

TEMPLATE

MONITORING REPORT

PUBLICATION DATE 14.10.2020

VERSION v. 1.1

RELATED SUPPORT - **TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

Key Project Information

A - Description of project

B - Implementation of project

C - Description of monitoring system applied by the project

D - Data and parameters

E - Calculation of SDG Impacts

F - Safeguards Reporting

G - Stakeholder inputs and legal disputes

KEY PROJECT INFORMATION

Key Project Information

GS ID (s) of Project (s)	GS 11662
Title of the project (s) covered by monitoring report	Gazişehir LFG Utilization Project
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	V8.0
Version number of the monitoring report	V7.0
Completion date of the monitoring report	26/07/2025
Date of project design certification	20/08/2024
Date of Last Annual Report	n.a.
Monitoring period number	1 st Monitoring Period
Duration of this monitoring period	01/01/2022 – 31/03/2023
Project Representative	Ömer Akyürek (OakDanışmanlık)
Host Country	Republic of Turkey
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	Approved consolidated baseline methodology ACM0001 "Flaring or Use of Landfill Gas" version 19.0.0
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
13 Climate Action	Reduction of CO ₂ emissions	538,985	tCO ₂ e
7 Access to Affordable, reliable, sustainable and	Renewable energy generated	98,693	MWh

modern energy for all			
8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work	Number of jobs created	32	Job created

Table 2 – Product Vintages

		Amount Achieved	
Start Dates	End Dates	SDG 13 (tCO2e)	SDG7 (GWh)
01/01/2022	31/12/2022	408,612	76,825
01/01/2023	31/03/2023	130,373	21,868

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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Gazişehir Utilization Project (hereafter referred as project activity) is developed and operated by Gazişehir Enerji Üretim Sanayi Ticaret A.S. (hereafter referred to as the “project participant”). The proposed activity involves the collection and utilization of the LFG with an electricity component with a maximum installed capacity reaching 13.520 MWe¹. The location of the proposed activity is the Gaziantep landfill site, Turkey. The Gaziantep landfill is the main landfill of the Gaziantep city, which is the 6th largest city in Turkey with its 1.2 million inhabitants. It started operations in 1996 and receives close to 2000 t/day on average. The baseline is a managed landfill with no landfill gas utilization.

The proposed project activity involves the covering of the landfill and the installation of a gas extraction system, capturing the landfill gas and feeding it to gas engines for electricity generation. Total capacity of the proposed project is projected to reach 13.520 MWe once full capacity. The generated electricity will be delivered to the national grid.

Once working with full capacity the project will reach a total of 11 engines. The activity has generated 95 GWh/year of electricity and delivered to the national grid and 539,970 tCO₂e emission reductions during the first monitoring period which covers the period between 01/01/2022 and 31/03/2023.

PD shall not claim VERs for the same vintage in another standard other than GS.

¹ Energy Generation License obtained from EMRA (Energy Market Regulatory Authority) is available to the VVB.

A.2. Location of project

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Company HQ: Kızılırmak Mah. Dumlupınar Bulvarı No: 9A/151 Çankaya / ANKARA

Facility: Bağlarbaşı Mah. 105200 Nolu Küme Evler No:104 Şahinbey² / GAZİANTEP

The closest village to the project is in Akbulut Mahallesi.

Latitude: 36,983642

Longitude: 37,3989812



Figure 1 Location of the project activity

A.3. Reference of applied methodology

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Latest version of methodologies and applicable tools have been applied at the time of first submission of the Project to Gold Standard for registration.

Applied approved baseline and monitoring methodologies:

² Ref: Generation License

- Approved consolidated baseline methodology ACM0001 "Flaring or Use of Landfill Gas" version 19.0.0;

Used tools:

- "Combined tool to identify the baseline scenario and demonstrate the additionality" version 07.0.0;
- "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" version 03.0.0
- "Emissions from solid waste disposal sites" version 08.0;
- "Tool to calculate the emission factor for an electricity system" Version 03.0.0,
- 'Tool to calculate baseline, project and/or leakage emissions from electricity consumption' version 03.

For more information regarding the methodology please refer to

<https://cdm.unfccc.int/methodologies/index.html>

A.4. Crediting period of project

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Start of the first crediting period: 01/01/2022

End of the first crediting period: 31/12/2026

The expected total length of the crediting period is 5 years with 2 times renewable with a total of 15 years in line with as per para 4.4.2 of Renewable Activity

Requirement.

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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The project activity is operational with a total installed capacity of 13.52 MWe capacity, including 11 gas engines used to generate electricity for the national grid system. The project activity has commissioned all engines within this monitoring period. The first engine was commissioned on 21.06.2021 however the LFG extraction and electricity generation started on 21/01/2022. For simplicity, the first crediting period has been determined as 01/01/2022 which also marks the start of the first crediting period. Important milestones of the project activity has been summarized as follows.

Date	Event
29/06/2021	Commissioning of GM1 (1X1.413 MWe)
01/01/2022	Start of first crediting period
13/01/2022	Commissioning of GM2-GM3-GM4 (3X1.413 MWe)
11/03/2022	Commissioning of GM7-GM8-GM9-GM10-GM11 engines (5X1.131 MWe)
30/11/2022	Commissioning of GM5-GM6 (1X1.413 MWe + 1X0.800 MWe)
16/04/2022	LSC Meeting
01/01/2022	Start of LFG extraction and electricity generation
31/12/2026	End of 1 st crediting period

B.1.1 Forward Action Requests

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No Forward action Requests are applicable to the Monitoring Period.

B.2. Post-Design Certification changes

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B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

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There are no temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline.

B.2.2. Corrections

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No corrections are applied within this monitoring period.

B.2.3. Changes to start date of crediting period

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No changes to the start date of crediting period have been applied.

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

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No permanent changes from the design certified monitoring plan, applied methodology or applied standardized baseline.

B.2.5. Changes to project design of approved project

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No changes to project design of approved project.

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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The monitoring system has been based on the procedures required as per the approved methodology ACM0001.

The electricity meters are bidirectional and measure both the electricity generated by the project activity and the electricity consumed by the facility. The meters are sealed by the electricity distribution/transmission company and the Project Participant cannot intervene with the devices. The main meter for the monitoring of the electricity import and export is at grid connection.

There are two official and viable sources where the meter readings could be extracted from. One is the State Regulated Automated Meter Reading System (OSOS) and the other source is the monthly protocols confirmed by the distribution company. For clarity, State Regulated Automated Meter Reading System will be considered as the main source for this parameter while monthly protocols could be used for cross check. Meter readings are also the basis of invoicing for the electricity sales from the proposed project activity. The electricity meters are bidirectional and will measure both the imported and exported electricity from and to the grid.

The calculation of GS VERs for the monitoring period is carried out through a separate spreadsheet. The data is archived and stored electronically during the crediting period and two years after.

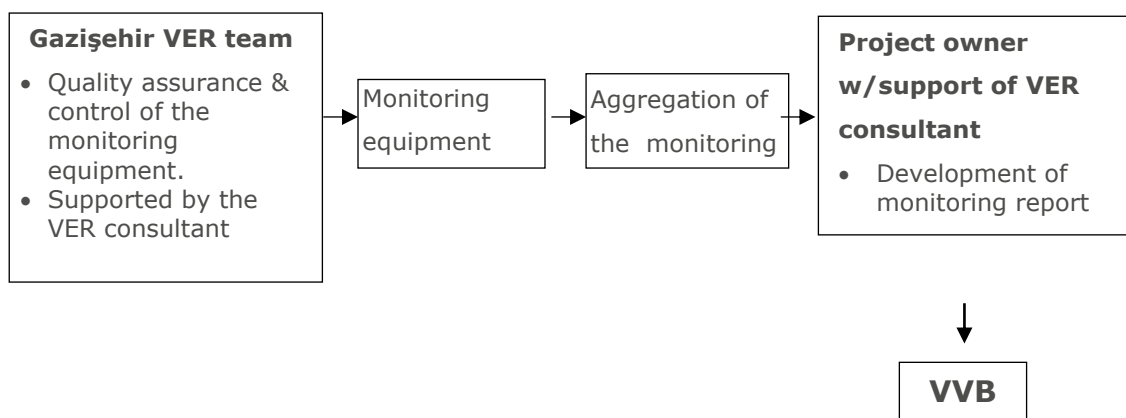
Roles and responsibilities

The responsible person for the monitoring of the Project is the site manager. The Project owner will appoint a site manager who will collect the data. The data will be processed and reported in agreement with the monitoring plan by the site manager.

The site manager is responsible for overseeing the implementation of the monitoring procedure. Competency requirements for these tasks will be applied to ensure that the site manager is able to implement and/or supervise this procedure. The site manager will be responsible of the emission reduction calculations and the preparation of necessary documents for verification.

The site manager is also responsible for data collection, checking instrumentation, record keeping, data handling and data processing, filing, reporting, organizing repair and maintenance of monitoring equipment. The site manager will ensure that the personnel of the Project Owner acquire the skills to carry out these tasks properly through capacity building practices and trainings.

In the diagram below the organization of monitoring management and data application is presented.



Involvement of Third Parties

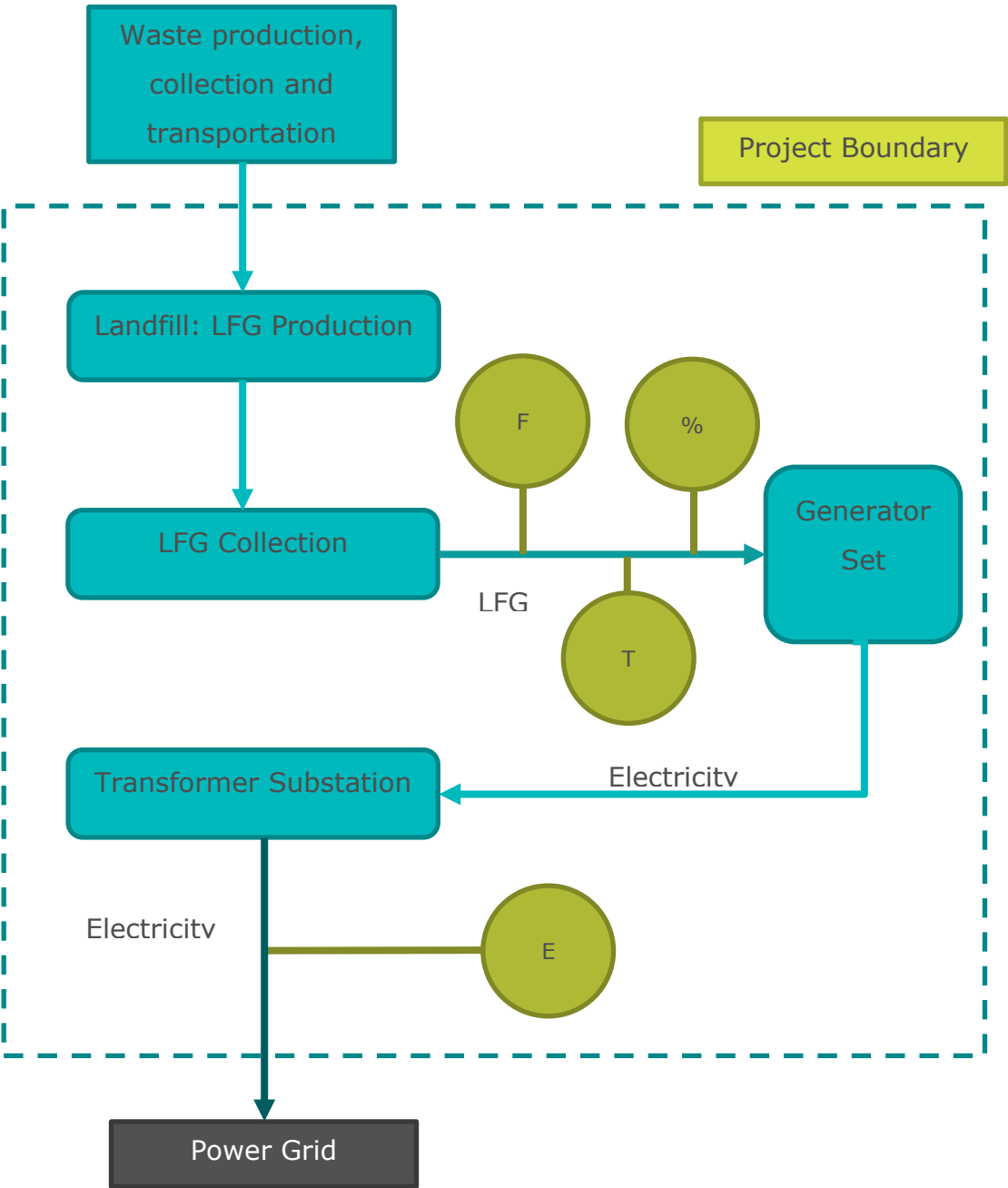
Support and consultancy regarding the development of monitoring reports is provided by Ömer Akyürek (OakDanışmanlık).

Maintenance and calibration of meters

All measurement devices that are used in monitoring are subject to a quality control procedure that will include regular maintenance and calibration in agreement with legal and/or manufacturer requirements. In accordance with the "Regulation on "Measurement and Measuring Tools", gaseous stream meters have to be calibrated within a frequency of once per 10 years³.

³ Ref: <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=> (Article 9.b)

Monitoring System Flow Chart



SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

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SDG13

Data/parameter	ID.13.1 / OX_{top_layer}
Unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal sites"
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	As referred under ACM0001
Purpose of data	Calculation of baseline emissions
Additional comment	Applicable to Step A defined under ACM0001

Data/parameter	ID.13.2 / GWP_{CH_4}
Unit	tCO ₂ e/tCH ₄
Description	Global Warming Potential of CH ₄
Source of data	IPCC AR5
Value(s) applied	28
Choice of data or Measurement methods and procedures	As referred under ACM0001
Purpose of data	Calculation of baseline emissions

Additional comment	-
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Data/parameter	ID.13.3 / n_{PJ}
Unit	Dimensionless
Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data	ACM0001
Value(s) applied	50%
Choice of data or Measurement methods and procedures	Default Value.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/parameter	ID.13.4 / R_u
Unit	Pa.m ³ /kmol.K
Description	Universal ideal gases constant
Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
Value(s) applied	8314
Choice of data or Measurement methods and procedures	As referred under "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	ID.13.5 / MM_{CH_4}
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Unit	kg/kmol								
Description	Molecular mass of CH ₄								
Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream								
Value(s) applied	<table><tr><th>Compound</th><th>Structure</th><th>Molecular mass (kg/kmol)</th></tr><tr><td>Methane</td><td>CH₄</td><td>16.04</td></tr></table>			Compound	Structure	Molecular mass (kg/kmol)	Methane	CH ₄	16.04
Compound	Structure	Molecular mass (kg/kmol)							
Methane	CH ₄	16.04							
Choice of data or Measurement methods and procedures	As referred under “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”								
Purpose of data	Calculation of baseline emissions								
Additional comment									

Data/parameter	ID.13.6 / P_n		
Unit	Pa		
Description	Total pressure at normal conditions		
Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream		
Value(s) applied	101325 Pa		
Choice of data or Measurement methods and procedures	As referred under "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"		
Purpose of data	Calculation of baseline emissions		
Additional comment			

Data/parameter	ID.13.7 / T_n		
Unit	K		
Description	Temperature at normal conditions		

Source of data	Tool to determine the mass flow of a greenhouse gas in a gaseous stream
Value(s) applied	273.15 K
Choice of data or Measurement methods and procedures	As referred under "Tool to determine the mass flow of a greenhouse gas in a gaseous stream"
Purpose of data	Calculation of baseline emissions
Additional comment	

Data/parameter	ID.13.8 / φ_{default}
Unit	-
Description	Default value for the model correction factor to account for model uncertainties
Source of data	Emissions from solid disposal sites
Value(s) applied	0.75
Choice of data or Measurement methods and procedures	As referred under "Emissions from solid disposal sites"
Purpose of data	Calculation of baseline emissions
Additional comment	The proposed project activity falls under Application A

Data/parameter	ID.13.9 / OX
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Emissions from solid disposal sites. Based on extensive review of published literature on this subject, including

	the IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	As referred under "Emissions from solid disposal sites"
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	ID.13.10 / F
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	Upon biodegradation, organic material is converted to a mixture of methane and carbon dioxide

Data/parameter	ID.13.11 / DOC_{f,default}
Unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that can decompose in the SWDS
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5

Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	The proposed project activity falls under Application A

Data/parameter	ID.13.12 / MCF_{default}
Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	1.0
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	The baseline falls under the definition "anaerobic managed solid waste disposal"

Data/parameter	ID.13.13 / DOC _j					
Unit	-					
Description	Fraction of degradable organic carbon in waste type j (weight fraction)					
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table2.4 and Table 2.5)					
Value(s) applied	The following values for the different waste types have been applied: <table><tr><th>Waste type j</th><th>DOC_j (% wet waste)</th></tr><tr><td>Wood and wood products</td><td>43</td></tr></table>		Waste type j	DOC _j (% wet waste)	Wood and wood products	43
Waste type j	DOC _j (% wet waste)					
Wood and wood products	43					

	Pulp, paper and cardboard	40
	Food, food waste, beverages and tobacco	15
	Textiles	24
	Garden, yard and park waste	20
	Glass, plastic, metal, other inert	0
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites	
Purpose of data	Calculation of baseline emissions	
Additional comment	-	

Data/parameter	ID.13.14 / k _j																	
Unit	1/yr																	
Description	Decay rate for the waste type j																	
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (Volume 5, Table 3.3)																	
Value(s) applied	The following values for the different waste types have been applied: <table><tr><th colspan="2" rowspan="2">Waste type j</th><th>Boreal and Temperate (MAT < 20°C)</th></tr><tr><th>WET(MAP/PET >1)</th></tr><tr><td rowspan="2">Slowly degradable</td><td>Pulp, paper, cardboard</td><td>0.06</td></tr><tr><td>Wood, wood products and straw</td><td>0.03</td></tr><tr><td>Moderately degradable</td><td>Other (non-food) organic putrescible garden and park waste</td><td>0.10</td></tr><tr><td>Rapidly degradable</td><td>Food, food waste, sewage sludge, beverages and tobacco</td><td>0.185</td></tr></table>			Waste type j		Boreal and Temperate (MAT < 20°C)	WET(MAP/PET >1)	Slowly degradable	Pulp, paper, cardboard	0.06	Wood, wood products and straw	0.03	Moderately degradable	Other (non-food) organic putrescible garden and park waste	0.10	Rapidly degradable	Food, food waste, sewage sludge, beverages and tobacco	0.185
Waste type j		Boreal and Temperate (MAT < 20°C)																
		WET(MAP/PET >1)																
Slowly degradable	Pulp, paper, cardboard	0.06																
	Wood, wood products and straw	0.03																
Moderately degradable	Other (non-food) organic putrescible garden and park waste	0.10																
Rapidly degradable	Food, food waste, sewage sludge, beverages and tobacco	0.185																
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites																	
Purpose of data	Calculation of baseline emissions																	

Additional comment	MAT is 15 C https://tr.weatherspark.com/y/100231/Gaziantep-T%C3%BCrkiye-Ortalama-Hava-Durumu-Y%C4%B1l-Boyunca) PET is 3.96 mm monthly average (Urfa values have been considered) https://dergipark.org.tr/en/download/article-file/2425367 MAP is 47 mm monthly average https://tr.weatherspark.com/y/100231/Gaziantep-T%C3%BCrkiye-Ortalama-Hava-Durumu-Y%C4%B1l-Boyunca
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Data/parameter	EF_{grid,CM,y}
Unit	tCO ₂ /MWh
Description	Combined Margin Emission Factor
Source of data	Emission factors are derived from "Informative Note on Emission Factor of Turkey's National Electricity Grid" (ETKB-EVÇED-FRM-039 Rev.02) published by the Ministry of Energy and Resources.
Value(s) applied	0.5552
Choice of data or Measurement methods and procedures	The value is fixed for the crediting period
Purpose of data	Calculation of Baseline and Project Emissions
Additional comment	

Data/parameter	EF_{grid,OM,y}
Unit	tCO ₂ /MWh
Description	Operating Margin Emission Factor
Source of data	Emission factors are derived from "Informative Note on Emission Factor of Turkey's National Electricity

	Grid" (ETKB-EVÇED-FRM-039 Rev.02) published by the Ministry of Energy and Resources.
Value(s) applied	0.7424
Choice of data or Measurement methods and procedures	The value is fixed for the crediting period
Purpose of data	Calculation of Baseline and Project Emissions
Additional comment	

Data/parameter	EF_{grid,BM,y}
Unit	tCO ₂ /MWh
Description	Combined Margin Emission Factor
Source of data	Emission factors are derived from "Informative Note on Emission Factor of Turkey's National Electricity Grid" (ETKB-EVÇED-FRM-039 Rev.02) published by the Ministry of Energy and Resources.
Value(s) applied	0.3680
Choice of data or Measurement methods and procedures	The value is fixed for the crediting period
Purpose of data	Calculation of Baseline and Project Emissions
Additional comment	

D.2 Data and parameters monitored

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SDG 13

Data / Parameter	ID.13.16 / Management of SWDS
Unit	-
Description	Management of SWDS

Source of data	One of the following sources could be used: - Original design of the landfill - Technical specifications for the management of the SWDS - Local or national regulations
Value(s) applied	n.a.
Measurement methods and procedures	Project participants will refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SEDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	ID.13.17 / $V_{t,wb}$	
Unit	m ³ wet gas/h	
Description	Volumetric flow of the gaseous stream in time interval t on a wet basis	
Source of data	Volumetric flow meter	
Value(s) applied	47,283,278 m3	
	Month	Monthly Volumetric flow of the gaseous stream (m3)
	January 2022	666,757
	February 2022	1,798,209
	March 2022	2,011,083
	April 2022	3,332,920
	May 2022	3,427,866
	June 2022	1,716,544
	July 2022	3,732,033
	August 2022	3,582,415
	September 2022	3,556,569
	October 2022	3,720,802
	November 2022	3,935,600
	December 2022	4,050,611
	January 2023	4,297,859

	February 2023	3,918,482
	March 2023	3,535,528
	TOTAL	47,283,278
Measurement methods and procedures	Volumetric flow will be monitored with a volumetric flow meter. $V_{t,wb}$ measures flow for normal conditions ⁴ .	
Monitoring frequency	Hourly	
QA/QC procedures	Calibration has been conducted on 17/03/2021 Accuracy Specifications are as follows: +/- 1%	
Purpose of data	Calculation of baseline emissions	
Additional comment	In line with the applicable law and regulations, gas meters have a , frequency of 10 years.	

Data / Parameter	ID.13.18 / $v_{CH_4,t,wb}$	
Unit	m ³ gas CH ₄ / m ³ wet gas	
Description	Volumetric fraction of CH ₄ in a time interval t on a wet basis	
Source of data	The volumetric fraction of CH ₄ will be monitored with a gas analyzer	
Value(s) applied	Hourly readings are presented to the VVB through ER Calculation	
Measurement methods and procedures	Continuous gas analyzer.	
Monitoring frequency	Hourly	
QA/QC procedures	Calibration has been conducted on 25/05/2021 Accuracy Specifications are as follows: +/- 1.8%	

⁴The Project uses EPI Series 540 Inline thermal mass flow meter that provides real-time flow measurement with a sensor that is both temperature and pressure corrective. <https://epiflow.com/products/val/insertion/val-lm#processParameters>

Purpose of data	Calculation of baseline emissions
Additional comment	In line with the applicable law and regulations, gas meters have a calibration frequency of 10 years.

Data / Parameter	ID.13.20 / EC_{BL,y}
Unit	MWh
Description	Net amount of electricity generated using LFG by the project activity in year y
Source of data	Electricity meters
Value(s) applied	98,693 MWh
Measurement methods and procedures	The quantity of net electricity generation supplied to the grid by the project plant will be monitored based on the main meter (also referred as TEİAŞ meters) readings.
Monitoring frequency	Continuous monitoring and monthly recording.
QA/QC procedures	Electricity meters are checked, installed and sealed to the site by TOROS Elektrik Dağıtım A.Ş. which is the Distribution Company on 29/06/2021 (Meter initial installation protocol is available to the VVB). Metering equipment: KOHLE AELTF21 Accuracy Mode C (0,5)⁵ The electricity meters are used to measure the net electricity exported to the grid and used for billing purposes. There are two official and viable sources where the meter readings could be extracted from. One is the State Regulated Automated Meter Reading System (OSOS) and the other source is the monthly protocols confirmed by the distribution company. For clarity, State Regulated Automated Meter Reading System will be considered as the main source for this parameter while monthly protocols could be used for cross check.
Purpose of data	Calculation of baseline emissions

⁵ Ref: <https://www.turkiyesolarmarket.com.tr/urunler/solar-malzemeler/akim-trafolu-aeltf21-cift-yonlu-sayac>

Additional comment	-
Data / Parameter	ID.13.21 / EC_{PJ,y}
Unit	MWh
Description	Quantity of electricity consumed by the project activity.
Source of data	Electricity meters
Value(s) applied	5 MWh
Measurement methods and procedures	The quantity of electricity consumed by the project plant will be monitored based on the main meter (also referred as TEİAŞ meters) readings.
Monitoring frequency	Continuous monitoring and monthly recording.
QA/QC procedures	Electricity meters are checked, installed and sealed to the site by TOROS Elektrik Dağıtım A.Ş. which is the Distribution Company on 29/06/2021 (Meter initial installation protocol is available to the VVB). Metering equipment: KOHLE AELTF21

	Accuracy Mode C (0,5)⁶ The electricity meters are used to measure the net electricity exported to the grid and used for billing purposes. There are two official and viable sources where the meter readings could be extracted from. One is the State Regulated Automated Meter Reading System (OSOS) and the other source is the monthly protocols confirmed by the distribution company. For clarity, State Regulated Automated Meter Reading System will be considered as the main source for this parameter while monthly protocols could be used for cross check.
Purpose of data	Calculation of project emissions
Additional comment	The quantity of electricity consumed is monitored by the same equipment, which monitors the net amount of electricity generated by the project activity.

Data / Parameter	ID.27 / TDL_y
Unit	%
Description	Average technical transmission and distribution losses
Source of data	TEIAS Statistics ⁷
Value(s) applied	13.8%.
Measurement methods and procedures	Will be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the project activity is connected. The distribution losses can either be calculated by the project participant or be based on references from utilities, network operators or other official documentation (such as protocols for electricity meter readings)
Monitoring frequency	Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
QA/QC procedures	-

⁶ Ref: <https://www.turkiyesolarmarket.com.tr/urunler/solar-malzemeler/akim-trafolu-aelft21-cift-yonlu-sayac>

⁷ Ref: <https://webim.teias.gov.tr/file/01638a5d-94aa-484b-9c48-b4c86fa99469?download>

Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data / Parameter	ID.SDG.8.a / Quantification of employment
Unit	#
Description	# of jobs created
Source of data	Social security records.
Value(s) applied	32
Measurement methods and procedures	By checking the social security records of personnel
Monitoring frequency	Each verification
QA/QC procedures	n.a.
Purpose of data	Quantification of SDG Impact
Additional comment	The numbers mentioned are for permanent employees with various responsibilities within the project activity that which is a result of employment opportunity created by the project activity.

Data / Parameter	ID.SDG.8.b / Quality of employment
Unit	#
Description	# of occupational health and security trainings
Source of data	Training log book.
Value(s) applied	All personal (32) have been provided health and security trainings. Details have been provided to the VVB.
Measurement methods and procedures	Check of logs
Monitoring frequency	Each verification
QA/QC procedures	n.a.
Purpose of data	Quantification of SDG Impact
Additional comment	n.a.

D.3. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
ID.13.17	47,283,278 Sm3	n.a.

ID.13.18	%57 (average) ⁸	n.a.
ID.13.20	98.693 MWh	n.a.
ID.13.18	5 MWh	n.a.
ID.13.19	13.8%	n.a.
ID.SDG.8	25	n.a.

D.4. Implementation of sampling plan

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There are no data or parameter monitored to be determined by a sampling approach.

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

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SDG 13, 7, 11

Baseline emissions are calculated based on the registered PDD. Since there are no heat generation or natural gas usage in the baseline scenario, only baseline emissions from methane emissions from SWDS (STEP A) and electricity generation (STEP B) will be considered. The baseline emissions are calculated based on the following formula:

$$BE_y = BE_{CH_4,y} + BE_{EC,y}$$

Where:

BE_y	Baseline emissions in year y (tCO ₂ e/yr)
$BE_{CH_4,y}$	Baseline emissions of methane from SWDS in year y (tCO ₂ e/yr)
$BE_{EC,y}$	Baseline emissions associated with electricity generation in year y

Step (A): Baseline emissions of methane from the SWDS ($BE_{CH_4,y}$)

⁸ The value is the average of hourly readings and presented as a representative number. Please refer to the ER calculation sheet for hourly readings.

Baseline emissions of methane from the SWDS are determined as follows, based on the amount of methane that is captured under the project activity. In addition, the effect of methane oxidation that is present in the baseline and absent in the project is taken into account as follows;

$$BE_{CH_4,y} = (1 - OX_{top-layer}) * (F_{CH_4,PJ,y} - F_{CH_4,BL,y}) * GWP_{CH_4}$$

Where:

- $BE_{CH_4,y}$ Baseline emissions of LFG from SWDS in year y (tCO₂e/yr)
- $OX_{top-layer}$ Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
- $F_{CH_4,PJ,y}$ Amount of methane in the LFG that which is flared and/or used in the project activity in year y (tCH₄/yr)
- $F_{CH_4,BL,y}$ Amount of methane in the LFG that would be flared in the baseline in year y (tCH₄/yr)

During the crediting period $F_{CH_4,PJ,y}$ is determined as the amount of methane used in power plant(s) as follows:

$$F_{CH_4,PJ,y} = F_{CH_4,EL,y}$$

$F_{CH_4,PJ,y}$ is determined using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream".

The tool provides procedures to determine the following parameter:

Parameter	SI Unit	Description
$F_{i,t}$ ⁹	kg/h	Mass flow of greenhouse gas i (CO ₂ , CH ₄ , N ₂ O, SF ₆ or a PFC) in the gaseous stream in time interval t.

⁹ The parameter ($F_{i,t}$) under the "Tool to determine the mass flow of a greenhouse gas in gaseous stream" corresponds to the parameter ($F_{CH_4,EL,y}$) under ACM0001.

The mass flow of CH₄ (F_{CH₄,t}) is determined as follows:

$$F_{CH_4,t} = V_{t,db} * v_{CH_4,t,db} * \rho_{CH_4,t}$$

Where:

F _{CH₄,t}	Mass flow of CH ₄ in the gaseous stream in time interval t (kg gas/h)
V _{t,wb}	Volumetric flow of the gaseous stream in time interval t on a wet basis (m ³ wet gas/h)
v _{CH₄,t,wb}	Volumetric fraction of CH ₄ in the gaseous stream in a time interval t on a wet basis (m ³ gas CH ₄ /m ³ wet gas)
ρ _{CH₄,n}	Density of CH ₄ in the gaseous stream in time interval t (kg gas CH ₄ /m ³ gas CH ₄)

As the measuring device converts the flow direct to normal conditions, no separate measurement of pressure and temperature is conducted for the project activity and ρ_{CH₄,t} is determined as 0.0007157 kg gas CH₄/ m³ gas CH₄.

In accordance with the registered Project Design;

$$F_{CH_4,BL,y}=0$$

The following table summarizes the monitoring results for this monitoring period.

Table 2 Summary of monitoring results for this monitoring period

Parameter	Description	Monitoring result
r		
BE _y	Baseline emissions (*)	539,970 tCO ₂ e
BE _{CH₄,y}	Baseline emissions of methane from SWDS	476,633 tCO ₂ e
BE _{EC,y}	Baseline emissions associated with electricity generation	63,356 tCO ₂ e
GWP _{CH₄}	Global Warming Potential of CH ₄	28

$OX_{top-layer}$	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)	0.1
$F_{CH_4,PJ,y}$	Amount of methane in the LFG that which is flared and/or used in the project activity	18,914 tCH ₄
$F_{CH_4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline	0 tCH ₄
$V_{t,wb}$	Volumetric flow of the gaseous stream (**)	47,283,278 m ³ gas
$V_{CH_4,t,wb}$	Volumetric fraction of CH ₄ in the gaseous stream	57% m ³ gas CH ₄ /m ³ ¹⁰
$\rho_{CH_4,t}$	Density of CH ₄ in the gaseous stream	0.0007157 kg gas CH ₄ / m ³ gas CH ₄

Detailed calculations are presented under the Ex-Ante Calculation Excel sheet available to the VVB.

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

The baseline emissions associated with electricity generation in year y ($BE_{EC,y}$) is calculated in accordance with the Methodological tool "Baseline, project and/or leakage emissions from electricity consumption and monitoring electricity generation" version 3. The electricity source k in the tool corresponds to the sources of electricity generated by the grid, which is identified as the most plausible baseline scenario. $EC_{BL,k,y}$ in the tool is equivalent to the net amount of electricity generated using LFG in year y ($EG_{PJ,y}$).

Generic approach

¹⁰ The value is provided as an average of the entire monitoring period.

In the generic approach, baseline emissions from consumption of electricity are calculated based on the quantity of electricity consumed, an emission factor for electricity generation and a factor to account for transmission losses, as follows:

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

Where:

$BE_{EC,y}$	Baseline emissions from electricity consumption in year y (tCO ₂ e/yr)
$EC_{BL,k,y}$	Net amount of electricity generated using LFG in year y (MWh/yr)
$EF_{EL,k,y}$	Emission factor for electricity generation source k in year y ((tCO ₂ e/MWh)
$TDL_{k,y}$	Average technical and transmission and distribution losses for providing electricity to source k in year y
k	the sources of electricity generated by the grid

Turkish Ministry of Energy and Natural Resources calculates and publish combined emission factors periodically. The PP opted to use the most up to date official Emission Factor announced by the Ministry.

The combined margin emissions factor is as follows:

$$EF_{grid,CM,y}=0.5552 \text{ tCO}_2/\text{MWh}$$

The following table summarizes the monitoring results for this monitoring period.

$BE_{EC,y}$	Baseline emissions from electricity consumption	62,356 tCO ₂ e
$EC_{BL,k,y}$	Net amount of electricity generated using LFG (***)	98,693 MWh
$EF_{EL,k,y}$	Emission factor for electricity generation	0.5552 tCO ₂ /MWh
$TDL_{k,y}$	Average technical and transmission and distribution losses for providing electricity	13,8 %

(***) This parameter also represents SDG 7 Impact

Detailed calculations are presented under the Ex-Ante Calculation Excel sheet available to the VVB.

E.2. Calculation of project value or estimation of project situation of each SDG Impact

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Project Emissions

In accordance with ACM0001 "Flaring or Use of Landfill Gas", the project emissions are calculated as follows:

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

Where:

$PE_{EC,y}$ Emission from consumption of electricity due to the project activity in year y (tCO₂e/yr).

Since there are no consumption of fossil fuels due to the project activity, for the purpose other than electricity generation, there are no emissions from fossil fuel consumption and therefore $PE_{FC,y}$ is equal to "0" and has not been included in equation.

The project emissions from consumption of electricity by the project activity $PE_{EC,y}$ shall be calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". When applying the tool, electricity sources j in the tool corresponds to the sources of electricity consumed due to the project activity.

$PE_{EC,y}$ is calculated as follows:

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

Where:

$PE_{EC,y}$ Project emissions from electricity consumption in year y (tCO₂e/year)

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

$EF_{EL,j,y}$ Emission factor for electricity generation for source j in year y (tCO₂e/MWh)

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

The following table summarizes the monitoring results for this monitoring period.

$PE_{EC,y}$	Project emissions from electricity consumption	3 tCO ₂ e
$EC_{BL,k,y}$	Quantity of electricity consumed by the project electricity	5 MWh
$EF_{EL,k,y}$	Emission factor for electricity generation	0.5552 tCO ₂ /MWh
$TDL_{k,y}$	Average technical and transmission and distribution losses for providing electricity	13,8 %

Between 2-5% of volume of the landfill gas is known to contain sulfides . The amount of sulfide will be calculated based on the amount of landfill gas combusted in the engines as followed:

$$V \text{ sulfide destroyed} = V_{LFG} \text{ destroyed} * 0.005$$

Where “V” represents the volume in m3. A conservative approach of 0.5% is set for the sulfide content.

E.3. Calculation of leakage

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In accordance with ACM0001 “Flaring or Use of Landfill Gas”, no leakage effects are accounted.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Reduction of CO2 emissions	538,989	3	538,985 ¹¹
7	Renewable energy generated	0	98,693	98,693
8	Number of jobs created	0	25	25

¹¹ The value is rounded down to the nearest whole number

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated ¹² in ex ante calculation of approved PDD for this monitoring period	Actual values achieved during this monitoring period
13	366,970 tCO2/y	538,985 tCO2/y
7	106,470 GWh/y	98,693 GWh/y
8	25	32

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

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SDG 7 has successfully fulfilled the impact of the project activity while SDG 8 has Even surpassed the expectation positively. The electricity generation was slightly less then expected. SDG13 show an increase in ex-ante estimations. This is due to the fact that ex-ante and ex-post are not the same calculations where ex-ante is based on a theoretical model (FOD model) with a lot of default estimations where ex-ante is based on actual readings. One significant impact is the efficiency of the gas collection system. The ex-ante calculation is based on the default efficiency value of 50% (nPJ) where the actual gas collection system is evidently more efficient.

The impact of this difference is limited and is within the sensitivity ranges due to the fact that the additionality is based on financial indicators calculated based on income, and income is a variant of revenue from electricity generation. The actual electricity generated is 7% lower then anticipated.

The ex-ante estimations of SDG impact have been compared with the actual figures adjusted to a 12 month value.

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

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¹² Figures are revised to represent a 15 month value for comparison.

It is observed that the difference is very little around 3% - %4 in all SDGs except for SDG 8 number of new jobs created which has performed 28% better than estimated ex-ante.

SECTION F. SAFEGUARDS REPORTING

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There are no safeguard principles added to the monitoring plan.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

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No inputs and grievances have been received via continuous input and grievance mechanism during the monitoring period.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

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There are no stakeholder mitigations monitored.

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

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There has been no legal contest that has arisen with the project activity during the monitoring period.

Revision History

Version	Date	Remarks
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1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption