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

Key Project Information

GS ID (s) of Project (s)	GS935
Title of the project (s) covered by monitoring report	Samsun Landfill Gas to Energy Project, Turkey
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	v09 21/01/2020
Version number of the monitoring report	07
Completion date of the monitoring report	20/12/2021
Date of project design certification	24/06/2011
Date of Last Annual Report	n.a.
Monitoring period number	4th Monitoring period
Duration of this monitoring period	05/09/2019 to 30/04/2021
Project Representative	Cagla Balci Eris-Rüzgar Danışmanlık
Host Country	Turkey
Activity Requirements applied	☐ Community Services Activities X Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	ACM0002 Version 19 ACM0001 Version 19
Product Requirements applied	x 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
SDG 7 : Affordable and Clean Energy	T: 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix I: 7.2.1 "Renewable energy share in the total final energy consumption	83,064	MWh/per monitoring period
SDG 8 : Decent Work and Economic Growth	T: 8.5 By 2030 achieve full and productive employment and decent work for all 8.5.2 Unemployment rate, by sex, age and persons with disabilities	The project provides 29 employees	People
SDG 8 : Decent Work and Economic Growth	T: 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious 8.8.2 Increase in national compliance of labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual sources and national legislation, by sex and migrant status	26 people trained on health and safety issues during this monitoring period	All
SDG 13:Climate Action	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and	330,699	tCO_2e/per monitoring period

	technology transfer, and development actions" and following		

Table 2 – Product Vintages

		Amount Achieved		
Start Dates	**End Dates**	**VERs**		**...**
05/09/2019	31/12/2019	54,203		
01/01/2020	31/12/2020	197,803		
01/01/2021	30/04/2021	78,693		
05/09/2019	30/04/2021	330,699		

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

Samsun Landfill Gas is invested by "Samsun Aydan Enerji Üretim ve Tic. A.Ş". The landfill site of Samusn is situated on a hill 4 km north-east of the city center of Samsun with about 450,000 population. Operator of the landfill is the municipality. The old landfill has been filled in 2008 and the new landfill site, where the project is situated at, is in use since 2008. The first filled lot of the Samsun disposal area is about 37,000m^2 from 6m waste filling level in north west and south east ends of the landfill in the middle - direction north east it is increasing to a level of about 18m in the south west around 12-15m actual highness. A main pipe for is prepared from the leachate tank under the road and leads ends at a prepared area for the gen sets and booster station of about 300m^2. In 2009, the expected disposed waste amount was 182,500[1] tonnes, corresponding to an average of 500 t/day.

[1] Samsun Avdan Technical Feasibility Report

The capacity increased to 8.4 MWe on dd. 24/03/2016.[2]. The project will collects the wastes regularly and will help the decrease irregular distribution areas in Turkey.

Commissioning of the additional capacity is 22/05/2018

The project also has Biogas application, but it is not added to project boundary. The sime pipe has biogas and LFG gas. Calculations will be done through the Biogas and LFG Gas amounts. Both LFG and Biogas sides have their own flowmeters. The electricity energy produced from LFG is calculated based on conservative assumptions and measurements.

Prior to the proposed project activity, the wastes are left to decay within Samsun landfill site and methane is emitted to the atmosphere without any control or utilization. The baseline scenario is the same as the existing scenario, i.e. atmospheric release of the landfill gas and power supply by the grid. With the proposed project, LFG generated in the involved landfill site will be captured by newly constructed LFG collection and utilization system. All of the captured LFG will be combusted to produce electricity for export to the grid. A flare device installed to destroy excess LFG when the LFG generation amount exceeds the utilization capacity of the LFG power generators.

Exact timing and installed power of this expansion work depends on the actual LFG generation on site, the Project design as of commissioning phases;

Phase 1: Capacity 2.4 MWe – 09/03/2012 (1st and 2nd Gas Engines (2 x 1.2 Mwe)
Phase 2: Capacity 3.6 MWe – 27/09/2013 (3th Gas Engine (1.2 Mwe)
Phase 3: Capacity 6.0 MWe – 27/09/2014 (4th and 5th Gas Engines (2x 1.2 Mwe)
Phase 4: Capacity 8.4 MWe – 22/05/2018 (6th and 7th Gas Engines (2x 1.2 Mwe)

The Project activity has been located within the already existing landfill site, where the waste is transported from the city and the leachate is collected and stored. The Municipality has leased the building plot within the landfill site to the Project owner, on which the Project owner can build and operate the Project.

[2] License upgrade – 24/03/2016

The proposed Project does not involve any operations on site, it will solely install the vertical and horizontal pipes to collect the LFG efficiently and generate power from collected LFG.

The extraction system shall include a network of vertical gas extraction wells, de-watering units and gas transport pipelines connected to a main collector system. The gas has been driven to gas engine and the flare via an aspiration system. "Samsun Aydan Enerji Üretim ve Tic. A.Ş" also has Biogas utilization application but this part has not been included to project boundary. Biogas and LFG blends in same pipe and goes to the electricity generators.

The electricity energy produced from LFG is calculated based on conservative assumptions and measurements. The generation will depend on the quantity of the LFG.

The project has supply the Turkish National Grid (hereafter referred to as „the Grid") with zero emission energy, generated by the LFG . Electricity currently generated by the grid is relatively carbon intensive, with a combined margin emission factor of 0.3953 tCO_2 tCO2/MWh. The connection point of the project activity is Kavak 31.5 KV TM-39 TRA-DM.

Total emission reductions achieved in this monitoring period: **330,699** tCO_2[3]

Relevant dates for the project activity: The project activity milestones are:

Date	Action
02/11/2009	Feasibility study is submitted to the project owner.
04/01/2010	First talks with the carbon consultant about carbon finance
01/06/2010	Publication of the tender by Samsun Metropolitan Municipality
18/06/2010	Tender organisation by Samsun Metropolitan Municipality
28/07/2010	Contract signature date with the Municipality
02/08/2010	Carbon development contract signature date
21/08/2010	First equipment order date
13/09/2010	Mobilization on site

[3] The total emission reduction value has been rounded down for conservativeness. The excel ER file has been provided to the DOE.

24/09/2010	Energy Market Regulatory Authority (EMRA) License application
06/09/2011	First loan agreement - 9207368
18/05/2011	License awarded for 2.4 MWe
09/03/2012	Commissioning of the power plant
06/12/2012	Amendment to the municipality law 6360
04/06/2013	Capacity increase to 3.6 MWe - License upgrade
27/09/2013	Commissioning of the additional capacity (3.6 MWe)
07/05/2014	Capacity increase to 6.0 MWe - License upgrade
27/09/2014*	Commissioning of the additional capacity (6.0 MWe)
2015	Amount of waste deposited increased
24/03/2016	Capacity increase to 8.4 MWe - License upgrade
22/05/2018*	Commissioning of the additional capacity (8.4 MWe)
09/07/2019	Approved Design Change PDD_Samsun LFG_v07
29/07/2019	Review for Approval of Design Change under Gold Standard for the Global Goals
20/01/2020	Approved Crediting Period Renewal PDD Ver09 – 21/01/2020
05/02/2020	Design Renewal Review under Gold Standard for the Global Goals
15/06/2020	3th Monitoring Report (16/04/2016-08/02/2018)
22/06/2020	3th Monitoring Period (16/04/2016-08/02/2018) Verification Report
08/07/2020	3-week Issuance Review Period under GS Version 2.1 VER

A.2. Location of project

The Samsun Landfill Gas to Energy Project is located in Blacksea Region, Samsun Province. The nearest residential neighbourhoods is Aşağı Avdan.

The geographic location: 41^0 14’ 45” N, 36^0 13’ 16” E
The geographic location: 41.24583333 Latitude / 36.22111111 Longitude

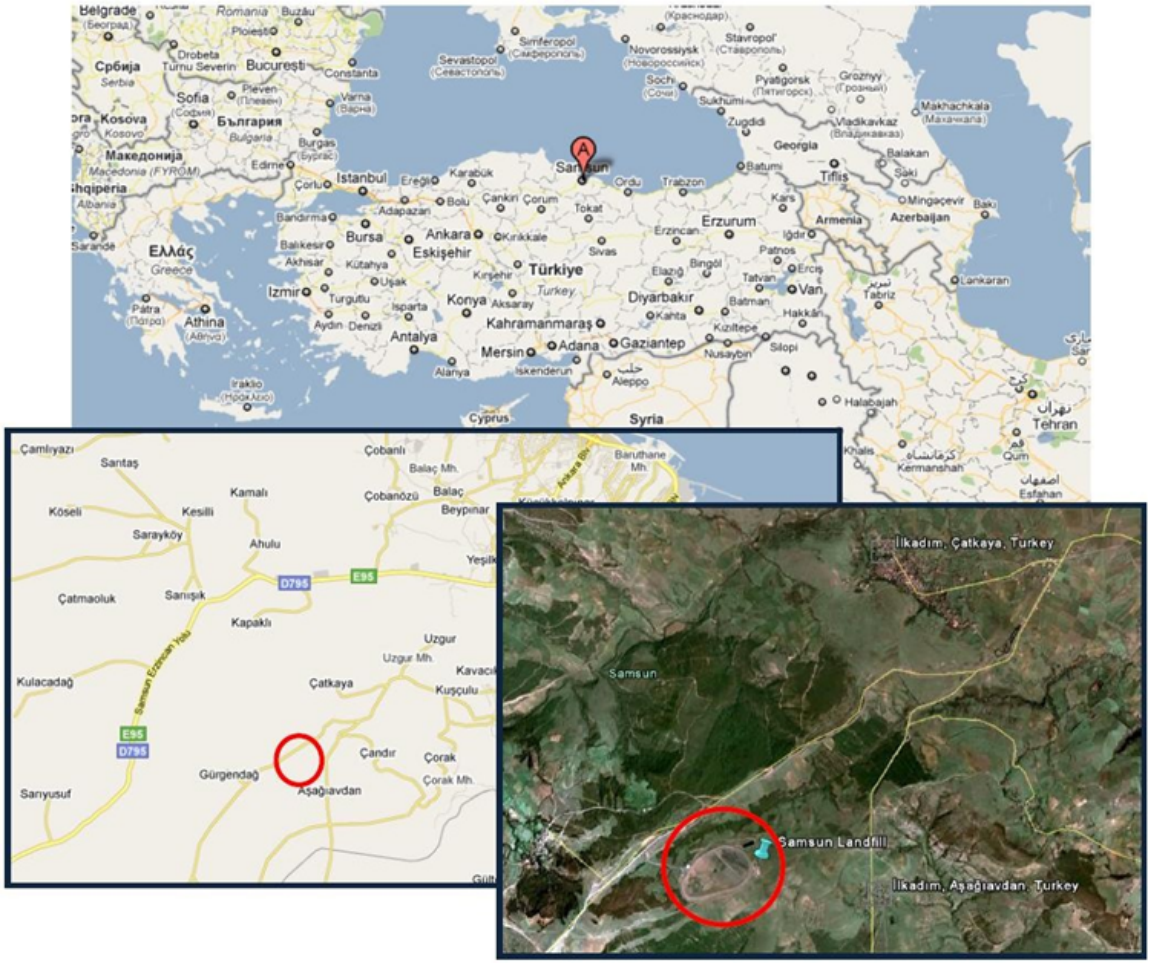


Figure 1: The project location

A.3. Reference of applied methodology

According to the Appendix B to the simplified modalities and procedures for small-scale CDM project activities, the proposed project activity falls under the following type and category:

Methodology: ACM0001 Version 19.0 Flaring or use of landfill gas

Sectoral Scope: 1 Energy industries (renewable - / non-renewable sources)
as per 'Sectoral scopes related approved methodologies and DOEs and 13 Waste handling and disposal
Project type: Waste Handling and disposal

Methodology: ACM0002: Grid-connected electricity generation from renewable sources Version 19.0

Sectoral Scope: 01 Energy industries (renewable - / non-renewable sources) as per 'Sectoral scopes related approved methodologies and DOEs.

Project type: Type I – Renewable Energy Projects

Category: Electricity generation for a system

The methodology refers to:

- Combined tool to identify the baseline scenario and demonstrate additionality Version 07
- "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", Version 03.
- Emissions from solid waste disposal sites Version 08.0
- Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation Version 03.0
- Project emissions from flaring Version 03.0
- Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 03.0
- Determining the baseline efficiency of thermal or electric energy generation Systems Version 02.0
- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period Version 03.0.1
- "Tool to calculate the emission factor for an electricity system", Version 07.0.0.
- Tool to determine the remaining lifetime of equipment", Version 01

The Monitoring Report has been carried out in accordance with the UNFCCC methodologies and tools that have been used in the registered PDD. These tools and methodologies that are used are available at https://cdm.unfccc.int/methodologies/DB/Y88077XT5O83TZ2PYEZ36LFIAMAODR

A.4. Crediting period of project

Type of crediting period: Renewable

Date of the first crediting period: 09/02/2011- 08/02/2018

Date of the second crediting period: 09/02/2018- 08/02/2025

Length: 7 years 0 months, this is planned to be renewed twice.

This is second crediting period.

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

The proposed activity involves the collection and utilization of the LFG with an electricity component with an installed capacity 8.4 MWe.

The Project mainly consists of the following components:

- LFG collection system
- Flaring unit
- Electricity generation unit
- Switchgear station
- Controlling / measurement equipment

The main equipment used in the Project is gas engines with the following specifications

Table 3. Technical details of installed methane destruction equipment

Equipment	**Specifications**
Gas Engine	Manufacturer: Deutz
Number of Units	7
Blower	Capacity: 1.23 MWm, 1.2 MWe Efficiency at full capacity: 40.4% Type: Packaged in container
Flare	Manufacturer: Conveco It has been designed for combustion of 500 Nm3/h of biogas and complete retention of flame inside combustion chamber.

The waste is covered with soil to block methane emissions to the atmosphere to provide sufficient containment and prevent air or rainwater to get into the waste. The Project aims at efficiently collecting LFG generated at the landfill site by using wells. The construction was carried out with a slight slope such that the condensate building up in the pipes were flow to the collecting points easily.

The Samsun Project generates electricity from LFG to cover its own electricity consumption and to feed the rest to the national power grid. The Project employ a gradual extension of the landfill gas collecting and utilization system on the basis of the gas generation. Electricity is generated and transmitted to national grid. Each engine/alternator unit contain a transformer, switch gear, synchronization system and system protection device.

Project owner also has installed a flare. This ensure that the LFG, which could not be combusted in the power generation units, is destroyed. The flare unit provides conditions for high temperature combustion to effectively destroy methane with other combustible LFG components and end up with low GHG emissions.

The Project includes monitoring instrumentation that allow for the accurate measurement of captured and destroyed LFG, including the following components:

- Flow meters have installed to measure and monitor accurately the flow of the LFG through the system. The measurement points are the main delivery pipe, the pipe going to the flare and the pipes going to each of the generation units. These flow meters are able to accurately measure various parameters such as pressure, temperature and the gas contents (e.g. methane) at normal conditions (0°, 1 Atm). The measurement sampling intervals of the flow meters are convenient in agreement with the UNFCCC requirements.
- The measurement system is able to store the measured data electronically. The control and monitoring system is allow these readings to be obtained remotely.

Overall, the Project is in commercial operation in line with the description in the registered PDD. There are no significant overhaul times, downtimes of equipment, exchange of equipment that could have an impact on the applicability of the UNFCCC tools and methodologies that have been used.

B.1.1 Forward Action Requests

There is not any forward action request for the project activity.

B.2. Post-Design Certification changes

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

There is no request for deviation applied during this monitoring period.

B.2.2.Corrections

There are no corrections applied during this monitoring period.

B.2.3.Changes to start date of crediting period

2nd Crediting period start date is 09/02/2018.

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

There are 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

In this monitoring period, the following project design changes have been carried out.
In the registered monitoring plan, a flow meter device was supposed to be installed for each gas engine that measures flow rate of the landfill gas. There are 3 flow meter units devices present in this 4th monitoring period in the project implementation. One of these units (denoted as FM 1, serial number AAL3824F) is installed after the booster (main pipe) FM1 measures total amount of Landfill gas and amount of landfill gas combusted in the power plant, another unit measures the LFG that goes into the flare (denoted as FM 2, serial number AAL3829F), and a third unit measures which would measure the LFGbiogas (Amount of Biogas) (denoted as FM 3, serial number 50151515)

In addition to landfill gas, biogas is also produced on site and this total gas is collected with the same booster unit. FM1 measures Landfill gas plus Biogas. In order to comply with project boundaries biogas production is measured separately to enable the deduction of the biogas from the total gas. Flow meter unit 3 (serial number 50151515) is implemented for this purpose as per Figure 2.

In 2009, the expected disposed waste amount was 182,500 tonnes[4], corresponding to an average of 500 t/day.
The capacity increased to 8.4 MWe on dd. 24/03/2016.[5] After the capacity increase amount of the waste is planned to be 304,466 tonnes, corresponding to an average of 800 t/day.
In 2017, the province established and operated a landfill site. The number is 59. It has an irregular distribution area number is 900. The project will collect the wastes regularly and will help the decrease irregular distribution areas in Turkey.

This amount is expected to rise in coming years, reaching 848,232 tonnes in 2040 when the landfill site will be filled up and closed.

[4] Samsun Avdan Technical Feasibility Report
[5] License upgrade – 24/03/2016

Another measurement instrument deviation is the use of a K-type thermocouple in the flare unit, instead of an N-type thermocouple as was suggested in the registered PDD.

Along with the capacity increase and optimization planning the initial P&ID is changed as per below diagrams:

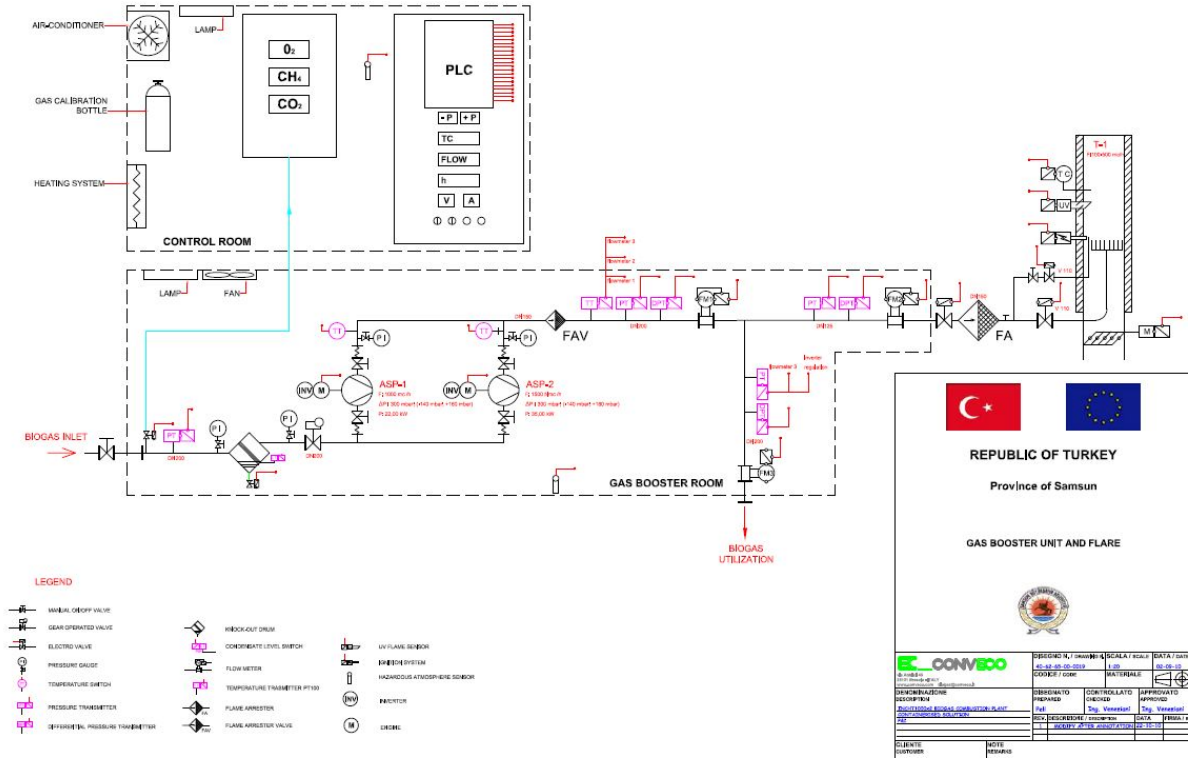


Figure 1. Flow chart of the implemented Project

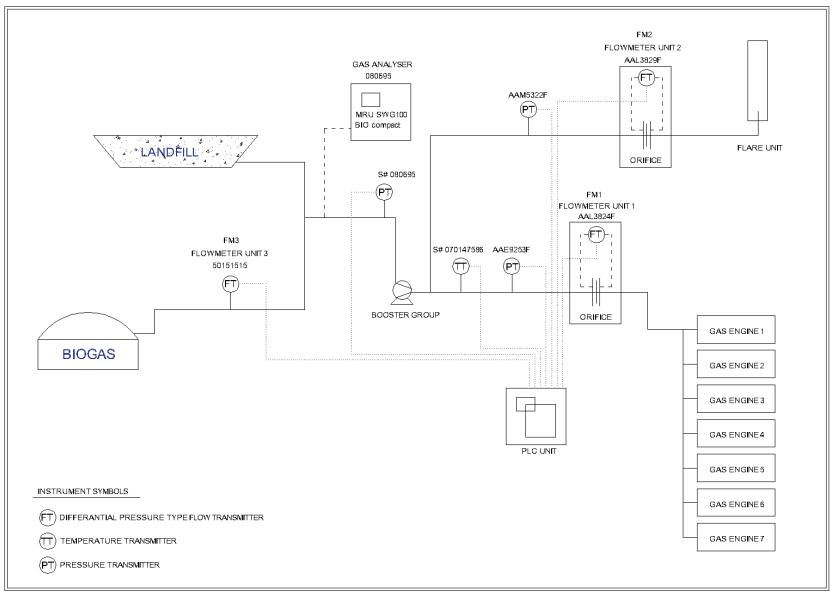


Figure 2 Flow chart of the implemented Project

Another design deviation from the registered PDD is the operating temperature of the flare unit. The installed flare is capable of efficiently flaring landfill gas with an exhaust gas temperature range of 800-1200 °C, instead of 900-1200 °C as stated in the PDD.

The project also has Biogas application but it is not added to project boundary. The main pipe collects the gas produced at the landfill (LFG) and the biogas plant . Biogas plant has its own flowmeter which enables us to monitor and measure the amount of gas produced at the biogas plant. FM3 is also connected to PLC-SCADA system. The electricity energy produced from LFG is calculated based on conservative assumptions and measurements

These deviations do not compromise the applicability of the methodologies and tools that are used for registration. The summary overview of the monitoring system is provided in *Table 4*.

Table 4. Summary of actual monitoring parameters in the implemented Project activity

Parameter	Explanation	Measurement Device
$w_{CH4,y}$	Methane fraction in the landfill gas	Gas Analyser
T	Temperature	Temperature Gauge
P	Pressure	Flow Meter 1-2-3
$T_{EG,m}$	Temperature in the exhaust gas	Thermocouple
$LFG_{total,y}$	Total amount of landfill gas captured at normal temperature and pressure	Flow meter Nr.1
$EL_{LFG,y}$	Net amount of electricity supplied to the grid by the Project	Electricity Meter
$LFG_{flare,y}$	Amount of landfill gas flared at normal temperature and pressure	Flow meter Nr.2
$LFG_{electricity,y,landfill}$	Amount of landfill gas combusted in the power plant at normal temperature and pressure	Flow Meter Nr.1
$LFG_{electricity,y,biogas}$	Amount of biogas combusted in the power plant at normal temperature and pressure	Flow Meter Nr.3
Operation of the power plant	Annual operational hours	Genset Control EASYGEN- 3200-5

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

The monitoring plan involves the determination of the baseline emissions occurring within the project boundary during the crediting period. As the project boundary is defined as the national grid of Turkey, the baseline emissions from electricity generation activities in Turkey are calculated and monitored based on national official data.

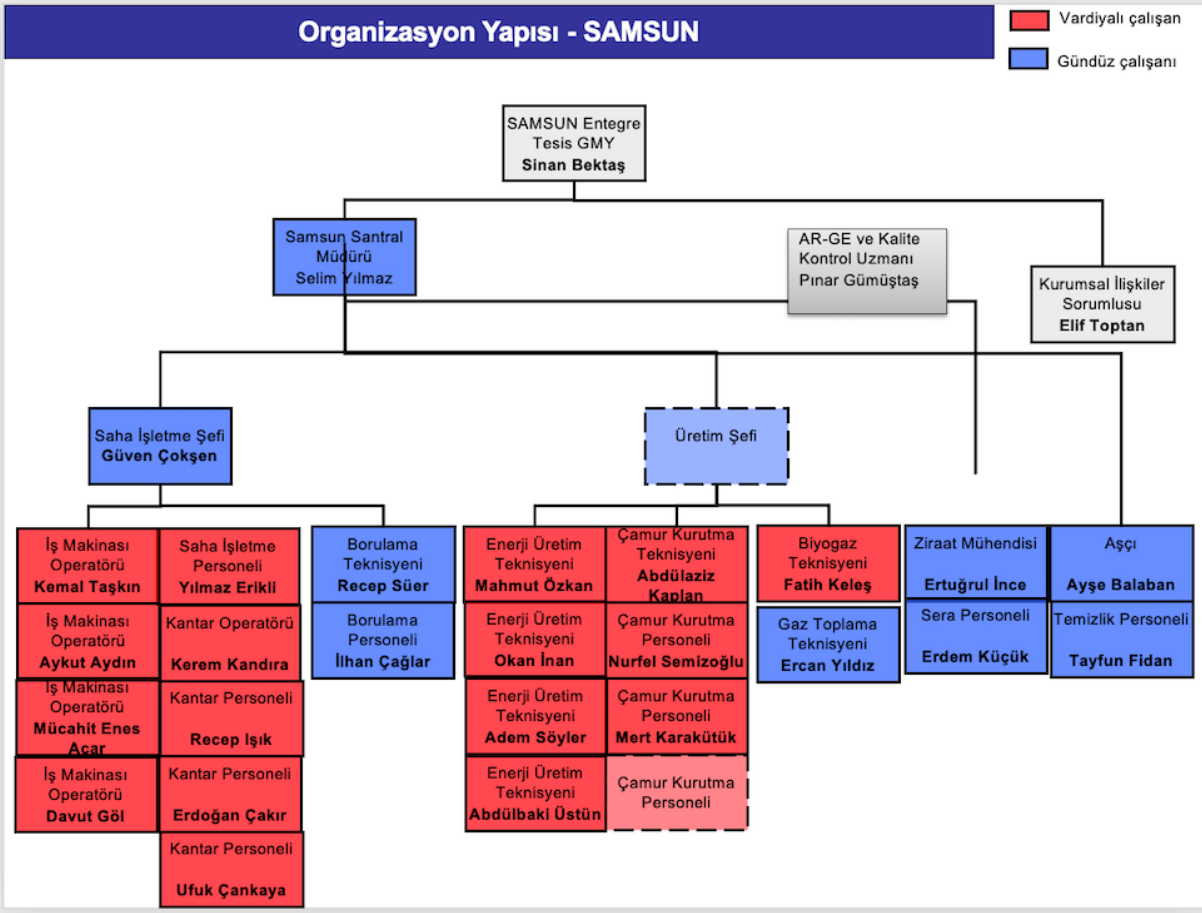
Organizational Structure

The responsible person for the monitoring of the Project is the general manager of the Project owner. The Project owner appoints a project manager who will collect the data. The data is processed and reported in agreement with the monitoring plan by the general manager. The general manager can assign a carbon consultant for these tasks.

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

The general manager is appoint the power plant manager for data collection, checking instrumentation, record keeping, data handling and data processing, filing, reporting, organizing repair and maintenance of monitoring equipment and ensuring the monitoring plan is adhered to as indicated in the approved PDD. The general managerl ensures that the personnel of the Project owner acquires the skills to carry out these tasks properly through capacity building practices and trainings.

The all staff receives health and safety trainings to minimise exposure to workplace hazards. At every shift, at least one trained technical personnel is present. All relevant information such as data files, maintenance and defect records and other monitoring related records is kept at a designated location in a transparent and organised manner.
Roles and responsibilities have been summarized in the following chart:



Other Responsibilities:

Çağla Balcı Eriş-Rüzgar Danışmanlık supports the Project owner in the preparation of this monitoring report and its verification.

For maintenance and repairs of the plant, the Project Participant has assigned different 3rd parties as subcontractors (three separate companies are assigned for generator units, for the booster system, and for the electricity and transformer station)

Information flow and Procedures:

According to the Turkish Law and Regulations, the methods of monitoring the net electricity fed to the grid and quality control and assures are explained below:

Monitoring data is collected in accordance with the agreement done between the project owner and Turkish Electricity Distribution Company (YEDAS) which provides the infrastructure for the connection to the national grid. Connection Agreement has signed on 05/04/2017 with YEDAŞ Electricity Authorized

Distribution Company. The metering system is defined in the agreement as two groups: main meter and spare meter. The design of the metering system is checked and approved by YEDAS before commissioning of the plant. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA) requires all meters to be in line with either Turkish Standards Institution or International Electrotechnical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of the both parties. This prevents any intervention and assures the accuracy and quality of the measurements. All requirements and specifications of the meters will be done according to Communique on the counter to be used in the Electricity Market by Energy Market Regulatory Authority on 22.04.2011. Each project activity has a certain amount of self-electricity consumption. Similar to energy generation, energy consumption is also recorded and accounted for the invoicing. The electricity consumption of the project mostly be covered by the Project's own electricity generation and the remaining power is the one which is measured and fed to the transmission line. In cases when the Project's own power generation is not high enough to cover its own consumption, electricity from the grid is used. This usage is measured also by the two measurement devices.

Data is stored electronically, during the crediting period and at least two years after the last issuance of credits for the project activity in the concerning crediting period. The Project Participant is responsible for storage of data received from the measuring devices.

Furthermore, the general manager implements a manual data recording system to act as a back-up for the on-line monitoring system. This basic back-up system consists of regular updating of a spreadsheet manually that includes the main key parameters.

The amount of LFG combusted in the gas engines is monitored by effectively and conservatively monitoring the methane amount supplied into each of the engine units. The actual emission reductions from the destruction of methane in the combustion units will be calculated such that the risk of overestimation is

minimized. The readings are taken and recorded internally by compatible and proper measurement devices automatically with high data quality.

The O2, CH4 and CO2 levels are measured regularly at intervals of couple of hours. If the O2 level is found lower than 1% and CH4 is found higher than 55%, the gas flow is increased by 10%. If the CO2 level is measured lower than 1% the gas flow is decreased by 10 percent.

Near the project activity there is a Biogas unit. The Biogas is measuring by flow meters same with the LFG. The flowmeters measure the LFG and Biogas. According to measuring biogas amount is removing in calculations. Flowmeters also reads temperature, Net calorific value and Gross Calorific values.

The meters are as below:

Serial Number	Model-Product	Manufacturer	Accuracy	Date of Initial Calibration
436730	A1500 Alpha	ELSTER (backup)	0.5 S	20.12.2011[6]
65001340	C510.AMT.585 1.RS485	MAKEL (main)	0.5 S	07.09.2016

Flow meter unit details are as below:

Number	Accuracy	Serial No:	Cal. Frequency	Dates of relevant calibrations	Cal. validity
1	%0.1	AAL3824F	Up to 10 years (no periodic calibration requires by manufacturer	10/05/2012 [7]	10/05/2022

[6] Back-up Meter Calibration Report
[7] Conveco Field Report

Number	Accuracy	Serial No:	Cal. Frequency	Dates of relevant calibrations	Cal. validity
2	%0.1	AAL3829F	Up to 10 years (no periodic calibration requires by manufacturer	19/07/2019 [8]	19/07/2029

Number	Accuracy	Serial No:	Cal. Frequency	Dates of relevant calibrations	Cal. validity
3	%0.1	50151515	Up to 10 years (no periodic calibration requires by manufacturer	11/06/2019	11/06/2029

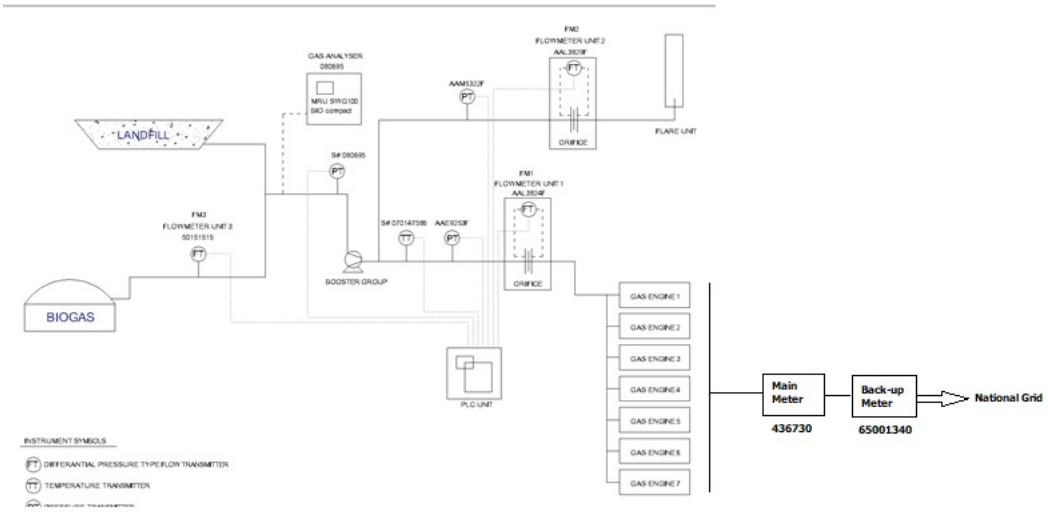
**New Flow meter 3: 50151515 (Flowmeter 3 has been changed. The old serial Number was: AGF1583F)*

Gas analyzer details are as below:

Type	Accuracy	Serial Nr.	Cal. Frequency	Dates of relevant calibrations	Cal. Validity
MRU SWG 100- BIO compact	%0.2	080695	Automotically	19.07.2019	19.07.2029

** New Gas Analyzer: 080695 (Gas Analyzer has been changed. The old serial number was: S#800 20000-1435*

[8] AAL3829F Calibration Report



Metering Devices Changing Details

The metering devices changing details are as below;

	3rd MR Serial Number	4th MR Serial Number	Change Date	Change Reference	Calibration Date	Period
FM 1	AAL3824F	AAL3824F	N/A	N/A	10.05.2012	10 years
FM 2	AAL3829F	AAL3829F	N/A	N/A	19.07.2019	10 Years
FM3*	AGF1583F	50151515	11.06.2019	Invoice	11.06.2019	10 Years
Gas Analyzer*	20000-1435	80695	19.07.2019	Conveco Decleration	19.07.2019	10 Years
Electricity Back up Meter	436730	436730	N/A		20.12.2011	10 Years
Electricity Main Meter	65001340	65001340	N/A		7.09.2016	10 years

During this monitoring period Gas Analyzer and FM-3 metering devices are changed. There is not any reason for changing. The Meter supplier changes towards the end of the calibration period.

SECTION D. DATA AND PARAMETERS

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

<table>
<tr><td>Relevant SDG Indicator</td><td>13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions” and following target</td></tr>
<tr><td>Data/parameter</td><td>GWPCH4</td></tr>
<tr><td>Unit</td><td>tCO2e/tCH4</td></tr>
<tr><td>Description</td><td>Global warming potential of CH4</td></tr>
<tr><td>Source of data</td><td>https://globalgoals.goldstandard.org/ru-2020-applicability-of-global-warming-potential-for-gold-standard-for-the-global-goals-projects/</td></tr>
<tr><td>Value(s) applied</td><td><table><tr><td>Year</td><td>GWP</td></tr><tr><td>2019</td><td>25</td></tr><tr><td>2020</td><td>25</td></tr><tr><td>2021</td><td>28</td></tr></table></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>-</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Relevant SDG Indicator</td><td>13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions” and following target</td></tr>
<tr><td>Data/parameter</td><td>DCH4</td></tr>
<tr><td>Unit</td><td>tCH4/ m3tCH4</td></tr>
<tr><td>Description</td><td>Methane Density</td></tr>
<tr><td>Source of data</td><td></td></tr>
<tr><td>Value(s) applied</td><td>0.0007168 tCH4/ m3tCH4</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>At standard temperature and pressure(0 degree Celsius and 1.013 bar) the
density of methane is 0.0007168 tCH4/m3
CH4</td></tr>
</table>

Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	**Φ**
Unit	-
Description	Default value for the model correction factor to account for model uncertainties
Source of data	"Methodological Tool: Emissions from solid waste disposal sites" (Version 08.0)
Value(s) applied	0.75 For baseline emissions: refer to Table 3 to identify the appropriate factor based on the application of the tool (A or B) and the climate where the SWDS is located

Default values for the model correction factor	Humid/dry conditions	Dry conditions
Application A	0.75	0.75
Application B	0.85	0.80

Choice of data or Measurement methods and procedures	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	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	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Table 3.2.
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	As the landfill was covered by soil, the default value for oxidation could be applied.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	F
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste,
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	DOCf,default
Unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes 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	The PP is applied in Application A and DOCf,y is given as a default value (DOCf,y = DOCf,default).
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	**MCF**
Unit	-
Description	Methane correction factor
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Table 3.1
Value(s) applied	1
Choice of data or Measurement methods and procedures	The methane correction factor (MCF) accounts for the fact that managed SWDS produces more methane than unmanaged SWDS. Based on the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site", IPPC default value for anaerobic managed SWDS is applied.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	**DOC_j**
Unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Tables 2.4 and 2.5.
Value(s) applied	

Waste type j	DOC_j (% dry waste)
Wood and wood products	**43**
Pulp, paper and cardboard (other than sludge)	**40**
Food, food waste, bevarages and tobacco (other than sludge)	**15**
Textiles	**24**
Garden, yard and park waste	**20**
Glass, plastic, metal, other inert waste	**0**

Choice of data or Measurement methods and procedures	Medium Average temperature MAT [°C]: 14.5 Medium Average Precipitation MAP [kg/m2]: 59.7 Source: https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=SAMSUN The selection of appropriate kj values are made according to a "boreal and temperate" and "wet" climate. Thus values are used in accordance to "Emissions from solid waste disposal sites" version 8 and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Tables 2.4 and 2.5. The temperatures are below 60 C

Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$\mathbf{k_j}$
Unit	-
Description	Decay rate for the waste type j
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Table 3.3.

Value(s) applied	Wood, wood products and straw (0.03), Pulp, paper and cardboard (other than sludge (0.06), Food, food waste, sewage sludge, beverages and tobacco (0.185), Textiles (0.06), Other (non-food) organic putrescible garden and park waste (0.10)

Waste type j		Boreal and Temperate (MAT ≤ 20 °C)		Tropical (MAT ≥ 20 °C)	
		Dry ☐MAP/PET < 1)	Wet(MAP/PET > 1)	Dry (MAP < 1000 mm)	Wet☐MAP > 1000)
Slowly Degrading	Pulp, paper, cardboard (other than sludge, textiles)	0.04	0.06	0.045	0.07
	Wood, wood products and straw	0.02	0.03	0.025	0.035
Moderately Degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
Rapidly Degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40

Choice of data or Measurement methods and procedures	Medium Average temperature MAT [°C]: 14.5 Medium Average Precipitation MAP [kg/m^2]: 59.7 Source: https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=SAMSUN The selection of appropriate kj values are made according to a "boreal and temperate" and "wet" climate.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	η_{PJ}
Unit	Dimensionless
Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data	Feasiblity study
Value(s) applied	70%[9]
Choice of data or Measurement methods and procedures	The collection system which will be installed on the Project site will be able to collect a certain fraction of the total LFG generation. This collection ratio is affected principally by the Project's technical design, therefore the value suggested in the feasibility study is used.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

[9] Samsun Avdan Technical Feasibility Report

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	**fy**
Unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year *y*
Source of data	Methodology ACM0001 Version 19.0
Value(s) applied	0
Choice of data or Measurement methods and procedures	According Methodology ACM0001 Version 19.0, "0" is applied. 16.04.2016 – 29.11.2018 Historical Data Avarage
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	While Samsun landfill does not have a water table above the bottom of the SWDS, then this parameter is used to determine the MCF

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	Ru
Unit	Pa.m3/kmol.K
Description	Universal ideal gas constant
Source of data	Methodological Tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 03.0
Value(s) applied	8.314
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	MMCH4
Unit	kg/kmol
Description	Molecular mass of greenhouse gas (CH4)
Source of data	Methodological Tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 03.0
Value(s) applied	16.04
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	P_n
Unit	Pa
Description	Total pressure at normal conditions
Source of data	Methodological Tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 03.0
Value(s) applied	101,325 Pa
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	T_n
Unit	K
Description	Tempearture at normal conditions
Source of data	Methodological Tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 02.0.0
Value(s) applied	273.15 K
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	SPECflare
Unit	Temperature -°C Flow rate or heat flux -kg/h or m3/h Maintenance schedule -number of days
Description	Manufacturer's flare specifications for temperature, flow rate and maintenance schedule. Specflare will be monitored through Flow Meter 2. Temperature, flow rate or heat flux and maintenance schedule will be monitored.
Source of data	Flow meter 2
Value(s) applied	

<table>
<tr><td>Choice of data or Measurement methods and procedures</td><td>Equipment Specification
<table>
<tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr>
<tr><td>Flow meter</td><td>2%</td><td>AAL3829F
AAM5322F</td><td>Up to 10 years

No periodic calibration required by manufacturer</td><td>19.07.2019</td><td>19.07.2029</td></tr>
</table></td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</td></tr>
<tr><td>Additional comment</td><td>Document in the CDM-PDD the flare specifications set by the manufacturer for the correct operation of the flare for the following parameters:
(a) Minimum and maximum inlet flow rate, if necessary converted to flow rate at reference conditions or heat flux;
(b) Minimum and maximum operating temperature; and
(c)Maximum duration in days between maintenance events</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	EGgrid,CM,y
Unit	tCO2/MWh
Description	The combined margin emissions factor
Source of data	Approved PDD.
Value(s) applied	0.3953
Choice of data or Measurement methods and procedures	TEIAS, the Turkish Electricity Transmission Company is the official source for the related data, thus providing the most up-to-date and accurate information available.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

D.2. Data and parameters monitored

Relevant SDG Indicator	7.2.1 "Renewable energy share in the total final energy consumption"
Data / Parameter	EGpj,y
Unit	MWh/yr
Description	Quantity of net electricity supplied to the grid in year y
Source of data	Meter reading protocols (OSOS records)
Value(s) applied	83,066 MWh [10] Sum 2019 (05.09.2019-31.12.2019): 16,986,337 kWh Sum 2020 (01.01.2020-31.12.2020): 48,689,965 kWh Sum 2021 (01.01.2021-30.04.2021): 17,390,104 kWh
Measurement methods and procedures	The net electricity generation supplied to the grid will be measured continuously by YEDAŞ meters (both main and spare) and recorded monthly. Please see B.7.3. for more detailed description of the monitoring plan.

[10] RAW DATA ER Calculation Sheet_Total Electricity Generation Sheet_H42

<table>
<tr><td>Monitoring frequency</td><td>Continuous measurement and at least monthly recording. (Remote automatic meter reading system-OSOS)
Information of the meters are listed as followed:

<table><tr><td></td><td>Main Meter</td></tr><tr><td>Manufacturer</td><td>ELSTER</td></tr><tr><td>Model</td><td>A1500</td></tr><tr><td>Serial number</td><td>65001340</td></tr></table>
<table><tr><td></td><td>Backup Meter</td></tr><tr><td>Manufacturer</td><td>ELSTER</td></tr><tr><td>Model</td><td>A1500</td></tr><tr><td>Serial number</td><td>436730</td></tr></table>
The accuracy of meters is given as 0.5s class</td></tr>
<tr><td>QA/QC procedures</td><td>• Measurements are undertaken using energy meters.
• Concerning metering system accuracy, project participants have to comply with relevant national legislation. The project must ensure that the metering devices are in line with the technical requirements which are set out by the Communiqué for Metering Devices to be used in the Electricity Market, which describes the minimum accuracy requirement the metering devices have to fulfil, which are categorized according to the installed capacity. Maintenance and calibration of YEDAŞ meters will be carried out according to the System Usage Agreement. The periodical calibration or maintenance is under the responsibility of YEDAŞ and has been fixed as once in 10 years. Since YEDAŞ meters are sealed by YEDAŞ, the project proponent cannot intervene with the devices. Calibration period in accordance with the manufacturer’s specifications and national regulations.
• The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import. Data measured by meters will be crosschecked with the YEDAŞ notice via e-mail or fax mail.</td></tr>
<tr><td>Purpose of Data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Relevant SDG Indicator	7.2.1 "Renewable energy share in the total final energy consumption"
Data / Parameter	**$PE_{FC,j,y}$**
Unit	$tCO2_e$
Description	Project emissions from fossil fuel combustion in process j during the year y
Source of data	Fuel invoices
Value(s) applied	0 tCO2e
Measurement methods and procedures	"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", Version 03. Project emissions involve direct emissions (such as fossil fuel consumption of construction equipment, co-firing for power generation or vehicles for on-going operations and maintenance) by the Project activity.
Monitoring frequency	Continuously
QA/QC procedures	
Purpose of data	Calculation of project emissions
Additional comment	There is not any consumption in the monitoring period.

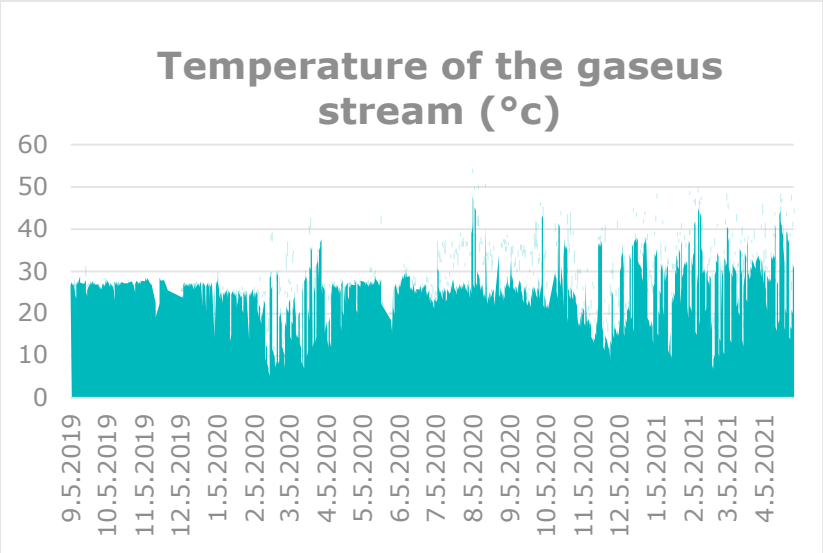
Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	$F_{CH4,RG,m}$
Unit	kg
Description	Mass flow of methane in the residual gas in the minute *m*
Source of data	Flow Meter Nr.2

<table>
<tr><td>Value(s) applied</td><td>Total methane mass flow in the residual gas over the monitoring period is 0 ton[11] of CH4.
2019: 0 ton CH4
2020: 0 ton CH4
2021: 0 ton CH4</td></tr>
<tr><td>Measurement methods and procedures</td><td>The flow rate of the residual landfill gas is automatically converted to dry basis and normal conditions by the PLC system without any intervention by the Project owner. This parameter is calculated by multiplying LFGflare, density of methane and wCH4 (percentage of methane measured by the gas analyzer).
This is in compliance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", v.03.0.0.
For conversion, volumetric flow rate data collected from the flow meter Nr.2 (FM 2).

Equipment Specification;

<table>
<tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr>
<tr><td>Flow meter</td><td>2%</td><td>AAL3829F</td><td>Up to 10 years (no periodic calibration requires by manufacturer</td><td>19.07.2019</td><td>19.07.2029</td></tr>
</table>
</td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time and recorded every 30 minutes.</td></tr>
<tr><td>QA/QC procedures</td><td>A separate flow meter is installed for the flare unit. Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour.</td></tr>
<tr><td>Purpose of data</td><td>This parameter will be used to check with the SPECflare parameter.
This parameter will be used to calculate PEflare,y.</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

[11] RAW DATA_ER Calculation_Methane Destruction Sheet -K29

<table>
<tr><td>Relevant SDG Indicator</td><td>13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions” and following target</td></tr>
<tr><td>Data / Parameter</td><td>Tn</td></tr>
<tr><td>Unit</td><td>K</td></tr>
<tr><td>Description</td><td>Temperature of the gaseous stream</td></tr>
<tr><td>Source of data</td><td>Temperature Gauge</td></tr>
<tr><td>Value(s) applied</td><td>Fluctuating between 25-38 °C (05.09.2019 – 30.04.2021)
The average is 26.23 °C[12]
2019: 26.88 °C
2020: 25.13 °C
2021: 28.85 °C
 
</td></tr>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table>
<tr><td>Type</td><td>Accuracy</td><td>Serial Nr.</td><td>Cal. Frequency</td><td>Dates of relevant calibrations</td><td>Cal. Validity</td></tr>
<tr><td>Gentek temperature gauge</td><td>< 1°C.</td><td>12-1900</td><td>No periodic calibration required by manufacturer</td><td>N/A</td><td>N/A</td></tr>
</table></td></tr>
</table>

[12] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_E6

Monitoring frequency	Manual reading and recording, every ca. 2 days on average.
QA/QC procedures	The data is manually read and recorded. The temperature measurement device is calibrated, indicating a small error margin and small fluctuations.
Purpose of data	FCH4,RG,m, mass flow of methane in the residual gas in the minute m, is calculated based on the dry basis assumption, which requires the temperature of the landfill gas to be below 60 °C. This data is used to verify that this requirement is fulfilled. It should also be noted that the landfill gas is dehumidified before the booster intake.
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	**$LFG_{electricity,y}$**
Unit	Nm^3
Description	Total amount of landfill gas and biogas (under normal conditions of 0° and 1 Atm) combusted in the generator unit in year y
Source of data	Flow Meter Nr.1
Value(s) applied	32,522,600 m3 [13] Sum 2019 (05.09.2019-31.12.2019): 5,144,454m3 Sum 2020 (01.01.2020-31.12.2020): 20,012,805m3 Sum 2021 (01.01.2021-31.04.2021): 7,355,341m3

[13] RAW DATA ER Calculation Sheet_Total Raw Sheet_D8

<table>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table>
<tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr>
<tr><td>Flow Meter</td><td>2%</td><td>AAL3824F</td><td>Up to 10 years (no periodic calibration requires by manufacturer</td><td>10.05.2012</td><td>10.05.2022</td></tr>
</table>
Measurement Range: 0-2200 Nm3/h.
Flowmeter consistency is checked on 11.04.2013 to confirm that no calibration is necessary.</td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time and recorded every 30 minutes.</td></tr>
<tr><td>QA/QC procedures</td><td>Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour.
One flow meter is installed for all of the gen-sets.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>Velectricity = LFGelectricity</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	Biogas Collection (Vbiogas)
Unit	m^3
Description	The electricity energy produced from burning biogas is calculated by using the measurements of flowmeter and the metan gas analyser and the calculated amount will be reduced from the total electricity generation.
Source of data	Flow Meter Nr.3

<table>
<tr><td>Value(s) applied</td><td>302,203 m3 [14]
Sum 2019 (05.09.2019-31.12.2019): 48,259 m3
Sum 2020 (01.01.2020-31.12.2020): 184,941 m3
Sum 2021 (01.01.2021-31.04.2021): 69,002 m3</td></tr>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table><tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr><tr><td>Flow Meter</td><td>2%</td><td>50151515</td><td>Up to 10 years no periodic calibration requires by manufacturer</td><td>11.06.2019</td><td>11.06.2029</td></tr></table>
Measurement Range: 0-2200 Nm3/h.</td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time.</td></tr>
<tr><td>QA/QC procedures</td><td>Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour. One flow meter is installed for all of the gen-sets.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	**$LFG_{flare,y}$**
Unit	Nm^3
Description	Total amount of landfill gas (under normal conditions of 0° and 1 Atm) flared in year y

[14] RAW DATA ER Calculation Sheet_Total Raw Sheet_E8

Source of data	Flow meter Nr.2 (FM 2)
Value(s) applied	0 m3[15] 2019: 0 m3 2020: 0 m3 2021: 0 m3
Measurement methods and procedures	Please see details of the parameter FCH4,RG,m.
Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	"Project emissions from flaring", v.03.0.0 (EB68, Annex 15) does not include this parameter, it is only used for double checking purposes by comparing it with LFGelectricity,y and LFGtotal,y.
Purpose of data	Calculation of baseline emissions
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	**$LFG_{total,y}$**
Unit	Nm^3
Description	Total amount of landfill gas and biogas (under normal pressure and temperature) captured in year y
Source of data	Flow meter Nr.1
Value(s) applied	

[15] RAW DATA ER Calculation Sheet_Total Raw Sheet_F8

<table>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table>
<tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr>
<tr><td>Flow Meter</td><td>2%</td><td>AAL3824F</td><td>Up to 10 years no periodic calibration requires by manufacturer</td><td>10.05.2012</td><td>10.05.2022</td></tr>
</table>
Measurement Range: 0-2200 Nm3/h</td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time and recorded every 30 minutes.</td></tr>
<tr><td>QA/QC procedures</td><td>Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour.</td></tr>
<tr><td>Purpose of data</td><td>This parameter is used for double checking purposes for comparing it with the sum of LFGelectricity,y and LFGflare,y.
Flow Landfill = Engine Gas - Flow Biogas - Flow Flare[16]</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	**w_{CH4}**
Unit	%
Description	Methane fraction in the landfill gas
Source of data	Gas analyzer (at the main booster pipe)

[16] RAW DATA ER Calculation Sheet_Total Raw Sheet_G8

<table>
<tr><td>Value(s) applied</td><td>55.70% (Average)[17]
2019: 58.05%
2020: 55.32%
2021: 54.99%</td></tr>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table>
<tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. Validity</th></tr>
<tr><td>MRU SWG 100-BIO compact</td><td>%0.2</td><td>080695</td><td>Automotically</td><td>19.07.2019</td><td>19.07.2029</td></tr>
</table></td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time and recorded every 30 minutes.</td></tr>
<tr><td>QA/QC procedures</td><td>Methane content is measured directly and continuously with a gas analyzer. The gas analyzer will be maintained and calibrated regularly according to the manufacturer’s requirements in order to ensure that required level of accuracy is maintained. The gas analyzer is subject to a regular maintenance and testing regime to ensure accuracy, therefore the analyzer will be calibrated according to the manufacturer’s recommendations. The measurement interval is equal to or more than one sampling each hour.</td></tr>
<tr><td>Purpose of data</td><td>The percentage of methane in the landfill gas is used to calculated the amount of methane destroyed in the gas engine and flare units. It is also used to check whether it satisfies the minimum methane content threshold for the flare unit to ensure the gas is flared efficiently.</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions” and following target
Data / Parameter	**$PE_{flare,y}$**
Unit	t_{CO2-eq}
Description	Project emissions from flaring of the residual gas in year y
Source of data	N/A

[17] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_E11

Value(s) applied	0 $tCO2e$[18]
Measurement methods and procedures	$PE_{flare,y} = \sum_{m=1} F_{CH4,RG,m}*(1-\eta_{flare,m})*GWP_{CH4}*10^{-3}$ $F_{CH4,RG,m}$ and $\eta_{flare,m}$ parameters are read continuously but recorded at regular intervals. Therefore, the formula above has been applied to 10- minutes and 30-minutes data, instead of 1-minute data. GWP_{CH4} is a fixed ex ante parameter.
Monitoring frequency	N/A
QA/QC procedures	Calculations are carried out with a spreadsheet to minimize the risk errors.
Purpose of data	Calculation of baseline emissions
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	**Operation of the power plant**
Unit	h
Description	Operational hours of the power plant
Source of data	Power generation of engines
Value(s) applied	96,935 hours[19]

[18] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_K39
[19] RAW DATA ER Calculation Sheet_Op.Hours Enginee Sheet_I7-I13

<table>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table>
<tr><th>Type</th><th>Ac.</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. Validity</th></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>17856564</td><td>N/A</td><td>02.11.2011</td><td>N/A</td></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>17609634</td><td>N/A</td><td>11.07.2011</td><td>N/A</td></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>18336534</td><td>N/A</td><td>27.09.2013</td><td>N/A</td></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>19872432</td><td>N/A</td><td>27.09.2014</td><td>N/A</td></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>19641470</td><td>N/A</td><td>27.09.2014</td><td>N/A</td></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>20499829</td><td>N/A</td><td>22.05.2018</td><td>N/A</td></tr>
<tr><td>Genset Control EASYGEN-3200-5</td><td>N/A</td><td>21078322</td><td>N/A</td><td>22.05.2018</td><td>N/A</td></tr>
</table></td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time and recorded every 30 minutes.</td></tr>
<tr><td>QA/QC procedures</td><td>The PLC provides data on engines’ supplied amount of power (kW). Operational hours are calculated based on engine operation (i.e. at least of one of the engines generates power).</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions” and following target
Data / Parameter	TEG,m
Unit	°C

<table>
<tr><td>Description</td><td>Temperature in the exhaust gas of the enclosed flare in minute m</td></tr>
<tr><td>Source of data</td><td>Thermocouple</td></tr>
<tr><td>Value(s) applied</td><td>The average exhaust gas temperature during the monitoring period is 500°C for the data that are used for calculations of emission reduction from flaring. Exhaust gas temperatures below and above the flare efficiency range are discarded from calculations</td></tr>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications
<table>
<tr><td>Type</td><td>Accuracy</td><td>Serial Nr.</td><td>Cal. Frequency</td><td>Dates of relevant calibrations</td><td>Cal. Validity</td></tr>
<tr><td>K-Type Thermocouple-Isocontrolli</td><td>N/A</td><td>N/A</td><td>Annual replacement</td><td>February 2012</td><td>N/A</td></tr>
</table></td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time and recorded every 30 minutes.</td></tr>
<tr><td>QA/QC procedures</td><td>If more than one temperature port is fitted to the flare, the flare manufacturer must provide written instructions detailing the conditions under which each location shall be used and the port most suitable for monitoring the operation of the flare according to manufacturer’s specifications for temperature.
Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule.
Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events should be noted in the site records along with any corrective action that was implemented to correct the issue.</td></tr>
<tr><td>Purpose of data</td><td>-</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions” and following target
Data / Parameter	ηflare,m
Unit	%
Description	Flare efficiency in minute m
Source of data	TEG,m, FCH4,RG,m, and SPECflare
Value(s) applied	Default. Option A in the methodological tool “Project emissions from flaring”,v.03.0.0 is selected, as the flare is of encolosed type.

Measurement methods and procedures	A calculation spreadsheet is used to check the requirements defined above, which minimizes the risk of manual errors. The flare efficiency for the minute m (ηflare,m) is 90% when the following conditions are met to demonstrate that the flare is operating: The temperature of the flare (TEG.m), minimum methane content and the flow rate of the residual gas to the flare (FRG,m) is within the manufacturer's specification for the flare (SPECflare) in minute m; and Otherwise ηflare,m is 0%.
Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	-
Purpose of data	-
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	Flamem
Unit	N/A
Description	Flame detection of flare in the minute m
Source of data	Flame detector unit
Value(s) applied	Time series
Measurement methods and procedures	Equipment Specifications
Monitoring frequency	Continuously
QA/QC procedures	The flare unit installed for the project activity includes the flame detector as an integral safety component. This detector coupled with the electronic module installed in the control panel continuously detect flame presence by UV sensor. If the detector cannot see the flame (and cogeneration engine are in OFF), the main valve automatically closes and a flame is tried to be created with only pilot line. If this operation fails, the system automatically shuts down and an alarm appears on the system. Therefore, the data availability also implies flame detection.

Type	Accuracy	Serial Nr.	Cal. Frequency	Dates of relevant calibrations	Cal. Validity
Optical Flame Detector	N/A	N/A	N/A	N/A	N/A

Purpose of data	This parameter is added to comply with the methodological tool "Project emissions from flaring", v.03.0.0 and there is no direct use for these data in calculations.
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	Wx
Unit	Ton
Description	Quantity of MSW land filled during 2019~2026
Source of data	Landfill gas power generation report of Samsun Landfill gas project
Value(s) applied	See section B.6.4 and Samsun Landfill Calculation sheet
Choice of data or Measurement methods and procedures	The data is provided in the report of landfill gas power generation report and this data is used to for calculation of energy generation. The date of waste is also confirmed by representative of waste department in Municipality.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	8.5.2. Unemployment rate, by sex, age and persons with disabilities
Data / Parameter	Number of employment generation
Unit	Number
Description	Number of people employed directly due to the project activity
Source of data	SGK Records
Value(s) applied	29 employee[20]
Measurement methods and procedures	The total number of persons working in the plant calculated based on the SGK Records

[20] SGK records

Monitoring frequency	Once for each monitoring period
QA/QC procedures	Social insurance registries of employees provided. After first verification, only changes in employees reported.
Purpose of data	-
Additional comment	-

Relevant SDG Indicator	8.8.2 Increase in national compliance of labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual sources and national legislation, by sex and migrant status.
Data / Parameter	Health and Safety Training Records
Unit	Number of people per monitoring period
Description	Number of people trained on health and safety issues during per monitoring period
Source of data	Training Records or Certificates
Value(s) applied	10-11/01/2019 - 8 employees attended to Health and Safety Training 08-09/06/2020 – 18 employees attended to Health and Safety Training
Measurement methods and procedures	The total number of Health and Safety training based on Training Records or Certificates
Monitoring frequency	Once for period each monitoring
QA/QC procedures	Training records or certificates are provided
Purpose of data	Monitoring the health and safety trainings of employees to demonstrate contribution to SDG8-8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following
Data / Parameter	ERy
Unit	tCO_2/y

Description	Emission Reductions in year y (t CO_2/yr) As per ACM0002 Version 19 and ACM0001 Version 19.0, the baseline emissions (emission reductions) are calculated as the net electricity generated by the project activity and Methane destroyed. For electricity, generation multiplied with the baseline emission factor for the project grid.
Source of data	Measured and Calculated. (The emission reduction value the emission factor of the grid to which the project exports electricity (0.3953 tCO_2 tCO2/MWh)
Value(s) applied	330,699 tCO_2[21]
Measurement methods and procedures	Please see PDD Ver09-21.01.2020 B.6.2-B.6.4 and B.7.3 for more detailed description of the monitoring plan.
Monitoring frequency	Once for each monitoring period
QA/QC procedures	Please see PDD Ver09_21.01.2020 B.7.3. for more detailed description of the monitoring plan.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	Air quality
Unit	n.a.
Description	Reduction of odour: By effectively collecting LFG that would otherwise be emitted freely, the Project reduces H2S (a foul smelling gas) emissions.
Source of data	Interview with stakeholders
Value(s) applied	There is no negative feedback received from local stakeholders.
Measurement methods and procedures	n.a
Monitoring frequency	Once for each monitoring period
QA/QC procedures	n.a.
Purpose of data	Odour and health improvment
Additional comment	-

[21] RAW DATA ER Calculation Sheet_Total ER Sheet_G16

Data / Parameter	Soil Condition
Unit	n.a.
Description	Waste terracing is properly done with capping layers
Source of data	Visual inspection Waste terracing: Setting up capping layers in terraces
Value(s) applied	Waste terracing is properly done with capping layers.
Measurement methods and procedures	Visual inspection
Monitoring frequency	Once for each monitoring period
QA/QC procedures	n.a.
Purpose of data	Waste terracing will be properly done with capping layers
Additional comment	-

Data / Parameter	Hazardous waste processing
Unit	n.a.
Description	No hazardous waste is accepted or processed at the landfill site
Source of data	Visual inspection
Value(s) applied	No hazardous waste is accepted or processed at the landfill site.
Measurement methods and procedures	Visual inspection
Monitoring frequency	Once for each monitoring period
QA/QC procedures	n.a.
Purpose of data	The Project will not function as a hazardous waste disposal or processing facility (i.e. as a hazardous waste gasification or incineration facility).
Additional comment	-

Data / Parameter	Leachate management
Unit	n.a.

Description	Leachate is successfully collected and treated. The Municipality has assigned a third party on site, who is responsible of treating leachate properly. The Municipality has provided a letter confirming that the leachate quality has improved after the Project start.
Source of data	Interview with the stakeholder or Municipality Letter
Value(s) applied	The Municipality has assigned a third party on site, who is responsible of treating leachate properly.
Measurement methods and procedures	n.a
Monitoring frequency	Once for each monitoring period
QA/QC procedures	n.a.
Purpose of data	Leachate is successfully collected and treated.
Additional comment	-

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

Data/Parameter	Value obtained in this monitoring period (4th 05/09/2019-30/04/2021)	Value obtained last monitoring period (3rd 16/04/2016-08/02/2018)
SDG7/Quantity of net electricity supplied to the grid in year y	83,064.315 MWh	65,168.768 MWh
SDG8 Number of employments	29 employees[22]	12 employees
SDG8 / Health and Safety Training Records	All personnel	All personnel
SDG13 /Emission Reductions in year y	330,699 t CO2	288,074 t CO2

D.4. Implementation of sampling plan

Not Applicable

[22] RAW DATA ER Calculation Sheet_Employee Records Sheet

SECTION E. CALCULATION OF SDG IMPACTS

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

SDG 7: Affordable and Clean Energy: The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel. The clean energy generated by the project is calculated based on the amount of electricity generated by the project per annum. As there is no electricity energy produced in the baseline, the baseline value is 0.

SDG 8 : Decent Work and Economic Growth: The project leads to employment opportunities which would not have been possible in the baseline scenario.
This will help to achieve SDG 8 with indicators 8.5.2 "Unemployment rate, by sex, age and persons with disabilities" and following target: 8.5 "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value" There is no opportunity to employ woman. So "equal pay for work of equal value" does not apply.

This will also help to achieve "the project labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment." Training records or certificates will be provided during each monitoring period. Since there would have been no training offered if the project did not exist, this baseline is also 0.

SDG 13 Climate Action: The project contributes to the following indicators 13.3.2 Number of countries that have communicated the strengtheningof institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target 13.3.Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

SDG13: Climate Action:

Baseline emissions are calculated using following equation:

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

Baseline emissions of methane from the SWDS are determined as follows, based on the amount of methane that is captured under the project activity and the amount that

would be captured and destroyed in the baseline (such as due to regulations). In addition, the effect of methane oxidation that is present in the baseline and absent in the project is taken into account:

$$BE_{CH4,y} = (1 - OX_{top-layer})(F_{CH4,PJ,y} - F_{CH4,BL,y})GWP_{CH4} \quad \textbf{(2)}$$

BE_{CH4}= 297,864 tCO2e[23]

Where:

$BE_{CH4,y}$ Baseline emissions of LFG from the SWDS in year *y* (t CO2e/yr)

$OX_{top-layer}$ Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)

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

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

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

There is neither regulatory nor contractual requirements for methane destruction/combustion. There is also no LFG flared without the project activity, therefore $F_{CH4,BL,y}$ is equal zero.

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

Where:

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

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

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

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

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

Thus, $F_{CH4,PJ,y}$ calculated as follow:

$$F_{CH4,PJ,y} = F_{CH4\,flared,y} + F_{CH4,EL,y} \quad \textbf{(4)}$$

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[23] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_C47

$F_{CH4,PJ,y}$ = 0 + 12,896 tCH4[24]

The mass flow of greenhouse gas *i* ($F_{CH4,t}$) is determined as follows:

$$F_{CH4,t} = V_{t,db} * v_{CH4,wb,t} * \rho_{CH4,n} \quad \textbf{(5)}$$

With

$$\rho_{CH4,n} = \frac{P_n * MM_{CH4}}{Ru * T_n} \quad \textbf{(6)}$$

Where:

$F_{CH4,t}$ Mass flow of greenhouse gas (*CH4)* 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 dry basis (m³ dry gas/h)

$v_{CH4,t,wb}$ Volumetric fraction of greenhouse gas *CH4* in the gaseous stream in a time interval *t* on a dry basis (m³ gas *i*/m³ dry gas)

$\rho_{CH4,n}$ Density of greenhouse gas CH4 in the gaseous stream at normal conditions *t* (kg gas *i*/m³ gas *i*)

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

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

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

T_n Temperature of the gaseous stream at normal conditions (K)

$F_{CH4,EL}$=12,896 tCH4

The hourly values are then aggregated for the duration of the monitoring period n, as follows:

$$F_{CH4,n} = \sum_{h=1}^{h=hn} F_{CH4,t}$$

$F_{CH4,\ flared,\ y}$ is determined as the difference between the amount of methane supplied to the flare(s) and any methane emissions from the flare(s), as follows:

$$F_{CH4,flared,y} = F_{CH4,sent\_flare,y} - (PE_{flare,y} / GWP_{CH4}) \quad \textbf{(8)}$$

Where:

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

$F_{CH4,\ sent\_flare,y}$ Amount of methane in the LFG which is sent to the flare in year *y* (t CH4/yr)

---

[24] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_K42

$PE_{flare,y}$ Project emissions from flaring of the residual gas stream in year *y* (t CO2e/yr)
GWP_{CH4} Global warming potential of CH4 (t CO2e/t CH4)
$F_{CH4,flared,y}$ = 0 tCH_4[25]

Baseline emissions due to electricity generation are calculated using the **ACM0002 Version 19** methodology as follows:

$$BE_y = EGBL,y * EF_{CO2,grid,y} \quad \textbf{(12)}$$

BEy= 83,066 MWh x 0,3953 tCO2/MWh = 32,836 tCO2e[26]

Where:

BE_y = Baseline emissions in year *y* (tCO_2/yr)
EG_{BLy} = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO2grid\ y}$ = CO2 emission factor of the grid in year *y* (t CO2/MWh)

BEy = $BE_{CH4,y}$ + BEy = 297,864+ 32,836 = 330,700 tCO2e[27]

Project Emission

According to ACM0001 Version 19.0 project emissions are calculated as follows;

$$PEy = PEEC,y + PEFC,y + PEDT,y + PESP,y$$

Where:

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

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

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

---

[25] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_K38
[26] RAW DATA ER Calculation Sheet_Total ER Electricity Generation_K42
[27] RAW DATA ER Calculation Sheet_Total ER Sheet_F9

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

$PE_{CH4,y} = PE_{EC,y} + PE_{FC,y}$ **(20)**

Where:

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

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

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

The project emissions from consumption of electricity by the project activity ($PE_{EC,y}$) is 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. This includes, where applicable, electricity consumed for the operation of the LFG capture system,

$PE_{EC,y} = \Sigma EC \times EFEL,j,y \times (1+TDL)$ **(21)**

PEEC,y = 0.9 tCO2e[28]

During the monitoring period there is not any fossil fuel consumption so $PE_{FC,y}$ is zero.

PEFC,y = 0 tCO2e

$PE_{CH4,y}$ = 0.9 + 0 = 0.9 tCO2e

[28] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_C50
RAW DATA ER Calculation Sheet_Total ER Sheet_E16

Application of "Tool to determine project emissions from flaring"

Project emission from flaring are calculated as the sum of emission from each minute m, based on the methane mass flow in the residual gas ($F_{CH4,RG,m}$) and the flare efficiency ($\eta_{flare,m}$), as follows:

$$PE_{flare,y} = GWP_{CH4} x \sum_{m=1}^{525600} F_{CH4,RG,m} \times \left(1 - \eta_{flare,m}\right) \times 10^{-3} \quad \textbf{(9)}$$

Where:

$PE_{flare,y}$ Project emissions from flaring of the residual gas in year y (tCO_2 e)

$F_{CH4,RG,m}$ Mass flow of methane in the residual gas in the minute m (kg)

$\eta_{flare,m}$ Flare efficiency in minute m

$PE_{flare,y}$= 0 tCO2e[29]

PEy = 0.9 tCO2e

Leakage

No leakage effects need to be accounted under the approved consolidated methodology ACM0001 version 19.0 and ACM0002 version 19.0

LEy = 0 tCO_2/year

Emission reductions

ERy = BEy – PEy - LEy = 330,700 – 1 - 0

ERy = 330,699 tCO_2[30]

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

SDG 7 (Affordable and Clean Energy)

EGy = the net electricity exported to the grid system during the year y

[29] RAW DATA ER Calculation Sheet_Methane Destruction Sheet_K39
[30] RAW DATA ER Calculation Sheet_Total ER Sheet_G16

The amount of electricity produced does not need any calculation, it is directly received from meter readings. C (Net Electricity supplied to the grid [MWh] EGy) = A (Electricity supplied to the grid MWh]) – B (Electricity consumption from the grid [MWh])

The Samsun Landfill Project net electricity supplied to the grid 83,064 MWh[31] during this monitoring period.

SDG 8 (Decent Work and Economic Growth)

"Number of employment generation" and does not need any calculation, it is directly received from SGK records. "Health and Safety Training Records" does not need any calculation, it is directly taken from training records. 29 people employed and all employed has taken Health and Safety Training during this monitoring period.

SDG 13 (Climate Action)

The total emission reductions can be calculated with the results of the below described equations. The emission reduction is equal to the baseline emissions minus project emissions and leakage emissions. Leakage emissions in this project are considered to be zero. The general equation is as follows:

$ER_y = BE_y - PE_y - LE_y$

Where:

ERy = Emission reductions in year y (tCO2e/yr)
BEy = Baseline emissions in year y (tCO2/yr)
PE y= Project emissions in year y (tCO2e/yr)
LEy = Leakage emissions in year y (t CO2/y

Project Emissions

PEy=0.9 tCO2e

[31] RAW DATA ER Calculation Sheet_Total ER Electricity Generation_J42

Leakage

Leakage emission (LEy) is considered as "0" as suggested in ACM0001 Version 19 and ACM0002 Version 19

Baseline Emissions

The baseline emissions are calculated as follows:

$$BE_{CH4,y} = (1 - OX_{top-layer})(F_{CH4,PJ,y} - F_{CH4,BL,y})GWP_{CH4}$$

and

BEy = EGBL,y * EFCO2,grid,y

Where:

BEy = Baseline emissions in year y (tCO2/yr)

EGBLy = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

EFCO2grid y = CO2 emission factor of the grid in year y (t CO2/MWh)

The Samsun Landfill Project produce **0.9 tCO2e** emission during this monitoring period.

E.3. Calculation of leakage

Leakage emission (LEy) is considered as "0" as suggested in ACM0001 Version 19 and ACM0002 Version 19.

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

SDG 7（Affordable and Clean Energy)

Net Benefit= Project value- Baseline value

83,064.315 MWh = 83,064.315 MWh – 0

Vintage	(A) Electricity supplied to the grid [MWh]	(B) Electricity consumption from the grid [MWh]	(C) = (A) - (B) EG Net electricity supplied to the grid [MWh]
2019 (05.09.2019-31.12.2019)	16,986.337	0.1386	16,986.198
2020 (01.01.2020-31.12.2020)	48,689.965	1.575	48,688.390
2021 (01.01.2021-31.04.2021)	17,390.104	0.378	17,389.726
TOTAL (05/09/2019 – 31/04/2021)	83,066.407	2.091	83,064.315

SDG 8 (Decent Work and Economic Growth)

29 people have employed, and all employment has attended to the trainings in this monitoring period.

SDG 13 (Climate Action)

The baseline emissions are calculated as follows:

$$BE_{CH4,y} = (1 - OX_{top-layer})(F_{CH4,PJ,y} - F_{CH4,BL,y})GWP_{CH4}$$

and

$BEy = EG_{BL,y} * EFCO2,grid,y$

	ACM0001 Ver19	***ACM0002 Ver19***	
Date	**BECH4,y Methane Destruction (tCO2e)**	**Baseline from Electricity Generation (tCO2e)**	**Overall BEy (tCO2e)**
Sum 2019 (05.09.2019-31.12.2019)	47,488	6,715	54,203

Sum 2020 (01.01.2020-31.12.2020)	178,557	19,247	197,804
Sum 2021 (01.01.2021-30.04.2021)	71,819	6,874	78,693
Sum 4th Monitoring Period (05/09/2019 – 31/04/2021)	**297,864**	**32,836**	**330,700**

Date	Baseline emissions or baseline net GHG removals by sinks (t CO2e)	Project emissions or actual net GHG removals by sinks (t CO2e)	Leakage (t CO2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO2e)
Sum 2019 (05.09.2019-31.12.2019)	54,203	0.06	0	54,203
Sum 2020 (01.01.2020-31.12.2020)	197,804	0.69	0	197,803
Sum 2021 (01.01.2021-30.04.2021)	78,693	0.17	0	78,693
Sum 4th Monitoring Period (05/09/2019 – 31/04/2021)	**330,700**	**1**	**-**	**330,699**

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
7	Affordable and Clean Energy	0	83,064 MWh	83,064 MWh
8	Decent Work and Economic Growth	0	29 people employed	29 people employed[32]
8	Decent Work and Economic Growth	0	All employed has taken Health and Safety Training	All employed has taken Health and Safety Training

[32] RAW DATA_ER Calculation_SDG Employee Records Sheet

13	Climate Action	330,699 tCO2	0	330,699 tCO2

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

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values achieved during this monitoring period
7***	90,501 MWh	83,064 MWh
8	Between 20 and 25 people employed	All employed 29 people employed
8	All employed will be trained during the monitoring period	All employed has taken Health and Safety Training
13***	530,317 tons net waste amount	526,114
13***	41,119,100 m3 LFG	32,522,601 m3 LFG
13***	190,403 tCO2e[33]	330,699 tCO2e

****The estimated in ex ante calculation of approved PDD has been determined through 604 days which is the day number in this crediting period.[34]*

E.6. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

The expected annual electricity generation value is 54,600MWh and emission reduction is 115,062 tCO2 average according to registered PDD. According to monitoring period the expected electricity generation value is 90,501 MWh and emission reduction is 190,403 tCO2e according to registered PDD. And PP has monitored 604 days (between 05/09/2019 and 30/04/2021) so PP has calculated 330,699 tCO2 emission reduction and 83,064 MWh electricity generation for this monitoring period.

E.7. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

The monitoring period covers the approximately two years and half of project operation. The comparison shows that the actual emission reduction is 330,699 tCO2 a higher (approximately 73.68%) than the expectation 190,403 tCO2 in the registered PDD. And the comparison shows that the actual net electricity generation is 83,064 MWh a lower (approximately 8.22%) than the expectation generation 90,501 MWh in the registered PDD. The difference is due to the accumulation of methane gas in the previous periods

[33] RAW DATA_ER Calculation_Toral ER Sheet-E25
[34] RAW DATA_ER Calculation_SDG Impact Sheet

and the calculations made on a fixed coefficient and tonnage during the validation process. Also this differences not effected to IRR analyses.

SECTION F. SAFEGUARDS REPORTING

There is no changes or improvements to proposed mitigation measures. The PP has assessment questions answered "potentially" only on "Principle 3-Community Health, Safety and Working Conditions" and related information has given under SDG8 Decent Work and Economic Growth.

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.

This is the first monitoring period of the second crediting period and there is no input received via the Continuous Input and Grievance Mechanism during the approximately 9 years.

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

They were agreed no SDG monitoring parameter to be monitored when the PP asked the stakeholder during the 2nd crediting renewal period which has approved on 05/02/2020 by GS.

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

No legal contest that has arisen with the project during the monitoring period.

There is no annual report has been prepared because of COVID-19 status.

Revision History

Version	Date	Remarks
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