continuation of the current situation, not requiring any investment or expenses to maintain the current situation.**

Step 1b. Consistency with mandatory applicable laws and regulations

Both alternatives are (building or not building the project activity) in compliance with the following identified applicable mandatory laws and regulations:

1. Electricity Market Law[10]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[11]
3. Environment Law[12]

Table 3. Project Milestones

Date	**Activity**
Signature Date of Gas Engine/Generator Agreement	12/02/2018
Issuance of the generation license to As Koç Enerji	20/09/2018

[10] Please see the related link.
[11] Please see the related link.
[12] Please see the related link.

EIA Exemption Decision	24/01/2019
Provisional Acceptance Date for Gas Engines/Generators (GMG-1, GMG-2, and GMG-3)	18/02/2020
Provisional Acceptance Date for Gas Engine/Generator (GMG-4)	11/03/2021
Name of the Company Change from As Koç Enerji to Termopet Akaryakıt A.Ş.	19/12/2024
Start Date of the Crediting Period	18/02/2020
Updated generation license for Termopet Akaryakıt A.Ş.	06/02/2025
End Date of the Crediting Period	17/02/2027

Signature Date of Gas Engine/Generator Agreement (12.02.2018) is set as Investment Decision.

In the following, the investment analysis is applied to clearly demonstrate that the project activity is unlikely to be financially/economically attractive without the revenue from the sale of VERs.

Step 2. Barrier analysis

The investment analysis will probably fully demonstrate and explain the additionality of the project, so step 2 will be skipped.

Step 3. Investment analysis

Investment analysis is carried out in line with the methodological tool: "Investment analysis", Version 09.0[13].

Three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

- Option I: Simple cost analysis
- Option II: Investment comparison analysis
- Option III: Benchmark analysis

The simple cost analysis is not applicable for the proposed project because the project activity will have revenue (from electricity sales) other than CDM-related income. The investment comparison analysis is also not applicable to the proposed project because the baseline scenario, providing the same annual electricity output by the Turkish National Grid, is not an investment project.

To conclude, the benchmark analysis will be used to identify whether the proposed project's financial indicators (project IRR in this case) is better than the relevant benchmark value.

With the help of the investment analysis, it shall be demonstrated that the proposed project activity is not economically or financially feasible without the revenue from the sale of VERs. Therefore, the benchmark analysis shall be applied, as there is no alternative project activity for a comparison of the attractiveness of an investment.

While applying the Benchmark Analysis, Option III, the Project IRR is selected as the financial indicator to demonstrate the project's additionality as permitted in the additionality tool.

The Benchmark rate is calculated in line with "Tool 27: Investment Analysis version 08.0" which suggests the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or WACC are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for a project IRR.

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[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf

Ministry of Development publishes "Main Economic Indicators" on a monthly basis. Since the project is a mid-term investment (exceeding one year), the lending rate for medium-term investment has been selected as the benchmark. The lending rate for the medium-term investment, as estimated by the Turkish Development Bank, is 14.5 % for March 2018[14]. Thus, 14.5% is taken as the benchmark value for Project IRR (before tax to be conservative).

Assessment of likelihood conditions for each parameter to reach benchmark IRR is provided below:

Electricity Price

In order to reach the 14.5 % benchmark IRR, electricity prices should increase more than 10 % from the assumed price. This feed-in-tariff price is already very high compared to the general market price and is not likely to increase. Thus, this 10% increase in the feed-in tariff is not likely to happen. Even if the electricity price increases by 10%, the project IRR cannot reach up to 14.5%.

Investment Cost

In order to reach the benchmark IRR, investment costs shall be decreased by more than 10%. Since the equipment contract, which has a higher share of the total costs, is fixed, a 10% decrease in the investment cost is unlikely. Thus, it is not likely for project activity to have a threshold investment cost and reach to benchmark IRR. Even if investment cost decreases by 10%, project IRR cannot reach up to 14.5%.

Energy Yield

To have a benchmark IRR, the annual energy yield amount shall increase more than 10 % more than the base case electricity generation amount used in financial analysis. To be conservative in the financial investment analysis of the project activity, the annual electricity generation amount from the Generation License is used. Also, internal consumption and transmission losses are accounted for to calculate the net generation. It was seen from the analysis that if energy yield increases by 10%, project IRR reaches up to

14 https://www.sbb.gov.tr/wp-content/uploads/2020/07/13-faiz_orani.xls

10.97% which is lower than the benchmark value of 14.5%. However, the electricity generation value given in the Generation License shows the maximum capacity of the generation value and over estimates the actual generation values. To retrieve the electricity generation data from the Generation License is thus conservative.

Operation Cost

Compared to other parameters, operation costs do not have a high impact on the project IRR and even if annual operation decrease by 10%, benchmark IRR cannot be reached.

Calculation and comparison of financial indicators

The technical lifetime of Diyarbakır Biogas Plant is determined by using the Tool to determine the remaining lifetime of equipment (v.1). To be conservative, a total of 25 yrs lifetime is considered and IRR analysis is performed for this period.

The project IRR (before tax) of the Diyarbakır Biogas Plant was calculated based on expected cash flows (investment, operating costs and revenues from electricity and fertiliser sales). It has yielded 9.44% before tax. The parameters and values used for the IRR calculation are made available to VVB during validation.

While the main parameters determining the project's income are the electricity and fertiliser sales revenue, the project's expenditures are investment and operation costs. A variation of the accordant values demonstrates the reliability of the IRR calculation. Key parameters are varied with +/-10%. The worst, base and best-case results for each parameter variation are given below, in the below table.

The sensitivity analysis confirms that the proposed project activity is unlikely to be economically attractive without the revenues from VERs, as even the maximum IRR result for the best-case scenario (11.60%) is slightly lower than the benchmark of 14.5%.

The project has already started generating electricity, so there is no chance that the investment cost will be -%10. In addition, Turkey has a feed-in tariff which means a fixed electricity price for the renewable project; it is unlikely to have a higher electricity price which is above the market price.

Table 4. IRR Results Concerning Different Financial Scenarios

Parameter	Power Price			Investment Cost			Energy Yield			Operating Cost		
Variance	-10%	0%	10%	-10%	0%	10%	-10%	0%	10%	-10%	0%	10%
Project IRR BeforeTax	8.16%	9.44%	10.73%	11.60%	9.44%	7.56%	7.84%	9.44%	10.97%	10.02%	9.44%	8.85%

Step 4: Common Practice Analysis

The section below provides the analysis as per step 4 of the "Tool for the demonstration and assessment of additionality", version 7.0.0 and according to "Common Practice" Tool version 03.[15]

Step 4.1.: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity: The proposed project has a capacity of 6 MWe. Per the guideline of +/-50%, the applicable output range for the project is 2.362 MWe to 7.086 MWe.

Step 4.2.: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

a) The projects are located in the applicable geographical area; **(Turkey)**
b) The projects apply the same measure as the proposed project activity; **(Renewable Energy plants)**
c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity; **(All renewable energy plants excluding the plants using animal manure as feedstocks)**
d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant; **(Electricity and heat generation)**

[15] Please see the related link.

The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1; (2.362 MWe to 7.086 MWe)

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

Energy Market Regulatory Authority (EPDK) in Turkey publishes and updates the Final List of Renewable Energy Plants Operational in Turkey every year. And with this official list, it is possible to see all renewable energy plants operational in that year separated by their **License Number, Project Owner, Plant Name, Plant Type, Fuel Type, Installed Power, Number of Units Operational and the Start Date of Electricity Generation.** This Final List of Renewable Energy Plants Operational is used to determine the N_{all} number. From this list, firstly, the projects that apply the same measure as the proposed project activity are determined **(all renewable energy plants).** And then, since it is possible to separate plants according to the fuel type they use, the projects that use the same energy source/fuel and feedstock as the proposed project activity are determined **(Using animal manure as feedstocks).** And then, since it is possible to separate plants according to the installed capacity, the capacity of the projects within the applicable capacity range of **2.362 MWe to 7.086 MWe** are determined. And then, since it is possible to separate plants according to the start date of operation, the **projects that started commercial operation before the start date of the project activity** are determined. And finally, from the final determined list, the projects that are neither registered CDM/Gold Standard projects, project activities submitted for registration, nor project activities undergoing validation are determined to note N_{all} number.

Step 4.3.: within the projects identified in Step 4.2., identify those that are neither registered CDM/Gold Standard projects, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall.

According to the official report of "Final List on Renewable Energy Plants, 2025[16]" , published by Republic of Turkey Energy Market Regulatory Authority (EPDK), there were

[16] https://www.epdk.gov.tr/Detay/DownloadDocument?id=CO9lRyx83Ps=

a total of 20 applicable renewable energy plants (which started operation before the project start date of Diyarbakır Biogas Plant which is 12.02.2018)

Within these 20 renewable energy plants projects identified 13 of them are neither registered Gold Standard projects, project activities submitted for registration, nor ongoing project validation.

Accordingly, it is noted that

$N_{all}=13$

Step 4.4.: within similar projects identified in Step 4.3., identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.:

Among 13 projects identified in Step 4.3. 11 of them apply different technology type and feedstock from the proposed project.

Accordingly, it is noted that

$N_{diff}=11$

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

In Step 4.3., Nall is noted as 13.

In Step 4.4., Ndiff is noted as 11.

Accordingly, factor F=1-Ndiff/Nall is calculated as follows:

F= 1-11/13

F= 0.15

The paragraph 18 of the methodological tool: "Common practice", Version 03.1[17] states that

> "the proposed project activity is a 'common practice' within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3" (pg. 5).

For the proposed project activity, F=0.15 is not greater than 0.2, also Nall-Ndiff=2 which is not greater than 3. Hence, the proposed project activity shall be considered as not a common practice in the region.

Hence, in accordance with the methodological tool: "Combined tool to identify the baseline scenario and demonstrate additionality", Version 07.0[18,] the proposed project activity shall be considered additional.

3.5 Uncertainty management

Emission reduction calculations of the project were made according to the guideline in ACM0010 v08.0. 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,

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

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

- 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[19]

3.6 Leakage and non-permanence

According to ACM0010 v8.0, potential leakage sources have been assessed in accordance with the methodology requirements. Relevant leakage emissions, such as methane emissions from manure storage prior to digestion and from digestate management, have been calculated and accounted for in the emission reduction estimations. 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

[19] 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 applied methodology baseline emissions are :

$$BE_y = BE_{CH4,y} + BE_{N2O,y} + BE_{elec/heat,y}$$

Baseline emissions from Grid connected renewable electricity generation

Tool 'Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity', the Tool's most recent version, Version 03.0[20], will be applied to the proposed project activity. Scenario A applies to the baseline scenario of the proposed project activity.

Accordingly with this Tool, the baseline emissions associated with electricity generation in year y are calculated as follows:

$$BE_{EC,y} = \sum_{k} EC_{BL,k,y} \times EF_{EF,k,y} \times (1 + TDL_{k,y})$$

Where:

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

$EC_{BL,k,y}$ = Quantity of electricity that would be consumed by the baseline electricity consumer k in year y (MWh/yr)

$EF_{EF,k,y}$ = 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 proving electricity to source k in year y

k = Sources of electricity consumption in the baseline

[20] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf

$$BE_{EC,y} = \sum_{k} EC_{BL,k,y} \times EF_{EF,k,y} \times (1 + TDL_{k,y})$$

where $EF_{EF,k,y} = EF_{grid,CM,y}$.

$BE_{EC,y}$ = 33,068 MWh/yr x 0.5415 tCO2/MWh x (1+0.1482[21])

$BE_{EC,y}$ = 20,558.96tCO2/yr

Baseline Emissions from animal waste treatment

Accordingly with the Gold Standard Revised Consolidated Baseline Methodology for GHG Emission Reductions from Manure Management Systems and Municipal Solid Waste[22] baseline emissions are calculated as follows:

$$BE_{Manure} = BE_{CH4,y} + BE_{N2O,y} + BE_{elec/heat,y}$$

Where:

$BE_{manure,y}$ = Baseline emissions in year y (tCO2/yr)

$BE_{CH_4,y}$ = Baseline CH4 emissions in year y (tCO2/yr)

$BE_{N_2O,y}$ = Baseline N2O emissions in year y (tCO2/yr)

$BE_{elec/heat,y}$ = Baseline CO2 emissions from electricity and/or heat used in the baseline (tCO2/yr)

Baseline CH_4 emissions from manure treatment ($BECH_{4,y}$):

The manure management system in the baseline scenario can be different livestock, treatment systems and on one or more stages. Therefore:

[21] http://api.worldbank.org/v2/en/indicator/EG.ELC.LOSS.ZS?downloadformat=excel , row 247

[22] https://globalgoals.goldstandard.org/wp-content/uploads/2017/06/401.13-ER-MMS.pdf

$$BE_{CH4,y} = GWP_{CH4} \times D_{CH4} \times \sum_{j,LT} (MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{Bl,j})$$

Where:

$BE_{CH4,y}$ = Baseline emissions in year y (t CO_2)

GWP_{CH4} = Global Warming Potential (GWP) of CH_4 applicable to the crediting period (t CO_2e/t CH_4)

D_{CH4} = CH_4 density (0.00067 t/m3 at room temperature (20 °C) and 1 atm pressure)

$N_{LT,y}$ = Annual average number of animals of type LT for the year y (number)

$VS_{LT,y}$ = Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis (kg -dm/animal/yr)

LT = Index for all types of livestock

j = Index for animal manure management system

MCF_j = Annual methane conversion factor (MCF) for the baseline Animal Manure Management System (AWMS) j

$B_{o,LT}$ = Maximum methane producing potential of the volatile solid generated for animal type LT (m3CH_4/kg-dm)

$MS\%_{Bl,j}$ = Fraction of manure handled in system j in the baseline

Accordingly with the 2019 Refinement to the 2006 IPCC Guidelines, Table 10.17, MCF value for an uncovered anaerobic lagoon and for a warm temperate moist climate is taken as 0.73[23].

[23] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

Accordingly with 2019 Refinement to the 2006 IPCC Guidelines, Table 10.16; $B_{o,LT}$ has been assumed as 0.24[24] m3CH4/kg-dm for dairy cattle, 0.17 for other cattle and 0.36 for poultry for Eastern Europe Region.

Accordingly with 2019 Refinement to the 2006 IPCC Guidelines, Table 10.13A, $VS_{LT,y}$ has been taken as 10.7[25] for dairy cattle, 14.1 for non dairy cattle and 14.2[26] for poultry waste in the Middle East region.

The average number of animals of different type living in the farms were obtained from the Project Owner. Accordingly with 2019 Refinement to the 2006 IPCC Guidelines, Table 10A.5, Middle East, Mean, Page 10.118, the average weight of a dairy cattle has been taken as 349[27] kg, the average weight of a non-dairy cattle has been taken as 275 kg and poultry type as 0.9[28] kg. Moreover, accordingly with , the survey conducted by the Project Owner for the farms that supply animal manure to the plant, there were a total number of 1,960 dairy cattle, 5,750 non-dairy cattle and 3,900,000 poultry.

$BE_{CH4,y}$ = 321,642.69 tCO2/yr

Baseline N2O emissions ($BE_{N2O,y}$):

$$BE_{N2O,y} = GWP_{N2O} \times CF_{N2O-N,N} \times \frac{1}{1000} \times \left(E_{N2O,D,y} + E_{N2O,ID,y}\right)$$

Where:

$BE_{N2O,y}$ = Annual baseline N2O emissions in year y (tCO2e/yr)

GWP_{N2O} = Global Warming Potential (GWP) for N2O (tCO2e/tN2O)

$CF_{N2O-N,N}$ = Conversion factor N2O-N to N2O (44/28)

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[24] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

[25] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

[26] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

[27] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf Table 10A.5 Page 10.118, Middle East

[28] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf Table 10A.5 Page 10.118, Middle East

$E_{N2O,D,y}$ = Direct N2O emission in year y (kg N2O-N/year)

$E_{N2O,ID,y}$ = Indirect N2O emission in year y (kg N2O-N/year)

$BE_{N2O,y}$ = 9,566.05 tCO2/yr

$$E_{N2O,D,y} = \sum_{j,LT} EF_{N2O,D,j} \times NEX_{LT,y} \times N_{LT} \times MS\%_{Bl,j}$$

Where:

$E_{N2O,D,y}$ = Direct N2O emission in year y (kg N2O-N/year)

$EF_{N2O,D,j}$ = Direct N2O emission factor for the treatment system j of the manure management system (kg N2O-N/kg N)

$NEX_{LT,y}$ = Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/yr)

$MS\%_{Bl,j}$ = Fraction of manure handled in system j (fraction)

N_{LT} = Annual average number of animals of type LT for the year y (number)

$E_{N2O,D,y}$ = 0 N2O-N/year

$$E_{N2O,ID,y} = \sum_{j,LT} EF_{N2O,ID} \times F_{gasMS,j,LT} \times NEX_{LT,y} \times N_{LT} \times MS\%_{Bl,j}$$

Where:

$E_{N2O,ID,y}$ = Indirect N2O emission in year y (kg N2O-N/year)

$EF_{N2O,ID}$ = Indirect N2O emission factor for N2O emissions from atmospheric deposition of nitrogen on soils and water surfaces (kg N2O-N/kg NH3-N and NOx-N)

$NEX_{LT,y}$ = Annual average nitrogen excretion per head of a defined livestock population (kg N2O-N/animal/year)

$MS\%_{Bl,j}$ = Fraction of manure handled in system j (fraction)

$F_{gasMS,j,LT}$ = Default values for nitrogen loss due to volatilization of NH3 and NOx from manure management (fraction)

N_{LT} = Annual average number of animals of type LT for the year y

$E_{N2O,ID,y}$= 22,971.66kg N2O-N/year

Accordingly,

$$BEy= BE_{CH4,y} + BE_{N2O,y} + BE_{elec/heat,y}$$

BE_y= 321,643 + 9,566 + 20,559 = 351,768 tCO2/yr

3.7.4 GHG project emissions

Accordingly with the applied methodology the following formula has been employed to calculate project emissions associated with the project activity.

$$PE_y = PE_{AD,y} + PE_{Aer,y} + PE_{N2O,y} + PE_{EC/FC,y}$$

Where:

PE_y = Project emission in year y (t CO2)

$PE_{AD,y}$ = Project emissions associated with the anaerobic digester / co-digestion in year t (tCO2e/yr)

$PE_{Aer,y}$ = Project CH4 emissions from aerobic AWMS treatment (tCO2e/yr)

$PE_{N2O,y}$ = Project N2O emissions in year y (tCO2/yr)

$PE_{EC/FC,y}$ = Project emissions from electricity consumption and fossil fuel combustion (tCO2/yr)

However, due to the fact that the project activity does not include aerobic AWMS treatment, $PE_{Aer,y}$ will be assumed as zero. Thus the above formula results in the following;

$$PEy = PE_{AD,y} + PE_{N_2O,y} + PE_{EC,y}$$

Project emissions associated with the anaerobic digester in year y ($PE_{AD,y}$)

The consolidated baseline methodology states that $PE_{AD,y}$ is determined using the methodological Tool 14 'Project and leakage emissions from anaerobic digesters'. As per this tool, $PE_{AD,y}$ is calculated as follows:

$$PE_{AD,y} = PE_{EC,y} + PE_{FC,y} + PE_{CH4,y} + PE_{flare,y}$$

Where:

$PE_{AD,y}$ = Project emissions associated with the anaerobic digester in year y (tCO_2e)

$PE_{EC,y}$ = Project emissions from electricity consumption associated with the anaerobic digester in year y (tCO_2e)

$PE_{FC,y}$ = Project emissions from fossil fuel consumption associated with the anaerobic digester in year y (tCO_2e)

$PE_{CH4,y}$ = Project emissions of methane from the anaerobic digester in year y (tCO_2e)

$PE_{flare,y}$ = Project emissions from flaring of biogas in year y (tCO_2e)

As mentioned in above paragraph, the project activity uses its own generated energy for heating purposes and no additional fossil fuel is used. Thus, $PE_{FC,y}$ will be assumed as zero. $PE_{EC,y}$ will not be accounted for Project emissions associated with the anaerobic digester but for total project emissions PEy. Moreover, $PE_{flare,y}$ will also be assumed as zero. So above formula will be reduced to :

$$PE_{AD,y} = PE_{CH4,y}$$

In order to calculate $PE_{CH4,y}$, first step is the determination of the quantity of methane produced in the digester ($Q_{CH4,y}$). According to the tool "Project and leakage emissions from anaerobic digesters" there are two different procedures to determine the quantity of methane produced in the digester in year y ($Q_{CH_4,}$). However, the tool states that only Option 1 shall be used for large scale projects.

Thus, accordingly with the chosen Option 1, $Q_{CH4,y}$ shall be measured using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". According to this tool, the mass flow of a particular greenhouse gas is calculated based on measurements of: (a) the total volume flow or mass flow of the gas stream, (b) the volumetric fraction of the gas in the gas stream and (c) the gas composition and water content. The flow and volumetric fraction may be measured on a dry basis or wet basis. The tool covers the possible measurement combinations, providing six different calculation options to determine the mass flow of a particular greenhouse gas. Among these 6 options, for the proposed project activity, Option C is chosen due to the fact that it cannot be demonstrated that the gaseous stream is dry, then the flow measurement is assumed to be on a wet basis and the corresponding Option C from Table 2 best suits for the proposed project activity. Since the absolute humidity is a parameter required for Options B and E, for Option C chosen, it is not calculated.

The mass flow of greenhouse gas i (Fi,t) is determined as follows:

$$F_{i,t} = V_{t,wb,n} * V_{i,wb,t} * \rho_{i,n}$$

With

$$\rho_{i,n} = \frac{P_n * MM_i}{R_u * T_n}$$

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 in normal conditions (m³ wet gas/h)

$V_{i,t,wb}$ Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a wet basis (m³ gas i/m³ wet gas)

$\rho_{i,n}$ Density of greenhouse gas i in the gaseous stream at normal conditions (kg gas i/m³ gas i)

Pn Absolute pressure of the gaseous stream at normal conditions n (Pa)

MMi Molecular mass of greenhouse gas i (kg/kmol)

Ru Universal ideal gases constant (Pa.m3/kmol.K)

Where p_{CH_4} = 0.00067 tCH4/Nm3CH4 and it can be assumed that $V_{CH_4,t,wb}$ = 59%.

As per the the Tool, $PE_{CH_4,y}$ is calculated as follows:

$$PE_{CH4,y} = Q_{CH4,y} \times EF_{CH4,default} \times GWP_{CH4}$$

Where:

$PE_{CH_4,y}$ = Project emissions of methane from the anaerobic digester in year y (tCO2e)

$Q_{CH_4,y}$ = Quantity of methane produced in the anaerobic digester in year y (tCH4)

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

GWP_{CH_4} = Global warming potential of CH4 (tCO2/tCH4)

$PE_{CH_4,y}$ = 15.14 tCO2e

Hence,

$PE_{AD,y}$ = 15.14 tCO2e

Project N2O emissions in year y ($PE_{N_2O,y}$)

As per the ACM0010 v08.0, the project N2O emission from animal manure shall be estimated as follows:

$$PE_{N20,y} = GWP_{N20} \times CF_{N20-N,N} \times \frac{1}{1000} \times \left(E_{N20,D,y} + E_{N20,ID,y}\right)$$

Where:

$PE_{N_2O,y}$ = Project N2O emissions in year y (tCO2e/yr)

GWP_{N_2O} = Global Warming Potential (GWP) for N2O (tCO2e/tN2O)

$CF_{N_2O\text{-}N,N}$ = Conversion factor N2O-N to N2O (44/28)

$E_{N_2O,D,y}$ = Direct N2O emission in year y (kg N2O-N/year)

$E_{N_2O,ID,y}$ = Indirect N2O emission in year y (kg N2O-N/year)

There are two options to calculate N2O emissions which are Option 1 and Option 2. For this project activity, Option 2 is the preferred option for estimating N2O emissions since it is based on actual measurements.

$$E_{N20,D,y} = \sum_{n} EF_{N20,D,n} \times \sum_{m=1}^{12} \left(Q_{EM,m} \times [N]_{EM,m}\right)$$

$$E_{N20,ID,y} = EF_{N20,ID} \times \sum_{n} F_{gasm,j} \times \sum_{m=1} \left(Q_{EM,m} \times [N]_{EM,m}\right)$$

Where:

$PE_{N_2O,y}$ = Annual project N2O emissions in tCO2e/yr

GWP_{N_2O} = Global Warming Potential (GWP) for N2O (tCO2e/tN2O)

$CF_{N_2O\text{-}N,N}$ = Conversion factor N2O-N to N2O (44/28)

$E_{N_2O,D,y}$ = Direct N2O emission in year y (kg N2O-N/year)

$E_{N_2O,ID,y}$ = Indirect N2O emission in year y (kg N2O-N/year)

$Q_{EM,m}$ = Monthly volume of the effluent mix entering the central plant (m3/month)

$[N]_{EM,m}$ = Monthly total nitrogen concentration in the effluent mix (kg N/m3) entering the treatment plant

$F_{gasm,j}$ = Percent of total nitrogen that volatilizes as NH3 and NOx in the treatment stage j

Accordingly;

$PE_{N_2O,y}$ = 1,098.27 tCO2e/yr

Project emissions from use of electricity ($PE_{elec,y}$)

In accordance with the applied methodology, the project emissions from electricity consumption will be calculated following $[N]_{EM,m}$ the latest version of 'Tool to calculate baseline, project and/or leakage emissions from electricity consumption' (pg. 17). Accordingly, the methodological tool 'Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity'[29], Version 03.0, is applied to the proposed project activity to calculate PEelec,y.

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

Where:

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (tCO_2/yr)

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

$EF_{EF,j,y}$ = Emission factor for electricity generation for source j in year y (tCO_2/MWh)

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

Accordingly,

$PE_{EC,y}$ = 3,307.00 MWh/yr x 0.5415 tCO_2/MWh x (1+0.1482[30])

$PE_{EC,y}$ = 2,056.02tCO_2/yr

$EC_{PJ,j,y}$, which is the "quantity of the electricity imported from the grid and consumed by the project activity in year y" , has been assumed as 3,307 MWh/yr or 10% of total electricity generation as a conservative approach for biogas projects.

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[29] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf

[30] http://api.worldbank.org/v2/en/indicator/EG.ELC.LOSS.ZS?downloadformat=excel , row 247

Accordingly,

PEy $= PE_{AD,y} + PE_{Aer,y} + PE_{N2O,y} + PE_{EC/FC,y}$

PEy = 15.14 tCO_2/yr + 0 + 1,098.27tCO_2/yr + 2,056.02tCO_2/yr

PEy = 3,169 tCO_2/yr

3.7.5 GHG leakages.

Accordingly with the applied methodology ACM0010 v08.0 Leakage covers the emissions from land application of treated manure as well as the emissions related to anaerobic digestion in a digester, occurring outside the project boundary and shall be calculated as follows.

$$LE_y = \left(LE_{PJ,N2O,y} - LE_{BL,N2O,y}\right) + \left(LE_{PJ,CH4,y} - LE_{BL,CH4,y}\right) + LE_{Comp,y} + LE_{AD,y} + LE_{Trans,y}$$

Where:

$LE_{PJ,N2O,y}$ = Leakage N2O emissions released during project activity from land application of the treated manure in year y (tCO_2e/yr)

$LE_{BL,N2O,y}$ = Leakage N2O emissions released during baseline scenario from land application of the treated manure in year y (tCO_2e/yr)

$LE_{PJ,CH4,y}$ = Leakage CH_4 emissions released during project activity from land application of the treated manure in year y (tCO_2e/yr)

$LE_{BL,CH4,y}$ = Leakage CH_4 emissions released during baseline scenario from land application of the treated manure in year y (tCO_2e/yr)

$LE_{Comp,y}$ = Leakage emissions associated with the storage and disposal of compost in year y (tCO_2e)

$LE_{AD,y}$ = Leakage emissions associated with the anaerobic digester in year y (tCO_2e)

$LE_{Trans,y}$= Emissions from incremental distance travelled for waste/final compost/residue transportation in tCO_2e/yr

A. Estimation of leakage N_2O emissions ($(LE_{PJ,N2O,y} - LE_{BL,N2O,y})$)

The calculation of N_2O emissions from land application of manure in the baseline and project cases are estimated from equations below:

$$LE_{BL,N2O,y} = GWP_{N2O} \times CF_{N2O-N,N} \times (1/1000) \times (LE_{N2O,land,y} \times LE_{N2O,runoff,y} \times LE_{N2O,vol,y})$$

(L.2)

$$LE_{N2O,land,y} = EF_1 \times \left[\prod_{n=1}^{N}(1 - R_{N,n})\right] \times \sum_{j,LT}(NEX_{LT,y} \times N_{LT})$$

(L.3)

$$LE_{N2O,runoff,y} = EF_5 \times F_{leach} \times \left[\prod_{n=1}^{N}(1 - R_{N,n})\right] \times \sum_{j,LT}(NEX_{LT,y} \times N_{LT})$$

(L.4)

$$LE_{N2O,vol,y} = EF_4 \times F_{gasm} \times \left[\prod_{n=1}^{N}(1 - R_{N,n})\right] \times \sum_{j,LT}(NEX_{LT,y} \times N_{LT})$$

(L.5)

Where:

$LE_{N2O,land,y}$	=	Leakage N_2O emissions from application of manure waste in year y (kg N_2O-N/year)
$LE_{N2O,runoff,y}$	=	Leakage N_2O emissions due to leaching and run-off in year y (kg N2O-N/year)
$LE_{N2O,vol,y}$	=	Leakage N_2O emissions due to volatilisation in year y (kg N_2O-N/year)
GWP_{N2O}	=	Global Warming Potential (GWP) for N_2O (t CO2e/tN_2O)
$CF_{N2O-N,N}$	=	Conversion factor N_2O-N to N_2O (44/28)
EF_1	=	Emission factor for N_2O emissions from N inputs (kg N_2O-N/kg N input)
EF_4	=	Emission factor for N_2O emissions from atmospheric deposition of N on soils and water surfaces, [kg N- N2O/(kg NH3-N + NOX-N volatilized)]
EF_5	=	Emission factor for N_2O emissions from N leaching and runoff in (kg N_2O-N/kg N leached and runoff)

$NEX_{LT,y}$	=	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/year)
F_{leach}	=	Fraction of all N added to/mineralised in managed soils in regions where leaching/runoff occurs that is lost through leaching and runoff (fraction)
F_{gasm}	=	Fraction of N lost due to volatilization (fraction)
$R_{N,n}$	=	Nitrogen reduction factor (fraction)
N_{LT}	=	Annual average number of animals of type LT

B. Estimation of leakage CH_4 emissions $((LE_{PJ,CH4,y} - LE_{BL,CH4,y}))$

The calculation of methane emissions from land application of manure in the baseline and project cases are estimated from equations below:

$$LE_{BL,CH4,y} = GWP_{CH4} \times D_{CH4} \times MCF_d \times \left[\prod_{n=1}^{N}\left(1 - R_{VS,n}\right)\right] \times \sum_{j,LT}(B_{0,LT} \times N_{LT} \times VS_{LT,y} \times MS\%_j)$$

(L.6)

$$LE_{PJ,CH4,y} = GWP_{CH4} \times D_{CH4} \times MCF_d \times \left[\prod_{n=1}^{N}\left(1 - R_{VS,n}\right)\right] \times \sum_{j,LT}(B_{0,LT} \times N_{LT} \times VS_{LT,y} \times MS\%_j)$$

(L.7)

Where:

$LE_{BL,CH4,y}$	=	Leakage CH_4 emissions released during baseline scenario from land application of the treated manure in year *y* (tCO_2e/yr)
$LE_{PJ,CH4,y}$	=	Leakage CH_4 emissions released during project activity from land application of the treated manure in year *y* (tCO_2e/yr)
$R_{VS,n}$	=	Fraction of volatile solid degraded in AWMS treatment method *n* of the *N* treatment steps prior to sludge being treated
GWP_{CH4}	=	Global Warming Potential (GWP) of CH_4 (tCO_2e/tCH_4)
D_{CH4}	=	Density of CH_4 (t/m^3)
$B_{0,LT}$	=	Maximum methane producing potential of the volatile solid generated by animal type LT (m^3CH_4/kg dm)
N_{LT}	=	Annual average number of animals of type *LT* estimated as per equation (5.a) or (5.b), expressed (number)
$VS_{LT,y}$	=	Annual volatile solid excretions for livestock *LT* entering all AWMS on a dry matter weight basis (kg -dm/animal/yr)

$MS\%_j$ = Fraction of manure handled in system *j* in the project activity (fraction)

MCF_d = Methane conversion factor (MCF) assumed to be equal to 1

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

$LE_{AD,y}$ is determined using the methodological tool "Project and leakage emissions from anaerobic digesters".

LE_y = (26247– 5249) + (96493- 80411) + 0 = 37,080tCO2/yr .

Emission Reductions

Accordingly with the applied methodology, the emission reduction ERy by the project activity during a given year y is the difference between the baseline emissions (BEy) and the sum of project emissions (PEy) and leakage, as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Accordingly,

ERy = 351,767 tCO2/yr – 3,170 tCO2/yr – 37,080

ERy = 311,517 tCO2/yr

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 1	305,634	2,754	32,217	270,663
Year 2	351,767	3,170	37,080	311,517

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 3	351,767	3,170	37,080	311,517
Year 4	351,767	3,170	37,080	311,517
Year 5	351,767	3,170	37,080	311,517
Year 6	351,767	3,170	37,080	311,517
Year 7	351,767	3,170	37,080	311,517
Year 8	46,133	416	4,863	40,854
Total	2,416,236	21,774	254,697	2,139,765

The total estimated emission reductions/removals during the project's quantification period is 2,139,765 tCO2e and the estimated annual average is 311,517 tCO2e.

4 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is in compliance with the following identified applicable mandatory laws and regulations:

1. Electricity Market Law[31]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[32]
3. Environment Law[33]

[31] Please see the related link.
[32] Please see the related link.
[33] Please see the related link.

5 Carbon ownership and rights

5.1 Project holder

Individual or organization	**Termopet Akaryakıt A.Ş.**
Contact person	Fikrican Okan
Job position	General Manager
Address	Mutlukent Mahallesi, 2007. Cadde No: 60 Çankaya/Ankara/Türkiye
Phone number	+90 535 890 4141
Email	*fokan@askoc.com.tr*

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, Termopet Akaryakıt Anonim Şirketi. 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 Diyarbakır biogas plant, long-term operational continuity is ensured through contractual provisions, including feedstock supply agreements, power purchase agreements, and operator contracts with clauses on continuous operation and maintenance. A preventive maintenance plan, leak detection program, 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 biogas 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 biogas 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 biogas 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 biogas 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 biogas 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 Diyarbakır, 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 biogas from animal waste and utilizing it to produce 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 33,068 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 animal waste through biogas 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.

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 311,517 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

Diyarbakır Biogas 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

Net electricity generation will be measured and recorded via meters sealed by TEİAŞ for billing purposes; therefore, no new additional protocol will be needed for monitoring emission reduction. The power Plant Manager will be responsible for the electricity generated, gathering all relevant data and keeping the records. In addition, the Manager will also be responsible for gathering all data and keeping records on manure entering the plant and cogeneration engines, including amount of CH_4 co-generated and lab analyses.

Generation data collected during the crediting period will be submitted to Life Climate as the Project consultant, who will be responsible for calculating the emission reduction subject to verification. Generation data will be used to prepare monitoring reports which will be used to determine the vintage of the project activity. These reports will be submitted to the duly authorized and appointed Designated Operational Entity 'DOE' before each verification period.

Installation of meter and data monitoring will be carried out according to the regulations by TEİAŞ. Two metering devices (one used as a spare) will be used to monitor the electricity generated by the power plant. Readings will be done using main metering devices, and spare metering devices will be used for comparison only. Data on electricity generation will be primarily sourced from EPİAŞ records (https://www.epias.com.tr/), accessible via a password provided to electricity generation companies. In addition, generation data recorded monthly by TEİAŞ through remote metering devices will be used as a cross-check to verify the accuracy of the EPİAŞ data. EPİAŞ records will be the main basis for emission reduction calculations.

The biogas flow, the amount of biogas produced, the methane content of the biogas, temperature, and pressure of the produced biogas will be monitored continuously and regularly recorded through the SCADA system employed in the plant.

The Project Proponent will conduct regular laboratory analysis to determine the monthly total nitrogen concentration in the effluent mix entering the plant and also to determine the quality of the produced digestate. The Project Proponent will record the number of animals produced annually and the number of animals that is alive on the farm. Contracts signed with the farmers will be used for cross-checking. The Project Proponent will record any contract changes with the manure suppliers. All these records will be reported for the monitoring periods to be verified by VVB and Gold Standard

The ambient temperature at the project site will be recorded by the Project Proponent and will be crosschecked with the Annual average ambient temperature at the project city from the official public website monthly. The Project Proponent will record the number of days

the treatment plant is operational, and the SCADA system employed at the plant will be used for a crosscheck to see how many days the treatment plant is operational.

All data will be kept at least two years after the crediting period for QA/QC purposes.

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

Data / Parameter	D_{CH_4}
Data unit	t/m^3
Description	Density of CH4
Source of data used	The Gold Standard Revised Consolidated Baseline Methodology for GHG Emission Reductions from Manure Management Systems and Municipal Solid Waste[34], pg. 25.
Value (s)	0.00067
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	0.00067 t/m3 at room temperature (20 °C) and 1 atm pressure
Additional comments	-

Data / Parameter	R_u
Data unit	$Pa.m^3/kmol.K$
Description	Universal ideal gases constant

[34] https://globalgoals.goldstandard.org/wp-content/uploads/2017/06/401.13-ER-MMS.pdf

Source of data used	Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 03.0
Value (s)	8,314
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	MM_i
Data unit	kg/kmol
Description	Molecular mass of greenhouse gas CH_4
Source of data used	Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 03.0
Value (s)	16.04
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
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 to determine the mass flow of a greenhouse gas in a gaseous stream Version 03.0
Value (s)	101,325 Pa
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	Tn
Data unit	K
Description	Temperature at normal conditions
Source of data used	Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 03.0
Value (s)	273.15 K
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	$EF_{CH4,default}$
Data unit	Fraction
Description	Default emission factor for the fraction of CH4 produced that leaks from the anaerobic digester.
Source of data used	Project and leakage emissions from anaerobic digesters", Version 02.0[35], pg. 11-12
Value (s)	0.028
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission calculation.
Justification of choice of data or description of measurement methods and procedures applied	Digesters with steel or lined concrete or fiberglass digesters and a gas holding system and monolithic construction.
Additional comments	-

Data / Parameter	GWP_{N2O}
Data unit	tCO2/tN2O
Description	Global Warming Potential (GWP) for N2O.
Source of data used	IPCC Fifth Assessment Report: Climate Change 2013[36]
Value (s)	265
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.

[35] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v2.pdf

[36] https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf , page 87

Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	GWP_{CH4}
Data unit	tCO_2/tCH_4
Description	Global Warming Potential (GWP) for CH_4.
Source of data used	IPCC Fifth Assessment Report: Climate Change 2013[37]
Value (s)	28
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	MCF_j
Data unit	N/A
Description	Methane conversion factor

[37] https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf , page 87

Source of data used	Obtained from 2019 IPCC Refinement, Table 10.17, p. 67 (uncovered anaerobic lagoon for 17.9°C, warm temperate moist)[38].
Value (s)	0.73
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	Uncovered anaerobic lagoon, Value for 17.9°C.
Additional comments	-

Data / Parameter	$B_{o,LT}$ for Dairy Cow
Data unit	m^3CH_4/kg_dm
Description	Maximum methane producing potential of the volatile solid generated.
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.16, p. 10.66, Eastern Europe, Dairy Cow[39].
Value (s)	0.24
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of	Default value for dairy cows.

[38] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

[39] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

measurement methods and procedures applied	
Additional comments	-

Data / Parameter	$B_{o,LT}$ for Non-dairy cattle
Data unit	m^3CH_4/kg_dm
Description	Maximum methane producing potential of the volatile solid generated.
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.16, p. 10.66, Eastern Europe, non dairy cattle[40].
Value (s)	0.17
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	Default value for non dairy cattle.
Additional comments	-

Data / Parameter	$B_{o,LT}$ for chicken
Data unit	m^3CH_4/kg_dm
Description	Maximum methane producing potential of the volatile solid generated.

[40] CHAPTER 1 (iges.or.jp)

Source of data used	Obtained from 2019 IPCC Refinement, Table 10.16, p. 10.66, Eastern Europe, chicken broilers[41].
Value (s)	0.36
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	Default value for chicken broilers
Additional comments	-

Data / Parameter	$VS_{LT,y}$ for Dairy Cattle
Data unit	1000 kg animal mass/day
Description	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.13A p. 10.55 Middle East, Dairy Cattle[42].
Value (s)	10.7
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of	-

[41] CHAPTER 1 (iges.or.jp)

[42] CHAPTER 1 (iges.or.jp)

measurement methods and procedures applied	
Additional comments	-

Data / Parameter	$VS_{LT,y}$ for Other Cattle
Data unit	1000 kg animal mass/day
Description	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.13A p. 10.55 Middle East, Other Cattle[43].
Value (s)	14.1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	$VS_{LT,y}$ for Poultry
Data unit	1000 kg animal mass/day
Description	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis

[43] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 1 (iges.or.jp)

Source of data used	Obtained from 2019 IPCC Refinement, Table 10.13A p. 10.55 Middle East, Poultry[44].
Value (s)	14.2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in project emission/baseline calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	NEX for Dairy Cattle
Data unit	kg N (1000 kg animal mass)/day
Description	Nitrogen excretion rates for livestock categories.
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.19, p. 10.83, Middle East, Mean, Dairy Cattle[45].
Value (s)	0.50
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in baseline direct N_2O emissions calculations.
Justification of choice of data or description of measurement methods and procedures applied	-

[44] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 1 (iges.or.jp)

[45] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 1 (iges.or.jp)

Additional comments	-

Data / Parameter	NEX for Non-Dairy Cattle
Data unit	kg N (1000 kg animal mass)/day
Description	Nitrogen excretion rates for livestock categories.
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.19, p. 10.92, Middle East, Mean, Non-Dairy Cattle[46].
Value (s)	0.55
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in baseline direct N_2O emissions calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	NEX for Poultry
Data unit	kg N (1000 kg animal mass)/day
Description	Nitrogen excretion rates for livestock categories.
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.19, p. 10.92, Middle East, Mean, Poultry[47].
Value (s)	1.29

[46] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 1 (iges.or.jp)

[47] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 1 (iges.or.jp)

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in baseline direct N_2O emissions calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	EF_3 (for uncovered anaerobic lagoon)
Data unit	[kg N_2O-N /(kg Nitrogen excreted)]
Description	Emission factor for direct N2O emissions from manure management system S in the country, kg N2O-N/kg N in manure management system S.
Source of data used	Obtained from 2019 IPCC Refinement, Table 10.21, p. 10.91 (uncovered anaerobic lagoon) [48].
Value (s)	0.00
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in baseline direct N_2O emissions calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

[48] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 1 (iges.or.jp)

Data / Parameter	EF_4
Data unit	kg N_2O-N/(kg NH_3-N +NO_x-N volatilized)
Description	Emission factor for N_2O emissions from N volatilisation and redeposition
Source of data used	Obtained from 2019 IPCC Refinement, Table 11.3, p. 11.26[49].
Value (s)	0.010
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in baseline and project indirect N_2O emissions calculations.
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	EF_5
Data unit	kg N_2O-N (kg N leached and runoff)
Description	Emission factor for N_2O emissions from N leaching and runoff.
Source of data used	Obtained from 2019 IPCC Refinement, Table 11.3, p. 11.26[50].
Value (s)	0.011
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in baseline indirect N_2O emissions calculations.

[49] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 11 (iges.or.jp)

[50] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 11 (iges.or.jp)

Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	EF1
Data unit	kg N2O-N/kg N
Description	Emission factor for N2O emissions from N inputs
Source of data used	IPCC 2006, table 11.1,chapter 11, volume 4.
Value (s)	0.01
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of Leakage Emissions
Justification of choice of data or description of measurement methods and procedures applied	Site specific data is unavailable therefore default values are employed.
Additional comments	-

Data / Parameter	$f_{gas,m}$
Data unit	(kg NH_3–N + NOx–N) / (kg N applied or deposited)
Description	*Volatilisation from all organic N fertilisers applied, and dung and urine deposited by grazing animals*
Source of data used	*Obtained from 2019 IPCC Refinement, Table 11.3, p. 11.26*[51].

[51] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html CHAPTER 11 (iges.or.jp)

Value (s)	0.21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	*Used in baseline and project N_2O emissions calculations.*
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	$R_{VS,n}$
Data unit	Fraction
Description	VS degradation factor
Source of data used	USEPA 2001:Development Document for the Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the effluent Guidelines for Concentrated Animal Feeding Operations, Chapter 8.2,table 8-10
Value (s)	Uncovered Anaerobic Lagoon: 75% Anaerobic Digesters: 70%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of Leakage Emissions
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	F_{leach}

Data unit	kg N2O-N/kg N for EF5
Description	Fraction of all N added to/mineralised in managed soils in regions where leaching/runoff occurs that is lost through leaching and runoff
Source of data used	Default values from table 11.3, chapter 11, volume 4 of IPCC 2006 guidelines are used
Value (s)	0.00
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Used in leakage emission calculations
Justification of choice of data or description of measurement methods and procedures applied	Site specific data is unavailable therefore default values are opted for.
Additional comments	-

Data / Parameter	$R_{N,n}$
Data unit	Fraction
Description	Nitrogen reduction factor
Source of data used	USEPA 2001:Development Document for the Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the effluent Guidelines for Concentrated Animal Feeding Operations, Chapter 8.2,table 8-10
Value (s)	$R_{N,n,}$ anaerobic digester : 0.00 $R_{N,n,}$ uncovered anaerobic lagoon : 0.80
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emissions calculations

Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

Data / Parameter	$EFCO_{2,grid,y}$
Data unit	tCO_2/MWh
Description	Emission factor for Turkish Grid
Source of data used	Republic of Turkey Ministry of Energy in Emission Factor 2022[52]
Value (s)	0.5415
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions calculations
Justification of choice of data or description of measurement methods and procedures applied	-
Additional comments	-

16.3 Data and parameters monitored

Data / Parameter	$EG_{d,y}$
Data unit	MWh/yr
Description	Net electricity supplied to the grid

[52] https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru

Measured /Calculated /Default:	Measured
Source of data	Electricity meter(s)
Value(s) applied	33,068 MWh/yr
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring frequency	monthly
Measuring/ Reading/ Recording frequency	Continuous measurement and monthly recording
Measurement/Calculation method (if applicable)	Two electricity meters will be placed (one main and one reserve) at the substation. These meters are sealed by TEIAS and intervention by project proponent is not possible. The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is in the interest of not only the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers. $EG_{d,y}$ calculation is conducted by records of EPİAŞ, an association of TEİAŞ. Site records are used as a cross check, because, records of EPİAŞ are more conservative than the site records. EPİAŞ reading will be used as a base datum on the other hand; electricity meter reading will be used to crosscheck the accuracy of the data. Authenticity will be increased by the aid of data crosschecks between EPİAŞ datum and electricity meter readings. This means that the main source is the EPIAS data. TEIAS notices are used to cross-check the EPİAŞ records. TEIAS sends an electronic spreadsheet that includes daily and monthly electricity generation and withdrawn amounts for each power plant. Thus, cross-check source is the TEIAS meter readings.

	Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid will be calculated by electricity supplied minus electricity withdrawn. Thus, with this procedure, monitoring is sufficient and no extra monitoring has to be implemented.
QA/QC procedures applied	According to the Article 2 of the Communiqué: 'The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained "Type and System Approval" certificate from the Ministry of Trade and Industry.' Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' 7 (Regulation) of Ministry states that: ' b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years' . As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan.

Data / Parameter	ER_y
Data unit	tCO_2e/year
Description	CO2e emission reductions achieved per year
Measured /Calculated /Default:	Calculated
Source of data	Latest official data published by the Ministry of Energy and Natural Resources is used.
Value(s) applied	311,517 tCO_2e/year

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Continuous measurement and monthly recording
Measurement/Calculation method (if applicable)	The net electricity supplied by the Project Activity will be measured and recorded by EPİAŞ on a continuos basis. In addition to the EPİAŞ meters which is used for billing purposes, records taken by meters at the project site will be used for a double check.
QA/QC procedures applied	The data will be kept for two years after the crediting period or from last issuance. The values shall be monitored ex-post and VERs will be calculated as actual.

Data / Parameter	Quantitative employment and income generation
Data unit	N/A
Description	Number of recruited staff and local staff and their social security records
Measured /Calculated /Default:	Measured
Source of data	Social Security Records of the employees
Value(s) applied	The project will provide between at least 10 employment and at least 3 of them will be locals.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	-
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Annually

Measurement/Calculation method (if applicable)	SGK records of employees are provided during each monitoring period
QA/QC procedures applied	-

Data / Parameter	Quality of Employment
Data unit	N/A
Description	Number of certificates issues/trainings provided.
Measured /Calculated /Default:	Measured
Source of data	Health & Safety training records for all employees.
Value(s) applied	All employees will attend trainings on Health and Safety
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	-
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Annually
Measurement/Calculation method (if applicable)	The training records for all the employees
QA/QC procedures applied	HSE trainings will be held for employees at the plant.

Data / Parameter	Vf
Data unit	m^3
Description	Biogas flow
Measured /Calculated /Default:	Measured
Source of data	SCADA records
Value(s) applied	Will be subject to Ex-post monitoring

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline/emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Continuously by flow meter and reported cumulatively on monthly basis
Measurement/Calculation method (if applicable)	Electronic flowmeters are used
QA/QC procedures applied	In Turkey, there is no specific regulation for flow meter calibration. The most relevant regulation related to gas meters is Article 9 of the 'Regulation of Metering and Testing of Metering Systems', which is valid for meters that measure electricity, water, coal, gas, natural gas and current and voltage transformers. Since flow meters employed in this project activity measure biogas generated by the digesters, the article is also deemed valid for this project. However, the manufacturer's recommendation for the calibration of the flow meters will mainly be considered. Flow meters will undergo maintenance/calibration subject to appropriate industry standards. Manufacturer's specifications will also be taken into account. According to paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' (Regulation) of Ministry states that: ' b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years'.

Data / Parameter	$N_{p,LT}$
Data unit	Number
Description	Number of animals of type LT produced annually for the year y

Measured /Calculated /Default:	Measured
Source of data	Project proponents
Value(s) applied	Will be subject to Ex-post monitoring
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline/emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Annually
Measurement/Calculation method (if applicable)	Plant's log
QA/QC procedures applied	Agreements signed with the farmers will be used for cross check.

Data / Parameter	$N_{da,LT}$
Data unit	Number
Description	Number of animals of type LT is alive in the farm in the year y
Measured /Calculated /Default:	Measured
Source of data	Project proponents
Value(s) applied	365
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline/emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Annually

Measurement/Calculation method (if applicable)	Plant's log
QA/QC procedures applied	Agreements signed with the farmers will be used for cross check.

Data / Parameter	T
Data unit	^{o}C
Description	Annual average ambient temperature at project site
Measured /Calculated /Default:	Measured
Source of data	Project proponents
Value(s) applied	Will be subject to Ex-post monitoring
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline/emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Annually
Measurement/Calculation method (if applicable)	Plant's log
QA/QC procedures applied	Cross-Check with the Annual average ambient temperature at project city from public website monthly

Data / Parameter	$MS\%_{j,y}$
Data unit	Fraction
Description	Fraction of manure handled in year y from system j in the project activity

Measured /Calculated /Default:	Measured
Source of data	Project proponents
Value(s) applied	100%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline/emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Annually
Measurement/Calculation method (if applicable)	Plant's log
QA/QC procedures applied	100% is the maximum value and conservative.

Data / Parameter	nd_y
Data unit	Number
Description	Number of days treatment plant was operational in year y
Measured /Calculated /Default:	Measured
Source of data	Project proponents
Value(s) applied	-
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline/emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Daily

Measurement/Calculation method (if applicable)	Plant's log
QA/QC procedures applied	The SCADA system employed at the plant will be used for crosscheck to see how many days the treatment plant is operational.

Data / Parameter	$Q_{biogas,y}$
Data unit	Nm^3 biogas
Description	Amount of biogas collected at the digester outlet in year y
Measured /Calculated /Default:	Measured
Source of data	Project proponents
Value(s) applied	Will be subject to Ex-post monitoring
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission reductions calculations
Monitoring frequency	Once every monitoring period
Measuring/ Reading/ Recording frequency	Continuously measurement by the flow meter. Data to be aggregated monthly and yearly.
Measurement/Calculation method (if applicable)	The volumetric flow measurement refers to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital). Archive electronically during project plus two years
QA/QC procedures applied	In Turkey, there is no specific regulation for flow meter calibration. The most relevant regulation related to gas meters is Article 9 of the 'Regulation of Metering and Testing of Metering Systems', which is valid for meters that measure electricity, water, coal, gas, natural gas and current and voltage transformers. Since flow meters employed in this project activity measure biogas generated by the digesters, the article is also deemed valid for this project. However, the

	manufacturer's recommendation for the calibration of the flow meters will mainly be considered. Flow meters will undergo maintenance/calibration subject to appropriate industry standards. Manufacturer's specifications will also be taken into account. According to paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' (Regulation) of Ministry states that: ' b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years'.

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.