



Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	Adana Landfill Waste Management Project - Turkey
Reference number of the project activity	GS 715
Version number of the monitoring report	Version 05.0
Completion date of the monitoring report	17.08.2013
Registration date of the project activity	13.06.2012
Monitoring period number and duration of this monitoring period	1 st monitoring period 01.01.2011– 31.12.2012
Project participant(s)	ITC Invest Trading & Consulting A.G. Turkish Ankara Branch
Host Party(ies)	Republic of Turkey
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 13: Waste Handling and Disposal Applied Methodology: - ACM0001 "Consolidated methodology for landfill gas project activities" version 11; - AM0025 "Avoided emissions from organic waste through alternative waste treatment process" version 12
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	615,410 tCO ₂ eq
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	396,231 tCO ₂ eq ¹

¹ The actual GHG emission reductions achieved during the monitoring period between 01.01.2011 and 31.12.2012, which falls under the first commitment period.

SECTION A. Description of project activity**A.1. Purpose and general description of project activity**

Landfill is a significant source of global warming as it contains a high share of methane (CH₄), which is a potent greenhouse gas. The Adana Waste Management Project contributes to the reduction of greenhouse gas through destruction and avoidance of methane in the landfill area. The landfill, known as the Adana Sofulu Landfill has been established as a landfill area in 1990 and currently receives the waste generated by several municipalities of Adana.

The project activity destroys methane through landfill gas extraction from the landfill area and avoids methane formation through the anaerobic digester(s). The landfill gas is furthermore used for the purpose of electricity generation via gas engines. The electricity generated is delivered to the national grid system, substituting the baseline energy fuel which is mainly based on fossil fuels.

Brief description of the installed technology and equipment:

The proposed project activity involves:

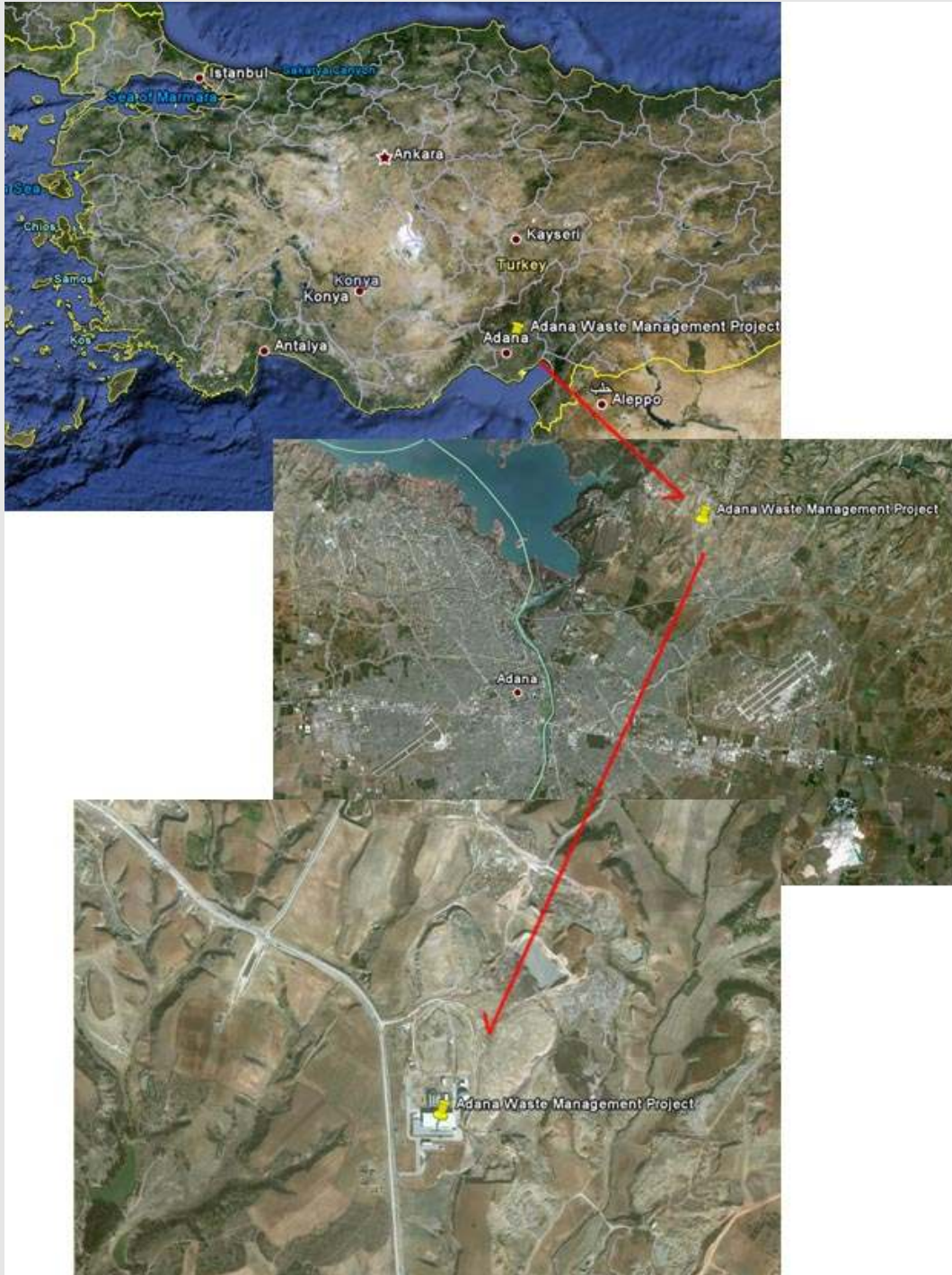
- gradual covering of the landfill area
- a gas extraction system which can support gas engines for electricity generation
- a flaring system
- a leachate drainage system
- an anaerobic digester
- gas engines

During the first monitoring period from 01.01.2011 – 31.12.2012, the total emission reduction achieved is 396,231 tCO₂eq.

A.2. Location of project activity

Host Party: Republic of Turkey

The project location is the Sofulu district of Adana Province. Adana landfill receives fresh waste from nearby municipalities of Adana Greater Municipality. The GSP coordinates of the project are 37°3'1.93"N / 35°23'44.22" E.



A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host country)	ITC Invest Trading & Consulting A.G. Turkish Ankara Branch	No

Name of the person/entity completing the monitoring report:

The monitoring report has been prepared by Mr. Ömer Akyürek from OakDanışmanlık in association with Mr. Hinrich Bornebusch.

Company Name	OakDanışmanlık	Ecoblu
Visiting Address	Acıbadem Mah. Şemibey Sok. Belkıs Apt. N:3 D:6 Kadıköy / İstanbul, TURKEY	Gerhart –Hauptmann-Weg 76 A 41469 Neuss Germany
Contact Person	Ömer Akyürek	Hinrich Bornebusch
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E-mail	oak@oakdanismanlik.com	bornebusch@ecoblu.de

A.4. Reference of applied methodology**Applied approved baseline and monitoring methodologies:**

- Approved consolidated baseline methodology ACM0001 “Consolidated methodology for landfill gas project activities” Version 11;
- Approved baseline and monitoring methodology AM0025 “Avoided emissions from organic waste through alternative waste treatment process” Version 12.

Used tools:

- “Tool for the demonstration and assessment of additionality” Version 05.2;
- “Tool to determine project emissions from flaring gases containing methane “Version 01;
- “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” Version 05;
- “Tool to calculate the emission factor for an electricity system” Version 02, EB50;
- ‘Tool to calculate baseline, project and/or leakage emissions from electricity consumption’ version 01.

For more information regarding the methodology please refer to

<http://cdm.unfccc.int/methodologies/PAmethodologies/approved>

A.5. Crediting period of project activity

The project was registered on 13.06.2012 with a renewable crediting period. The first crediting period starts from 01.01.2011 to 31.12.2017

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

At the moment of preparation of this monitoring report, the total installed capacity of the project activity has reached to 15.4 MW with two booster installed. There are 11 units of gas engines installed with a capacity of 1.4 MW each. 5 gas engines with a total installed capacity of 7 MW are connected to Booster 2, which is the dedicated booster for the LFG and 6 gas engines with a total installed capacity of 8.4 MW are connected to Booster 1, which is dedicated to the AD system.

At the time of PDD writing it was envisaged that the installed capacity will reach to a total of 15.4 MW, which is in line with the actual implementation.

A summary of the shifts of connections of engines (and respectively of capacity) is summarized in the following table:

Table.1 Timeline of capacity distribution

Date	Engines allocated to LFG (Booster 2) [capacity MW]	Engines allocated to biogas (Booster 1) [capacity MW]	Total installed capacity of engines [capacity MW]
02.09.2010	9.8	0	9.8
15.05.2011	5.6	4.2	9.8
06.10.2011	7	4.2	11.2
26.12.2011	5.6	5.6	11.2
28.06.2011	7	7	14
01.12.2012	7	8.4	15.4

The most important milestones of project activity are summarised as follows:

Table 2. Important milestones of the project activity

Date	Milestone
12.03.2009	Start of Construction
02.09.2010	Start of operation of the first 7 PGUs via Booster 2 ² (GM1; GM2; GM3; GM4; GM5; GM6 and GM7)
01.01.2011	Start of first crediting period. ³
21.01.2011	Start of operation of the first 3 digesters.
15.05.2011	GM1; GM2 and GM3, which were previously connected to Booster 2 are connected to Booster 1 ⁴ .
06.10.2011	Addition of a single engine to booster 2 (GM8)
26.12.2011	GM4, which was previously connected to Booster 2 is connected to Booster 1.

² Booster 2 is the first booster installed and serves for the LFG system.

³ The start of first crediting period also marks the starting date of this monitoring period.

⁴ Booster 1 is the second booster installed and serves for the AD system.

18.04.2012	Start of operation of 3 additional digesters
13.06.2012	Registration of the project
28.06.2011	Addition of a single engine to booster 1 (GM9)
28.06.2011	Addition of a single engine to booster 2 (GM10)
01.12.2012	Addition of a single engine to booster 1 (GM11)
31.12.2012	End of first monitoring period

Description of the LFG activity:

The landfill gas is collected with the horizontal channels and vertical wells in the landfill. This system also helps to carry out the collection of the leachate that will be discharged to the waste water treatment centre. These two different methods horizontal and vertical collection are explained in detail below:

The first one is the collection of the LFG with series of vertical wells, which helps the collection of the LFG from deep points in the landfill body. Wells are drilled till to a certain depth and then HDPE pipes are installed to the holes. After the installation of each well, the collected LFG via wells will be transferred to the main collection system.

The second system is the horizontal collection system, which intercept LFG migrating offsite in the subsurface. Vertical wells are installed at the horizontal pipe to convey the gas.

Active gas collection system is applied for degassing of the landfill. The main pipe is connected to the intake pipe of the landfill gas blower and the outgoing pipe from the blower is then finally connected to the LFG utilization system.

Description of digester technology:

There are currently 6 Anaerobic Digesters implemented in the project activity. The implemented technology for digester is dry digestion involving mesophilic / thermophilic bacteria at specific operating conditions and in absence of oxygen. The residence time is around 15-20 days. Digesters are designed to prevent physical leakage of biogas. Digester is designed to use organic waste effectively and produce methane. The produced gas is collected and is sent to engines via to generate electricity.

Construction of Digester:

To prevent leakage, advanced methods will be implemented during construction of the digesters. A proven and reliable technology developed by ITC will be applied during construction of digesters, enabling a 100% gas leakage free operation. Special concrete walls (50cm) and foundation (80cm) are thick enough, which will include additives (cement based insulation material resistance to sulphide) and concrete walls will be coated with cement based epoxy-anthracene oil mixture to prevent leakage. Furthermore, walls will be equipped with water stops.

The cement used for the construction of the anaerobic digester tanks are special type of blastfurnace cement with a standard defined as minimum class C30. The blastfurnace cement is used to reduce permeability, to lower hydration, better workability and finish ability, higher compressive and finish ability, improved resistance to aggressive chemical (such as sulphide) and resistance to many forms deleterious attack (such as acid attack) than normal concrete⁵.

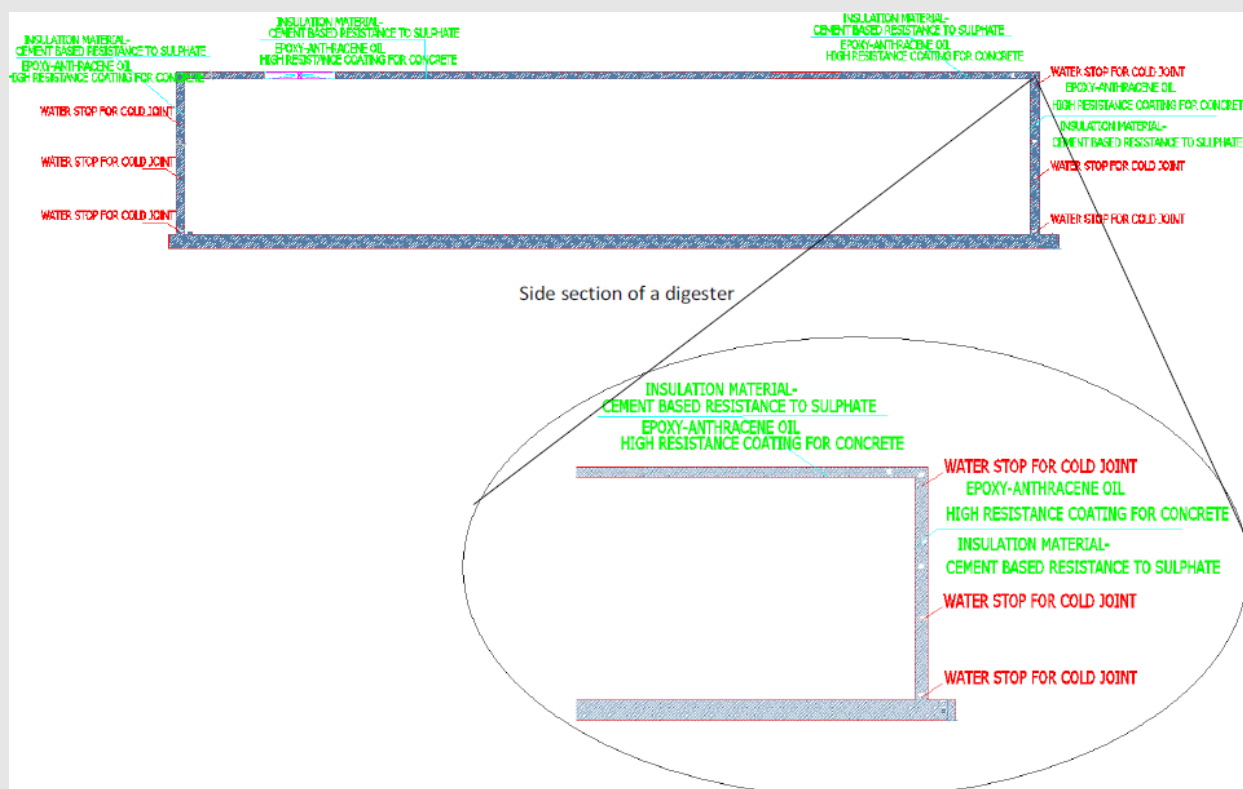
The quality of the concrete and lab tests have been carried out after the construction through a laboratory analysis and the results confirm the quality and a minimum standard of C30⁶.

Valves and any other connection points will be welded to prevent any leakage. The connection points are isolated as well to prevent leakage.

⁵ Detailed technical specifications are available to the DOE.

⁶ Lab report and test results have been submitted to the DOE.

The inside of the digester will be equipped with gas collection pipes in short distances. Gas will be transferred to the energy utilization plant with very well insulated HDPE gas pipes that is resistance to sulphate.



Both quality and the material are certified and assured methods will be applied delicately to connect the materials. Therefore, all the risks for leakage are prevented steadily.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

There are no temporary deviations from the registered monitoring plan or applied methodology within this monitoring period.

B.2.2. Corrections

There are no corrections to project information or parameters fixed at validation within this monitoring period. But it should be noted that the emission factor of the electricity system is mentioned as 0.609 tCO₂eq/MWh (ID.21) under section B.6.2 "Data and parameters available at the validation" and as 0.561 tCO₂eq/MWh under section B.6.1.a "Baseline Emissions". This is due to a mistake on the revision of the PDD during the registration and the correct value of the emission factor is 0.561 tCO₂eq/MWh⁷. The emission reductions are calculated based on the 0.561 tCO₂eq/MWh value for the emission factor.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

There are no permanent changes from the registered monitoring plan or applied methodology within this monitoring period.

⁷ Please refer to Registration review protocol of GS. Available to the DOE.

B.2.4. Changes to project design of registered project activity

There are no changes to project design of registered project activity within this monitoring period.

B.2.5. Changes to start date of crediting period

The start date of the crediting period has been indicated as 01.06.2010 under the registered PDD. Gold Standard Requirements v 2.1 provides the following requirement;

“V.a.2.1: For VER project activities proceeding under the regular project cycle, the start date of Gold Standard Crediting Period shall be the date of start of operation or a maximum of two years prior to Gold Standard registration, whichever occurs later.”

The project activity is registered as Gold Standard Project activity on 13.06.2012 and therefore only eligible to claim credits from 13.06.2010 and onwards. Therefore the Project Participant wishes to start the crediting period from 01.01.2011. This request has been communicated with Gold Standard through Ms. Bahar Ubay Güçlüsoy (Regional Manager) on 01.03.2013⁸.

The start date of crediting period is revised as 01.01.2011.

B.2.6. Types of changes specific to afforestation or reforestation project activity

This section is not applicable to the project activity.

SECTION C. Description of monitoring system

The monitoring system has been developed in a way to cover all the procedures required as per the approved methodology ACM0001 and AM0025 and validated monitoring plan. To guarantee the accuracy of the monitoring data periodic calibration of the installed monitoring equipment are carried out according to definitions included in the monitoring plan of the registered PDD and in accordance with the requirements of the manufacturer. All data are registered and processed electronically. At the booster stations server units receive all data sent from the meters and data in real time is saved to an internal memory every 30 minutes. Every day the server creates a file with all half-hourly data saved. The server also automatically calculates every 30 minutes the normal flow of landfill gas captured and of the biogas produced by the digester; the gas flow is multiplied with the real gas formula normating the gas flow to standard temperature and pressure. Temperature and pressure are real time values. The data stored at the booster station server are transferred once per month to a computer and a backup hard drive. The data is archived and stored electronically during the crediting period and two years after.

The electricity meters are bi directional and measure both the electricity generated by the project activity and the electricity consumed by the facility. The meters are sealed by the electricity distribution/transmission company and ITC cannot intervene with the devices. The original data from the electricity meter are taken by a distance reading carried out by the Grid Company. The electricity data can be seen on a web page of PNUM⁹. ITC has a password and username to follow the electricity data. The Grid Company submits monthly a protocol to the project owner. The monthly electricity data are transferred to the excel sheet used for the emission reduction calculations.

The calculation of GS VERs for the first monitoring period is carried out through a separate spreadsheet. The project owner is ITC and therefore responsible for the operation and the monitoring of the project activities.

Roles and responsibilities

The general manager with overall competencies is Mr. Erdoğan Göğen. The environmental manager and chief of monitoring is Mrs. Tuğba Kırer. The chief monitor is responsible for a sound monitoring system, for the implementation of the calibration procedures and for data storing.

Involvement of Third Parties

⁸ The email correspondence is available to the DOE.

⁹ <http://dgpys.teias.gov.tr/dgpys/>

Support and consultancy regarding the development of monitoring report is provided by Ömer Akyürek (OakDanışmanlık) in association with Mr. Hinrich Bornebusch (Ecoblu).

Internal audits and control measures

There are daily checks if the data from the day before was stored successfully on the servers in the booster station. Three times a day the operating hours of the engines are checked. Aggregation of data and cross checks takes place periodically.

Monitoring Equipment

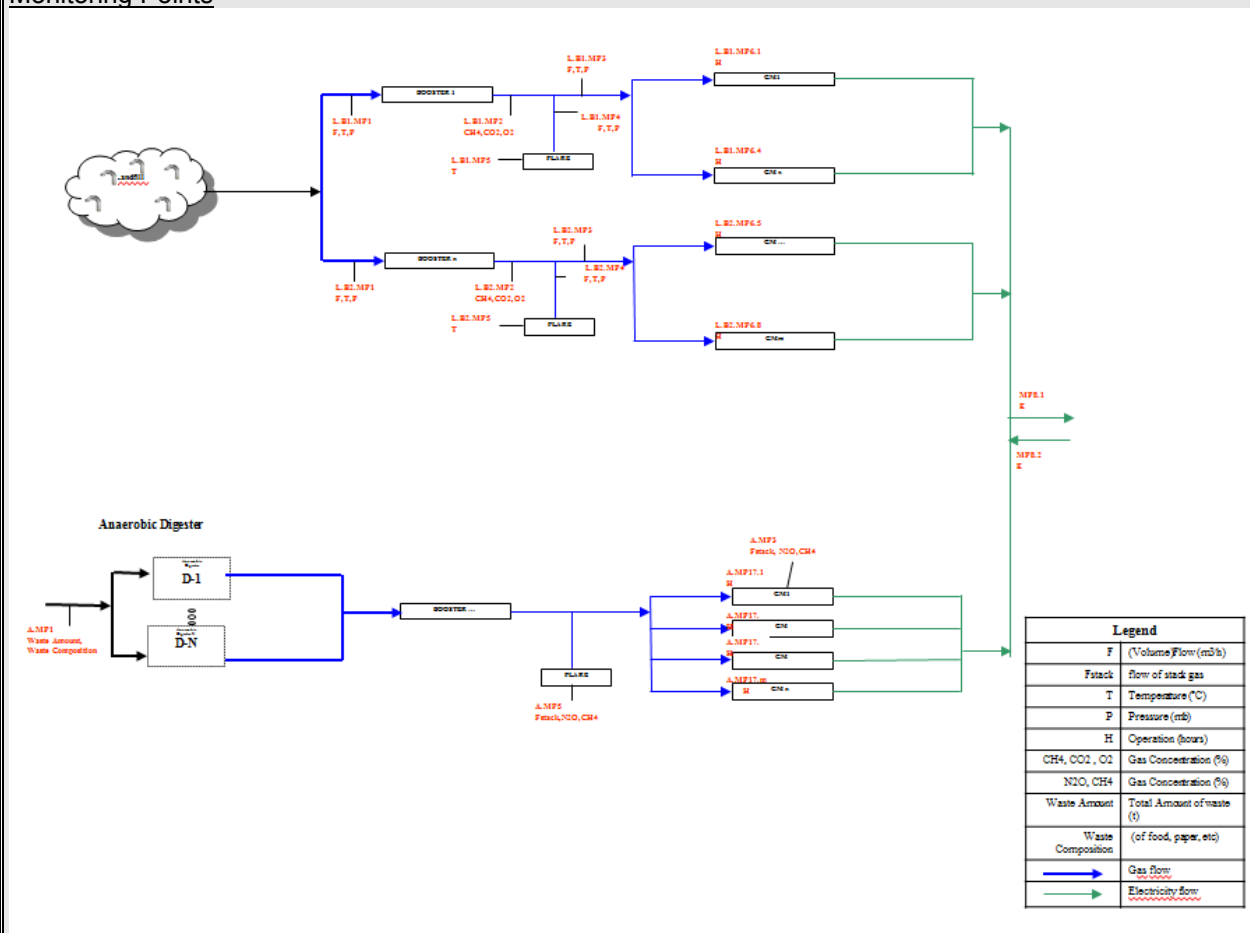
The list of monitoring equipment and equipment details including calibration dates are provided in the below table.

Table 3. List of monitoring equipment

ID NO	Monitoring Point Number	Measurement	Producer	Model	Serial No./ ID No	Date of Installation	Date of De-Installation	Maximal calibration period according to producer	Calibration Date
ID.22	L.B2.MP1	FLOW	ABB	2600T	6409029293	20.05.2010		5 Y	17.12.2009
ID.23	L.B2.MP4	FLOW	ABB	2600T	6408005055	20.05.2010	08.02.2013	5 Y	19.02.2008
ID.24	L.B2.MP3	FLOW	ABB	2600T	6409029303	20.05.2010		5 y	16.12.2009
ID.25	L.B2.MP1	TEMPERATURE	ELIMKO	RT03-1P06-7,5-Tr	08/33890	20.05.2010	02.03.2011	A	02.03.2010
ID.25	L.B2.MP1	TEMPERATURE	ELIMKO	PT 100	09/6659	02.03.2011	15.08.2011	A	20.10.2010
ID.25	L.B2.MP1	TEMPERATURE	TEKON	TRT03-B1E06-12Ü-TR	10/0748	15.08.2011	03.03.2012	1 Y	04.03.2011
ID.25	L.B2.MP1	TEMPERATURE	ELIMKO	RT03-1K09-70-U-Tr	09/6659	03.03.2012	08.02.2013	1 Y	24.02.2012
ID.25	L.B2.MP3	TEMPERATURE	ELIMKO	RT03-1P06-7,5-Tr	08/33892	20.05.2010	02.03.2011	A	02.03.2010
ID.25	L.B2.MP3	TEMPERATURE	ELIMKO	PT 100	09/23188	02.03.2011	24.01.2012	A	17.02.2011
ID.25	L.B2.MP3	TEMPERATURE	NOVA-Z	ODE-RTD-OR03-B1H09-2310	0801-00553	24.01.2012	03.03.2012	10 y	05.11.2008
ID.25	L.B2.MP3	TEMPERATURE	NOVA-Z	ODE-RTD-OR03-B1H09-ÜHT	0802-01120	03.03.2012		10 y	25.02.2011
ID.25	L.B2.MP4	TEMPERATURE	ELIMKO	RT03-1P06-7,5-Tr	08/33886	20.05.2010	02.03.2011	A	02.03.2010
ID.25	L.B2.MP4	TEMPERATURE	TEKON	1xPt100(3W)	11-0072	02.03.2011	19.09.2011	5 Y	24.01.2011
ID.25	L.B2.MP4	TEMPERATURE	TEKON	TRT03-B1E06-12-Ü-TR	10/0749	19.09.2011	03.03.2012	5 Y	04.03.2011
ID.25	L.B2.MP4	TEMPERATURE	ELIMKO	RT03-1P08-5-U-Tr	08/14623 T	03.03.2012	08.02.2013	1 Y	17.02.2012
ID.26	L.B2.MP1	PRESSURE	KELLER	PR23	129590	20.05.2010	10.03.2011	12 m	10.03.2010
ID.26	L.B2.MP1	PRESSURE	KELLER	PR23	138899	10.03.2011	24.01.2012	12 m	23.02.2011
ID.26	L.B2.MP1	PRESSURE	KELLER	PR23	145076	24.01.2012	16.05.2012	12 m	09.09.2011
ID.26	L.B2.MP1	PRESSURE	KELLER	PR23	138895	16.05.2012	08.02.2013	12 m	15.02.2012
ID.26	L.B2.MP3	PRESSURE	KELLER	PAA - 21S	70188	20.05.2010	09.03.2011	12 m	09.03.2010
ID.26	L.B2.MP3	PRESSURE	KELLER	PAA - 21S	128872	09.03.2011	03.03.2012	12 m	04.03.2011
ID.26	L.B2.MP3	PRESSURE	KELLER	PAA - 21S	128866	03.03.2012	16.05.2012	12 m	24.02.2012
ID.26	L.B2.MP3	PRESSURE	ABB	2600 T	3K646611009247	16.05.2012		10 Y	25.08.2011
ID.26	L.B2.MP4	PRESSURE	WIKA	S-10	I970T/4103354	20.05.2010	10.03.2011	12 m	18.03.2010
ID.26	L.B2.MP4	PRESSURE	KELLER	PAA - 21S	128862	10.03.2011	03.03.2012	12 m	04.03.2011
ID.26	L.B2.MP4	PRESSURE	KELLER	PAA - 21S	128873	03.03.2012	08.02.2013	12 m	24.02.2012
ID.27	L.B2.MP5	TEMPERATURE	ELIMKO	TC02-1S4Y10-50/10-R1/2-Tr-S	08/30902	20.05.2010	04.02.2011	A	04.02.2010
ID.27	L.B2.MP5	TEMPERATURE	HAASE	1 PTRH-PT/S	2006000477/920-1	04.02.2011		N/A	17.09.2008
ID.28	L.B2.MP2	CH4, CO2, O2	SIEMENS	ULTRAMAT 23	N1-V6-0196	20.05.2010		6-12 m	19.02.2010 12.02.2011 21.01.2012
ID.36	A.MP1	LOADCELL	SEG	KN4-100	A0928006	21.01.2011	15.01.2013	1 Y	17.01.2011 16.01.2012

ID.37/ ID.44	A.MP1	Weigh bridge	Ozkanlar	B2	E-888	18.12.2010		10 Y	26.12.2010 20.05.2011 12.03.2012
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Monitoring Points



SECTION D. Data and parameters

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

(Copy this table for each piece of data and parameter.)

Data / Parameter:	ID.2 / GWP _{CH4}
Unit:	tCO ₂ e/tCH ₄
Description:	Global warming potential of CH ₄
Source of data:	IPCC
Value(s) applied):	Under the PDD the GWP _{CH4} has been considered as 21 for ex-ante calculations. As this monitoring period falls completely within the first commitment period, the value of 21 is used.
Purpose of data:	Calculation of the baseline emissions
Additional comment:	In line with the requirements of GS ¹⁰ : 21 for the monitoring period that falls within the first commitment period (to 31.12.2012).

¹⁰ Reference: GS TAC&Rule update published on January 2013: <http://www.cdmgoldstandard.org/wp-content/uploads/2011/09/Global-Warming-Potentials-for-Gold-Standard-Project-Activities-2013.pdf>

Data / Parameter:	ID.3 / GWP_{N2O}
Unit:	tCO ₂ e/tN ₂ O
Description:	Global warming potential of N ₂ O
Source of data:	IPCC
Value(s) applied:	Under the PDD the GWP _{N2O} has been considered as 310 for ex-ante calculations. As this monitoring period falls completely within the first commitment period, the value of 310 is used.
Purpose of data:	Calculation of the baseline emissions
Additional comment:	In line with the requirements of GS ¹¹ : 310 for the monitoring period that falls within the first commitment period (to 31.12.2012).

Data / Parameter:	ID.4 / Density of Methane
Unit:	tCH ₄ /m ³ CH ₄
Description:	Density of methane
Source of data:	ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities" version 11
Value(s) applied:	0.0007168
Purpose of data:	Calculation of the baseline emissions
Additional comment:	Standard temperature and pressure is defined as 0° degree Celsius and 1.013 bar.

Data / Parameter:	ID.13 / ϕ
Unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data:	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" version 05
Value(s) applied:	0.9
Purpose of data:	Calculation of the baseline emissions and leakage
Additional comment:	-

Data / Parameter:	ID.14 / 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:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf (Volume 5 / page 3.15)
Value(s) applied:	0
Purpose of data:	Calculation of the baseline emissions and leakage

¹¹ Reference: GS TAC&Rule update published on January 2013: <http://www.cdmgoldstandard.org/wp-content/uploads/2011/09/Global-Warming-Potentials-for-Gold-Standard-Project-Activities-2013.pdf>

Additional comment:

-

Data / Parameter:**ID.15 / F**

Unit:

-

Description:

Fraction of methane in the SWDS gas (volume fraction)

Source of data:

IPCC 2006 Guidelines for National Greenhouse Gas Inventories

Value(s) applied:

0.5

Purpose of data:

Calculation of the baseline emissions and leakage

Additional comment:

-

Data / Parameter:**ID.16 / DOC_f**

Unit:

-

Description:

Fraction of degradable organic carbon (DOC) that can decompose

Source of data:

IPCC 2006 Guidelines for National Greenhouse Gas Inventories

Value(s) applied:

0.5

Purpose of data:

Calculation of the baseline emissions and leakage

Additional comment:

-

Data / Parameter:**ID.17 / MCF**

Unit:

-

Description:

Methane correction factor

Source of data:

IPCC 2006 Guidelines for National Greenhouse Gas Inventories

Value(s) applied:

0.8

Purpose of data:

Calculation of the baseline emissions and leakage

Additional comment:

-

Data / Parameter:**ID.18 / DOC_j**

Unit:

-

Description:

Fraction of degradable organic carbon (by weight) in waste type j

Source of data:

IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 2.4 and Table 2.5)

Value(s) applied:

The following values for the different waste types have been applied:

Waste type j**DOC_j
(% wet waste)**

Wood and wood products

43

Pulp, paper and cardboard

40

Food, food waste, beverages and tobacco

15

Non-food organics¹²

20

Purpose of data:

Calculation of the baseline emissions and leakage

¹² Non-food organics refer to textiles, garden, yard and park wastes. Therefore a conservative value of 20% has been chosen.

Additional comment:	-
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Data / Parameter:	ID.19 / k _j																	
Unit:	-																	
Description:	Decay rate for the waste type j																	
Source of data:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (Volume 5, Table 3.3)																	
Value(s) applied):	<table><tr><td colspan="2" rowspan="2">Waste type j</td><td>Boreal and Temperate (MAT < 20°C)</td></tr><tr><td>Dry (MAP/PET <1)</td></tr><tr><td rowspan="2">Slowly degrading</td><td>Pulp, paper, cardboard</td><td>0.04</td></tr><tr><td>Wood, wood products and straw</td><td>0.02</td></tr><tr><td>Moderately degrading</td><td>Other (non-food) organic putrescible garden and park waste</td><td>0.05</td></tr><tr><td>Rapidly degrading</td><td>Food, food waste, sewage sludge, beverages and tobacco</td><td>0.06</td></tr></table>			Waste type j		Boreal and Temperate (MAT < 20°C)	Dry (MAP/PET <1)	Slowly degrading	Pulp, paper, cardboard	0.04	Wood, wood products and straw	0.02	Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06
Waste type j		Boreal and Temperate (MAT < 20°C)																
		Dry (MAP/PET <1)																
Slowly degrading	Pulp, paper, cardboard	0.04																
	Wood, wood products and straw	0.02																
Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05																
Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06																
Purpose of data:	Calculation of the baseline emissions and leakage																	
Additional comment:	-																	

Data / Parameter:	ID.20 / f		
Unit:	-		
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner.		
Source of data:	Registered PDD		
Value(s) applied:	0		
Purpose of data:	Calculation of the baseline emissions and leakage		
Additional comment:	-		

Data / Parameter:	ID.21 / CEF_d		
Unit:	tCO ₂ e/MWh		
Description:	Emission factor for the production of the electricity in the project activity		
Source of data:	Registered PDD		
Value(s) applied:	0.561		
Purpose of data:	Calculation of the baseline and project emissions		

Additional comment:	the emission factor of the electricity system is mentioned as 0.609 tCO ₂ eq/MWh (ID.21) under section B.6.2 “Data and parameters available at the validation” and as 0.561 tCO ₂ eq/MWh under section B.6.1.a “Baseline Emissions”. This is due to a mistake on the revision of the PDD during the registration and the correct value of the emission factor is 0.561 tCO ₂ eq/MWh ¹³ . The emission reductions are calculated based on the 0.561 tCO ₂ eq/MWh value for the emission factor.
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Data / Parameter:	SD.1.a / EF_{SO2}
Unit:	kg/MWh
Description:	SO ₂ emissions per MWh electricity generation from fossil fuels determined ex-ante for SD.1 (Air Quality)
Source of data:	Registered Gold Standard Project Passport
Value(s) applied:	0.45
Purpose of data:	Used for Gold Standard Sustainable Development Monitoring Parameter SD.1 “Air Quality”.
Additional comment:	-

Data / Parameter:	SD.1.b / EF_{NO2}
Unit:	kg/MWh
Description:	NO ₂ emissions per MWh electricity generation from fossil fuels determined ex-ante for SD.1 (Air Quality)
Source of data:	Registered Gold Standard Project Passport
Value(s) applied:	1.81
Purpose of data:	Used for Gold Standard Sustainable Development Monitoring Parameter SD.1 “Air Quality”
Additional comment:	-

Data / Parameter:	SD.3 / w_{H2S}
Unit:	Fraction
Description:	Fraction of sulphide within the LFG determined ex-ante for SDI.3 “Other Pollutants”
Source of data:	Registered Gold Standard Project Passport
Value(s) applied:	0.5%
Purpose of data:	Used for Gold Standard Sustainable Development Monitoring Parameter SD.3 “Other Pollutants”
Additional comment:	-

¹³ Please refer to Registration review protocol of GS. Available to the DOE.

D.2. Data and parameters monitored

Data / Parameter:	ID.22 / LFG_{total,y}
Unit:	m ³
Description:	Total amount of landfill gas captured at normal temperature and pressure
Measured/ Calculated / Default:	measured
Source of data:	Measured continuously through flow meters
Value(s) of monitored parameter:	2011: 19,804,151.075 2012: 21,731,003.730
Monitoring equipment:	Monitoring Point: L.B2.MP1 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: • Regular maintenance and testing regime • Records of calibration and maintenance will be archived. The accuracies of the measurements are 0.075%. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. Please note that the measurements of the flow rate of the gas and the measurements of the volumetric fraction of methane in the gas refer to the same basis, which is a wet basis. However the gaseous stream is expected to be dry (gas temperature below 60°C, compare “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” version 2.0.0, Option 2, A, b).
Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check with flow to engines (ID.24) and flare (ID.23)
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	ID.23 / LFG_{flare,y}
Unit:	m ³
Description:	Total amount of landfill gas sent to flare at normal temperature and pressure
Measured/ Calculated / Default:	measured
Source of data:	Measured continuously through flow meters

Value(s) of monitored parameter:	2011: 0.00 2012: 0.00
Monitoring equipment:	Monitoring Point: L.B2.MP4 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: • Regular maintenance and testing regime • Records of calibration and maintenance will be archived. The accuracies of the measurements are 0.075%. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. Please note that the measurements of the flow rate of the gas and the measurements of the volumetric fraction of methane in the gas refer to the same basis, which is a wet basis. However the gaseous stream is expected to be dry (gas temperature below 60°C, compare “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” version 2.0.0, Option 2, A, b).
Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check with total flow (ID.22) and flow to engines (ID.24)
Purpose of data:	Baseline emission calculation
Additional comment:	

Data / Parameter:	ID.24 / LFG_{electricity,y}
Unit:	m ³
Description:	Total amount of landfill gas combusted to produce electricity at normal temperature and pressure
Measured/ Calculated / Default:	Measured
Source of data:	Measured continuously through flow meters
Value(s) of monitored parameter:	2011: 19,765,603.166 2012: 21,770,504.981

Monitoring equipment:	Monitoring Point: L.B2.MP3 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: • Regular maintenance and testing regime • Records of calibration and maintenance will be archived. The accuracies of the measurements are 0.075%. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. Please note that the measurements of the flow rate of the gas and the measurements of the volumetric fraction of methane in the gas refer to the same basis, which is a wet basis. However the gaseous stream is expected to be dry (gas temperature below 60°C, compare “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” version 2.0.0, Option 2, A, b).
Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check with total flow (ID.22) and flow to flare (ID.23)
Purpose of data:	Baseline emission calculation
Additional comment:	In line with the registered PDD and methodology requirements the lowest value between LFG_{total} and $LFG_{electricity}$ has been adopted in the calculations of $MD_{project}$.

Data / Parameter:	ID.25 / T
Unit:	°C
Description:	Temperature of the landfill gas
Measured/ Calculated / Default:	Measured
Source of data:	Temperature meter. The temperature is measured to determine the norm flow of the landfill gas.
Value(s) of monitored parameter:	/
Monitoring equipment:	Monitoring Point L.B2.MPx; x = 1,2,4 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: • Regular maintenance and testing regime • Records of calibration and maintenance will be archived. The accuracies of the measurements are 0.1% (NOVA-Z), 0.5% (ELIMKO) and 0.2% (Tekon) For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C.

Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Baseline emission calculation
Additional comment:	
Data / Parameter:	ID.26 / P
Unit:	Mbar
Description:	Pressure of landfill gas
Measured/ Calculated / Default:	measured
Source of data:	The pressure is measured to determine the norm flow of the landfill gas and it is monitored separately using a pressure meter.
Value(s) of monitored parameter:	/
Monitoring equipment:	Monitoring Point L.B2.MPx; x = 1,2,4 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: • Regular maintenance and testing regime • Records of calibration and maintenance will be archived. The accuracies of the measurements are 0.1% (ABB), 0.2% (WIKA), 0.25% and 0.5% (Keller) For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C.
Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Baseline emission calculation
Additional comment:	
Data / Parameter:	ID.27 / T_{flare}
Unit:	°C
Description:	Temperature in the exhaust gas of the enclosed flare
Measured/ Calculated / Default:	Measured

Source of data:	The temperature is measured is measured in continuous by thermocouple. Measurement of temperature above 500 °C in the exhaust gas stream in the flare indicated that the flare is operating in a reliable way.
Value(s) of monitored parameter:	The flare doesn't work during the whole monitoring period, there was no gas flow to the flare because all landfill gas was combusted in the engines to produce electricity.
Monitoring equipment:	Monitoring Points: L.B2.MP5; The calibration of the monitoring equipment was carried out according to the information provided in the PDD: Replaced or calibrated according to the supplier's manual The accuracies of the measurements are 2.5%. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C.
Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Calculation of the baseline emission
Additional comment:	

Data / Parameter:	ID.28 / $\eta_{\text{flare,h}}$
Unit:	%
Description:	Flare efficiency in hour h
Measured/ Calculated / Default:	Calculated with ID.23 and ID.27
Source of data:	The flare efficiency is calculated using data from flow meter of LFG send to flare and from thermocouple which measure the temperature in the exhaust gas of the enclosed flare.
Value(s) of monitored parameter:	90% default value as per methodological tool “Tool to determine project emissions from flaring containing methane”. During this monitoring period the was no LFG sent to the flare and therefore the flare was not operational.
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	For each 30 minutes the real time value of the temperature measured by thermocouple of the flare and the gas flow sent to flare is recorded.

Calculation method (if applicable):	According to the methodological tool "Tool to determine project emissions from flaring gases containing methane", the determination has to be hourly. The flare efficiency is: - 0% when the flare temperature is below 500°C (if any of the two values per hour is below 500°C) - 50 % when the flare temperature is above 500 °C but the norm flow to flare does not meet the manufacture's specifications. The norm flow according the manufacture specification is $265 \text{ Nm}^3 < \text{LFG}_{\text{flare}} < 1,125 \text{ Nm}^3$.
QA/QC procedures:	
Purpose of data:	Calculation of baseline emissions
Additional comment:	
Data / Parameter:	ID.29 / w_{CH_4}
Unit:	% ($\text{m}^3 \text{ CH}_4 / \text{m}^3 \text{ LFG}$)
Description:	Methane fraction in the landfill gas
Measured/ Calculated / Default:	measured
Source of data:	The methane fraction in the LFG is measured continuously by a gas analyser.
Value(s) of monitored parameter:	The weighted average of this monitoring period is 2011: 50.75% 2012: 52.79%
Monitoring equipment:	Monitoring Point: L.B2.MP2 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: - Regular maintenance and testing regime - Records of calibration and maintenance will be archived. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. The accuracies of the measurement are 0.2% (Siemens Ultramat 23).Please note that the measurements of the flow rate of the gas and the measurements of the volumetric fraction of methane in the gas refer to the same basis, which is a wet basis. However the gaseous stream is expected to be quite dry.
Measuring/ Reading/ Recording frequency:	The monitoring system works with continuous measurement devices. It is programmed to automatically save half hourly values. The data are stored automatically at the booster stations.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	ID.30 / Operation of the energy plant
Unit:	Hours/year
Description:	Operation of the energy plant
Measured/ Calculated / Default:	Measured
Source of data:	The amount of hours is registered by a counting device in each power generation unit.
Value(s) of monitored parameter:	2011: 38,946 h (engine hours) 2012: 69,478 h (engine hours)
Monitoring equipment:	Monitoring Points L.B2.MP6.i, i= 1...8, 10 A.MP7.j, j=1....4,9,11
Measuring/ Reading/ Recording frequency:	The system in place is related to the three shifts policy guaranteeing 24 hour support. So once per shift the totalized values are recorded manually.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Calculation of baseline emission
Additional comment:	

Data / Parameter:	ID.31 / $EC_{PJ,i,y}$
Unit:	MWh
Description:	Amount of electricity consumed from the grid as a result of the project activity
Measured/ Calculated / Default:	Measured
Source of data:	measured by electricity meters of the grid company
Value(s) of monitored parameter:	2011: 2.37 MWh 2012: 2.86 MWh.

Monitoring equipment:	Monitoring Point: MP8.2 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: Maintenance and calibration of equipment is carried out according to recognised procedures¹⁴. The Turkish grid company is responsible for this. There are two installed electricity meters at the site, one is referred as prime meter and the other is secondary meter. Both electricity meters are Aktaris SL7000. <table><tr><td>Meter</td><td>Primary meter</td><td>Secondary meter</td></tr><tr><td>Brand</td><td>ACTARIS</td><td>ACTARIS</td></tr><tr><td>Model</td><td>SL7000</td><td>SL7000</td></tr><tr><td>Serial Number</td><td>53064280</td><td>53064279</td></tr><tr><td>Accuracy</td><td>0.5</td><td>0.5</td></tr></table>		Meter	Primary meter	Secondary meter	Brand	ACTARIS	ACTARIS	Model	SL7000	SL7000	Serial Number	53064280	53064279	Accuracy	0.5	0.5
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Model	SL7000	SL7000															
Serial Number	53064280	53064279															
Accuracy	0.5	0.5															
Measuring/ Reading/ Recording frequency:	The consumed electricity is measured continuously by electricity meters operated by the Turkish grid company who is the owner of the meter. The amount is determined by a distance reading system, reported and invoiced every month by the grid company. The data is recorded and aggregated monthly.																
Calculation method (if applicable):	N/A																
QA/QC procedures:																	
Purpose of data:	Calculation of project emission																
Additional comment:																	

Data / Parameter:	ID.32 / TDL_{i,y}
Unit:	-
Description:	Average technical transmission and distribution losses for providing electricity source j, in year y.
Measured/ Calculated / Default:	Calculated
Source of data:	Meter reading protocols from TEIAS.
Value(s) of monitored parameter:	During the whole monitoring period the value was 0%
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	The Grid company calculated the TDL factor monthly and use the factor directly for the creation of the monthly reports.
Calculation method (if applicable):	N/A

¹⁴ In accordance with the Regulation on metering equipments, the calibration frequency is set for a 10 years period.
Reference: <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.12316&MevzuatIliski=0&sourceXmlSearch=>

QA/QC procedures:	
Purpose of data:	Calculation of project emission
Additional comment:	

Data / Parameter:	ID.33 / SG_{a,y}
Unit:	m ³ /year
Description:	Stack volume flow rate
Measured/ Calculated / Default:	Measured and calculated
Source of data:	Flow rate measured by an external laboratory
Value(s) of monitored parameter:	2011: 50,202,842 Nm ³ 2012: 171,175,629 Nm ³
Monitoring equipment:	Monitoring Points: A.MP3 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: Calibration is under the responsibility of the third party laboratory that is performing the quarterly analysis.
Measuring/ Reading/ Recording frequency:	The monitoring of the stack gases takes places quarterly by an independent laboratory.
Calculation method (if applicable):	The stack flow rate is calculated by the average measured flow rates at the engines multiplied by the operational hours of the engines extracted from ID.30
QA/QC procedures:	
Purpose of data:	Project emission calculation
Additional comment:	

Data / Parameter:	ID.34 / MC_{N2O,a,y}
Unit:	T N ₂ O/m ³
Description:	Concentration of N ₂ O in stack gas
Measured/ Calculated / Default:	Measured
Source of data:	Measured by an external laboratory
Value(s) of monitored parameter:	The concentration is 0 ppm
Monitoring equipment:	Monitoring Points: A.MP3 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: Calibration is under the responsibility of the third party laboratory that is performing the quarterly analysis.

Measuring/ Reading/ Recording frequency:	The monitoring of the stack gases takes places quarterly by an independent laboratory. The concentrations are measured during normal operation in order to be representative. The average concentrations are determined on hourly base taking into account the operating hours of the engines.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Calculation of project emissions
Additional comment:	
Data / Parameter:	ID.35 / MC_{CH₄,a,y}
Unit:	T CH ₄ /m ³
Description:	Concentration of CH ₄ in stack gas
Measured/ Calculated / Default:	Measured
Source of data:	Measured by an external laboratory
Value(s) of monitored parameter:	The concentration is 0 ppm
Monitoring equipment:	Monitoring Points: A.MP3 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: Calibration is under the responsibility of the third party laboratory that is performing the quarterly analysis.
Measuring/ Reading/ Recording frequency:	The monitoring of the stack gases takes places quarterly by an independent laboratory. The concentrations are measured during normal operation in order to be representative. The average concentrations are determined on hourly base taking into account the operating hours of the engines.
Calculation method (if applicable):	N/A
QA/QC procedures:	
Purpose of data:	Calculation of project emissions
Additional comment:	
Data / Parameter:	ID.36 / W_x
Unit:	Tonnes
Description:	Total amount of organic waste prevented from disposal and fed into the anaerobic digester in year x.
Measured/ Calculated / Default:	Measured
Source of data:	The total amount waste fed into the anaerobic digester is weighed with a belt scale, especially designed to weigh materials which are carried on conveyers.

Value(s) of monitored parameter:	2011: 57,845 t 2012: 175,202 t	
Monitoring equipment:	Monitoring Point: A.MP1 The calibration of the monitoring equipment was carried out according to the information provided in the PDD. The scale is subject to calibration in accordance with the suppliers specifications. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. The accuracies of the measurement is 0.2% (Loadcell SEG KN4-100).	
Measuring/ Reading/ Recording frequency:	Continuous measurement, daily reading and manually transferred to the ERs spreadsheet calculation	
Calculation method (if applicable):	/	
QA/QC procedures:		
Purpose of data:	Calculation of baseline emission	
Additional comment:		

Data / Parameter:	ID.37 / $p_{n,j,x}$; ID.38 / z																				
Unit:	%; n																				
Description:	Weight fraction of the waste type j in the sample collected during year x; Number of samples collected during year x																				
Measured/ Calculated / Default:	Measured																				
Source of data:	The collected sample is weighted through a dedicated balance																				
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th></th> <th>2011</th> <th>2012</th> </tr> </thead> <tbody> <tr> <td>Food waste</td> <td>73.89%</td> <td>73.90%</td> </tr> <tr> <td>Non food organics</td> <td>8.17%</td> <td>8.04%</td> </tr> <tr> <td>Wood</td> <td>3.92%</td> <td>4.00%</td> </tr> <tr> <td>Paper</td> <td>8.97%</td> <td>9.03%</td> </tr> <tr> <td>Inorganic / Inert waste</td> <td>5.04%</td> <td>5.01%</td> </tr> </tbody> </table> Number of samples z: 2011: 10 2012: 21				2011	2012	Food waste	73.89%	73.90%	Non food organics	8.17%	8.04%	Wood	3.92%	4.00%	Paper	8.97%	9.03%	Inorganic / Inert waste	5.04%	5.01%
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Inorganic / Inert waste	5.04%	5.01%																			

Monitoring equipment:	Monitoring Point: A.MP1 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: The scale is subject to calibration in accordance with the suppliers specifications. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. In accordance with the Regulation on Metering and Metering Equipment, the calibration frequency is set to be 10 years ¹⁵ . The accuracy is 20 kg till to 60t, 50 kg after 60t. As there are no measurements above 60t accuracy is 20 kg.
Measuring/ Reading/ Recording frequency:	Composition analysis is performed 10 times in 2011 and 21 times in 2012. The sampling is statistically significant as the uncertainty range at a confidence level of 95% is significantly below 20% as required by the “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site” version 4.
Calculation method (if applicable):	
QA/QC procedures:	A reliability check was carried out: The results met the requirement of a 95% confidence level and 20% precision.
Purpose of data:	Calculation of baseline and leakage emission
Additional comment:	

Data / Parameter:	ID.39 / MB_y
Unit:	tCO _{2e}
Description:	Methane produced in the landfill in absence of the project activity in year y
Measured/ Calculated / Default:	Calculated as per “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site” version 4
Source of data:	The value has been determined according to the methodological t “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” using the default values established by the tool and parameters as ID.36 / W _x ; ID.37 / P _{n,j,x} ; ID.38 / z
Value(s) of monitored parameter:	2011: 2,621.56 tCO _{2e} 2012: 10,514.14 tCO _{2e}
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	/
QA/QC procedures:	/

¹⁵ Reference: Regulation on Metering and Metering Equipment, Article 9

<http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=>

Purpose of data:	Calculation of baseline emission	
Additional comment:		

Data / Parameter:	ID.40 / EG_{d,y}																
Unit:	MWh																
Description:	The amount of electricity generated utilising the biogas and LFG																
Measured/ Calculated / Default:	Measured																
Source of data:	measured by electricity meters of the grid company																
Value(s) of monitored parameter:	2011: 44,157.28 MWh 2012: 73,687.35 MWh.																
Monitoring equipment:	Monitoring Point: MP8.1 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: Maintenance and calibration of equipment is carried out according to recognised procedures¹⁶. The Turkish grid company is responsible for this. There are two installed electricity meters at the site, one is referred as prime meter and the other is secondary meter. Both electricity meters are Aktaris SL7000. <table border="1"> <tr> <td>Meter</td> <td>Primary meter</td> <td>Secondary meter</td> </tr> <tr> <td>Brand</td> <td>ACTARIS</td> <td>ACTARIS</td> </tr> <tr> <td>Model</td> <td>SL7000</td> <td>SL7000</td> </tr> <tr> <td>Serial Number</td> <td>53064280</td> <td>53064279</td> </tr> <tr> <td>Accuracy</td> <td>0.5</td> <td>0.5</td> </tr> </table>		Meter	Primary meter	Secondary meter	Brand	ACTARIS	ACTARIS	Model	SL7000	SL7000	Serial Number	53064280	53064279	Accuracy	0.5	0.5
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Accuracy	0.5	0.5															
Measuring/ Reading/ Recording frequency:	The consumed electricity is measured continuously by electricity meters operated by the Turkish grid company who is the owner of the meter. The data is recorded and aggregated monthly.																
Calculation method (if applicable):	N/A																
QA/QC procedures:																	
Purpose of data:	Calculation of baseline emission																
Additional comment:	measured by electricity meters of the grid company																

Data / Parameter:	ID.41 /AF	
Unit:	%	
Description:	Methane destroyed due to regulatory or other requirements	
Measured/ Calculated / Default:	Default	

¹⁶ In accordance with the Regulation on metering equipments, the calibration frequency is set for a 10 years period.
Reference: <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.12316&MevzuatIliski=0&sourceXmlSearch=>

Source of data:	/
Value(s) of monitored parameter:	Fixed as 0 (for the first crediting period)
Monitoring equipment:	/
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	/
QA/QC procedures:	/
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	ID.42 / LFG usage
Unit:	-
Description:	Percentage of LFG applied to PGUs divided by the total amount of LFG captured.
Measured/ Calculated / Default:	Calculated
Source of data:	Data are derived from monitoring parameters ID.21 and ID.23
Value(s) of monitored parameter:	For the whole period 100% as all of the LFG is combusted in the PGUs
Monitoring equipment:	/
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	/
QA/QC procedures:	/
Purpose of data:	Calculation of baseline emissions
Additional comment:	In accordance with Annex C of GS v2.1 in terms of utilization at least 65% of the recovered gas for energy generation is required. As calculated the project activity utilizes all of the captured LFG complying with the eligibility criteria of GS.

Data / Parameter:	ID.43 / $PE_{\text{flare},y}$		
Unit:	tCO _{2e}		
Description:	Project emissions from flaring of the residual gas stream in year y		
Measured/ Calculated / Default:	Calculated as per “Tool to determine project emissions from flaring gases containing methane” version 01.		
Source of data:	The calculation is derived from LFG_{flare} (ID.22), T_{flare} (ID.27), $\eta_{\text{flare},h}$ (ID.28) and w_{CH_4} (ID.29)		
Value(s) of monitored parameter:	0 for the whole period: There was no gas flow to the flare, the flare was not operational.		
Monitoring equipment:	/		
Measuring/ Reading/ Recording frequency:	For each 30 minutes the real time value of the temperature measured by thermocouple of the flare, the gas flow sent to flare and the methane concentration is recorded and PE_{flare} is calculated.		
Calculation method (if applicable):	/		
QA/QC procedures:	/		
Purpose of data:	Calculation of baseline emissions		
Additional comment:			

Data / Parameter:	ID.44 / $A_{ci,x}$		
Unit:	Tonnes/year		
Description:	Amount of residual waste type “ci” from anaerobic digestion. The assumption is that the amount of inert waste is not changing in the digestion process and the organic part of the residues (the compost) is assumed to be food waste. This is a conservative approach, because the compost generating less emission than fresh food waste.		
Measured/ Calculated / Default:	Measured		
Source of data:	The collected sample is weighted through a dedicated balance		
Value(s) of monitored parameter:		2011	2012
	Total residues	34,671.6	107,057.3
	Inert waste	2,915.4	8,776.8
	Compost (food waste)	31,756.2	98,280.5

Monitoring equipment:	Monitoring Point: A.MP1 The calibration of the monitoring equipment was carried out according to the information provided in the PDD: The scale is subject to calibration in accordance with the suppliers specifications. For detailed information regarding type, serial numbers, calibration details please refer to „Table 3 – Table of monitoring devices” at the begin of section C. In accordance with the Regulation on Metering and Metering Equipment, the calibration frequency is set to be 10 years ¹⁷ . The accuracy is 20 kg till to 60t, 50 kg after 60t. As there are no measurements above 60t accuracy is 20 kg.
Measuring/ Reading/ Recording frequency:	Continuous measurement, daily reading and manually transferred to the ERs spreadsheet calculation
Calculation method (if applicable):	/
QA/QC procedures:	/
Purpose of data:	Calculation of leakage emission
Additional comment:	

Data / Parameter:	ID.45 / Other flare operation parameters
Unit:	
Description:	Data and parameters that are required to monitor whether the flare operates within the range of operating conditions according to manufacturer's specifications.
Measured/ Calculated / Default:	Measured
Source of data:	Flow meter
Value(s) of monitored parameter:	/
Monitoring equipment:	The flow meter required for measuring LFG _{flare} /ID.22
Measuring/ Reading/ Recording frequency:	It is checked if the measured value of the gas flow is within the specification range of the flare. The norm flow according to manufacture specification is: $265 \text{ Nm}^3 < \text{LFG}_{\text{flare}} < 1,125 \text{ Nm}^3$ As the flare was not operational during the whole monitoring period, the measurement was not required.
Calculation method (if applicable):	/
QA/QC procedures:	/
Purpose of data:	Calculation of baseline emissions

¹⁷ Reference: Regulation on Metering and Metering Equipment, Article 9

<http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=>

Additional comment:

D.3. Implementation of sampling plan

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

SECTION E. Calculation of emission reductions or GHG removals by sinks**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

The calculation of the baseline emissions for the waste management activities are based on two methodologies:

- For the fresh waste: Avoided methane emissions due to the installation of the anaerobic digester. This is calculated using approved methodology AM0025 "Avoided emissions from organic waste through alternative waste treatment process" (version 12).
- For the existing waste: avoided methane emissions due to the landfill gas capture and utilisation. This is calculated using approved consolidated methodology ACM0001 "Consolidated methodology for landfill gas project activities" (version 11).

The baseline emissions resulting from electricity consumption are calculated based on the amount of electricity generated and delivered to the grid by the project activity and the corresponding emissions resulting from the production of this amount of electricity by the Turkish grid.

The baseline emissions include the emissions generated in the absence of the project activity (AM0025), the methane from the existing waste destroyed by the project activity (ACM0001) and the baseline emissions from electricity generated utilising the LFG and biogas. The baseline emissions are calculated as follows in line with the registered PDD:

$$BE_y = MB_y + (MD_{project,y} * GWP_{CH_4}) + BE_{elec,y}$$

Equation 1

Where:

BE_y	Baseline emissions in year y (tCO ₂ e)
MB_y	The methane produced in the landfill from the fresh waste in the absence of the project activity in year y, calculated as per AM0025 (tCO ₂ e)
$MD_{project,y}$	The amount of methane destroyed/combusted during year y, in tonnes of methane in project scenario calculated as per ACM0001 (tCH ₄)
$BE_{elec,y}$	Is the baseline emissions from the electricity generated utilizing the LFG and biogas in the project activity and exported to the grid (tCO ₂ e/year)
GWP_{CH_4}	Global Warming Potential value of methane for the first commitment period is 21 tCO ₂ e/tCH ₄

Baseline Emissions due to methane generation from the landfill in the absence of the anaerobic digestion system with biogas (MB_y) (baseline emissions covered by AM0025)

According to AM0025, the amount of methane that is generated each year (MB_y) is calculated as per the latest version of the registered PDD, by the following equation:

$$MB_y = BE_{CH4, SWDS, y}$$

Equation 2

Where:

MB_y	The methane produced in the landfill from the fresh waste in the absence of the project activity in year y (tCO ₂ e)
$BE_{CH4, SWDS, y}$	Is the methane generation from the landfill in the absence of the project activity at year y, calculated using the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" version 05.

The amount of methane produced in year y ($BE_{CH4, SWDS, y}$) is calculated as follows:

$$BE_{CH4, SWDS, y} = \varphi \cdot (1 - f) \cdot GWP_{CH4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1 - e^{-k_j})$$

Equation 3

Where:

$BE_{CH4, SWDS, y}$	Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO ₂ e)
φ	Model correction factor to account for model uncertainties (0.9)
f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period (tCO ₂ e/tCH ₄)
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose
MCF	Methane correction factor
$W_{j,x}$	Amount of organic waste type j prevented from disposal in the SWDS in the year x (tonnes)
DOC_i	Fraction of degradable organic carbon (by weight) in the waste type j
k_i	Decay rate for the waste type j
j	Waste type category (index)
x	Year during the crediting period: x runs from the first year of the first crediting period (x=1) to the year y for which avoided emissions are calculated (x=y)
y	Year for which methane emissions are calculated

Where different types of j are prevented from disposal, the amount of different waste types ($W_{i,x}$) will be determined through sampling and calculation of the mean from the samples, as follows:

$$W_{j,x} = W_x \cdot \frac{\sum_{n=1}^z p_{n,j,x}}{z}$$

Equation 4

Where:

$W_{j,x}$	Amount of organic waste type j prevented from disposal in the SWDS in year x (tonnes)
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W_x	Total amount of organic waste prevented from disposal in year x (tonnes)
$P_{n,i,x}$	Weight fraction of the waste type j in the sample n collected during the year x
z	Number of samples collected during the year x

The methane destroyed by the project activity ($MD_{project,y}$) (baseline emissions covered by ACM0001)

The methane destroyed by the project activity during the monitoring period is calculated *ex-post* by monitoring the quantity of methane actually flared and gas used to generate electricity and the total quantity of methane captured. According to ACM0001 it is calculated as:

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y}$$

Equation 5

Where:

$MD_{project,y}$	The amount of methane destroyed/combusted during year y, in project scenario (tCH ₄)
$MD_{flared,y}$	Quantity of methane destroyed by flaring (tCH ₄), in year y
$MD_{electricity,y}$	Quantity of methane destroyed by generation of electricity (tCH ₄), in year y

The quantity of methane destroyed by the flare ($MD_{flared,y}$)

The quantity of methane destroyed by the flare $MD_{flared,y}$ is calculated as follows:

$$MD_{flared,y} = (LFG_{flare,y} * w_{CH_4,y} * D_{CH_4}) - (PE_{flare,y} / GWP_{CH_4})$$

Equation 6

Where:

$MD_{flared,y}$	Quantity of methane destroyed by flaring (tCH ₄), in year y
$LFG_{flare,y}$	Quantity of the landfill gas fed to the flare(s) during the year measured in cubic meters (m ³),
$w_{CH_4,y}$	Average methane fraction of the landfill gas as measured during the year and expressed as a fraction (in m ³ CH ₄ /m ³ LFG)
D_{CH_4}	Methane density expressed in tonnes of methane per cubic meter of methane (tCH ₄ / m ³ CH ₄)
$PE_{flare,y}$	Project emissions from flaring residual gas stream in year y (tCO ₂ e) determined following the procedure described in the "Tool to determine project emissions from flaring gases containing methane"
GWP_{CH_4}	Global Warming Potential methane (tCO ₂ /tCH ₄)

Emissions from flaring of the residual gas stream are calculated based on the flare efficiency and the flow rate of methane in the residual gas stream that is flared. The flare efficiency depends on both the actual efficiency of combustion in the flare and the time that the flare is operating.

Project emissions from flaring ($PE_{flare,y}$) are calculated according to:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH_4}}{1000}$$

Equation 7

Where:

$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y (tCO ₂ e)
$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h (kg/h)
$\eta_{flare,h}$	Flare efficiency in hour h
GWP_{CH_4}	Global Warming Potential of methane valid for the commitment period (tCO ₂ e/tCH ₄)

In line with the registered PDD, the efficiency in the hour h is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500°C for more than 20 minutes during the hour h.
- 50% if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour h, but the manufacture's specifications on proper operation of the flare are not met at any point in time during the hour h.
- 90% if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour h and the manufacture's specifications on proper operation of the flare are met continuously during the hour h.

The norm flow to flare according the manufactures specification of the installed flares should be: 265 Nm³ < LFG_{flare} < 1,125 Nm³.

Quantity of methane destroyed by generation of electricity ($MD_{electricity,y}$)

The quantity of methane destroyed by the generation of electricity, $MD_{electricity,y}$ is calculated as followed:

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH_4,y} * D_{CH_4}$$

Equation 8

Where:

$MD_{electricity,y}$	Is the quantity of methane destroyed by generation of electricity (tCH ₄ /year)
$LFG_{electricity,y}$	Is the quantity of landfill gas fed into electricity generator (m ³ /yr)
$w_{CH_4,y}$	Is the average fraction of methane in the landfill gas (fraction)
D_{CH_4}	Is the methane density expressed in tonnes of methane per cubic meter of methane (tCH ₄ / m ³ CH ₄)

Baseline emissions from generation of electricity that is displaced by the project activity ($BE_{elec,y}$) (baseline emissions covered by AM0025 & ACM0001)

The Baseline emissions from generation of electricity are calculated per formula (6). The amount of electricity generated will be monitored during the project activity. This includes electricity generated from

- the utilisation of LFG extracted from the landfill area,
- the biogas produced from the anaerobic digester,

Therefore the baseline emissions from generation of electricity that is displaced by the project activity is calculated as the total amount of electricity produced by utilisation of LFG and biogas multiplied by the emission factor for the Turkish grid.

$$BE_{elec,y} = EG_{d,y} * CEF_d$$

Equation 9

Where:

- $BE_{elec,y}$ Is the baseline emissions from the electricity generated utilising the LFG and biogas in the project activity and exported to the grid (tCO₂/year)
- $EG_{d,y}$ is the amount of electricity generated utilising the LFG and biogas collected in the project activity and exported to the grid during year y (MWh)
- CEF_d is the carbon emission factor for the displaced electricity source in the project scenario (tCO₂e/MWh)

Baseline emission calculations are summarised as follows:

Table 4. Baseline Emissions

Month/Year	ACM001				AM0025	Electricity (Both Methodologies)		Total BE
	MD _{flared,y}	MD _{elec.,y}	MD _{project,y}	MD _{project,y} *G _{WP_{CH4}}	MB _y	EG _{d,y}	BE _{elec,y}	
	tCH ₄	tCH ₄	tCH ₄	tCO ₂ eq	tCO ₂ eq	MWh	tCO ₂ eq	
January 2011	0	570.81	570.81	11,986.99	218.46	2,778.44	1,558.70	13,764.15
February 2011	0	500.20	500.20	10,504.28	218.46	2,453.17	1,376.23	12,098.97
March 2011	0	549.84	549.84	11,546.58	218.46	2,695.09	1,511.95	13,276.99
April 2011	0	569.66	569.66	11,962.86	218.46	2,643.49	1,483.00	13,664.32
May 2011	0	691.87	691.87	14,529.17	218.46	4,001.05	2,244.59	16,992.22
June 2011	0	711.27	711.27	14,936.71	218.46	4,571.00	2,564.33	17,719.50
July 2011	0	690.85	690.85	14,507.89	218.46	4,147.92	2,326.98	17,053.33
August 2011	0	665.74	665.74	13,980.57	218.46	4,565.42	2,561.20	16,760.23
September 2011	0	560.73	560.73	11,775.30	218.46	4,318.91	2,422.91	14,416.68
October 2011	0	572.09	572.09	12,013.92	218.46	3,771.95	2,116.06	14,348.45
November 2011	0	548.31	548.31	11,514.60	218.46	3,906.58	2,191.59	13,924.65
December 2011	0	568.32	568.32	11,934.76	218.46	4,304.26	2,414.69	14,567.91
January 2012	0	609.79	609.79	12,805.54	876.18	3,436.52	1,927.89	15,609.60
February 2012	0	569.39	569.39	11,957.14	876.18	3,716.37	2,084.88	14,918.20
March 2012	0	605.75	605.75	12,720.71	876.18	5,012.12	2,811.80	16,408.69
April 2012	0	585.88	585.88	12,303.46	876.18	5,263.45	2,952.80	16,132.43
May 2012	0	646.64	646.64	13,579.41	876.18	6,008.55	3,370.80	17,826.39
June 2012	0	683.16	683.16	14,346.36	876.18	6,367.43	3,572.13	18,794.67
July 2012	0	624.84	624.84	13,121.55	876.18	6,135.50	3,442.02	17,439.74
August 2012	0	839.49	839.49	17,629.26	876.18	7,179.46	4,027.68	22,533.11
September 2012	0	832.09	832.09	17,473.87	876.18	7,230.34	4,056.22	22,406.27

October 2012	0	793.28	793.28	16,658.92	876.18	7,745.69	4,345.33	21,880.43
November 2012	0	675.65	675.65	14,188.66	876.18	7,660.45	4,297.51	19,362.35
December 2012	0	766.92	766.92	16,105.39	876.18	7,931.47	4,449.55	21,431.12
Total 2011 (01.01.2011-31.12.2011)	0	7,199.70	7,199.70	151,193.62	2,621.56	44,157.28	24,772.23	178,587.41
Total 2012 (01.01.2012-31.12.2012)	0	8,232.87	8,232.87	172,890.26	10,514.14	73,687.35	41,338.60	224,743.00
Total Monitoring Period (01.01.2011-31.12.2012)	0	15,432.57	15,432.57	324,083.87	13,135.69	117,844.63	66,110.84	403,330.40

E.2. Calculation of project emissions or actual net GHG removals by sinks

The project emissions are calculated as follows in line with the registered PDD.

$$PE_v = PE_{elec,v} + PE_{a,v}$$

Equation 10

Where:

- PE_v is the project emissions during the year y (tCO₂e)
- $PE_{elec,y}$ is the emissions from electricity consumption on-site due to the project activity in year y (tCO₂e)
- $PE_{a,y}$ is the emissions from the anaerobic digestion process in year y (tCO₂e)

Emissions from electricity use on-site ($PE_{elec,y}$)

The project emissions from electricity usage are calculated as follows:

$$PE_{elec,y} = EC_{PJ,i,y} * EF_{grid,CM,y} * (1 + TDL_{j,y})$$

Equation 11

Where:

- $PE_{elec,y}$ is the emissions from electricity consumption on-site due to the project activity in year y (tCO₂e)
- $EC_{PJ,i,y}$ is the amount of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity, measured using an electricity meter (MWh/year)
- $EF_{grid,CM,y}$ Combined Margin emission factor (tCO₂/MWh)
- $TDL_{j,y}$ Average technical transmission and distribution losses for providing electricity for source j, in year y.

Project emissions from anaerobic digestion ($PE_{a,y}$)

The project emissions from the anaerobic digestion are calculated as follows:

$$PE_{a,y} = PE_{a,l,y} + PE_{a,s,y}$$

Equation 12

Where:

$PE_{a,y}$	is the emissions from the anaerobic digestion process in year y (tCO ₂ e)
$PE_{a,l,y}$	is the CH ₄ leakage emissions from the anaerobic digester in year y (tCO ₂ e)
$PE_{a,s,y}$	is the total emissions of N ₂ O and CH ₄ from stacks of the anaerobic digestion process in year y (tCO ₂ e)

CH₄ emissions from leakage ($PE_{a,l,y}$)

Under AM0025 "Avoided emissions from organic waste through alternative waste treatment process" version 12, three options are provided for quantifying methane emissions from leakage: monitoring the actual quantity of the gas leakage, applying an appropriate IPCC physical leakage default factor, or applying a physical leakage factor of zero where advanced technology used by the project activity prevents any physical leakage. In the proposed project activity the last option, apply a physical leakage factor of zero, is selected.

The currently implemented technology for digester is dry digestion involving mesophilic/thermophilic bacteria at specific operating conditions and in absence of oxygen. The residence time is expected to be around 15 - 20 days. Digesters are designed to prevent physical leakage of biogas. To prevent leakage, advanced methods were implemented during the installation of the digesters. A proven and reliable technology developed by the project participant has been applied during construction of the digesters, enabling a gas leakage free operation. Special concrete walls and ground are thick enough and includes additives to prevent leakage. Inside of the digester is equipped with gas collection pipes in short distances. The connection points are more isolated to prevent leakage. Therefore emissions from the physical leakage from the anaerobic digester has been taken as "0" in line with the requirements of the methodology.

Emissions from anaerobic digestion stacks ($PE_{a,s,y}$)

The biogas produced from the anaerobic digestion process is used for energy generation. The final stack emissions calculated as follows:

$$PE_{a,s,y} = SG_{a,y} * MC_{N_2O,a,y} * GWP_{N_2O} + SG_{a,y} * MC_{CH_4,a,y} * GWP_{CH_4}$$

Equation 13

Where:

$PE_{a,s,y}$	is the total emissions of N ₂ O and CH ₄ from stacks of anaerobic digestion process in year y (tCO ₂ e)
$SG_{a,y}$	is the total volume of stack gas from the anaerobic digestion in year y (m ³ /y)
$MC_{N_2O,a,y}$	is the monitored content of nitrous oxide in the stack gas from anaerobic digestion in year y (tN ₂ O/m ³)
GWP_{N_2O}	is the Global Warming Potential of nitrous oxide (tCO ₂ e/tN ₂ O)
$MC_{CH_4,a,y}$	is the monitored content of methane in the stack gas from anaerobic digestion in year y (tCH ₄ /m ³)

GWP_{CH_4} is the Global Warming Potential of methane (tCO_2e/tCH_4)

Project emission calculations are summarised as follows:

Table 5. Project Emissions

Month/Year	Electricity (Both Methodologies)		AM0025			Total PE
	$EC_{PJ,y}*(1+TDL)$	$PE_{elec,y}$	$PE_{a,i,y}$	$PE_{a,s,y}$	$PE_{a,y}$	
	MWh	tCO_2eq	tCO_2eq	tCO_2eq	tCO_2eq	tCO_2eq
January 2011	0.18	0.10	0.00	0.00	0.00	0.10
February 2011	0.25	0.14	0.00	0.00	0.00	0.14
March 2011	0.20	0.11	0.00	0.00	0.00	0.11
April 2011	0.45	0.25	0.00	0.00	0.00	0.25
May 2011	0.25	0.14	0.00	0.00	0.00	0.14
June 2011	0.15	0.08	0.00	0.00	0.00	0.08
July 2011	0.21	0.12	0.00	0.00	0.00	0.12
August 2011	0.05	0.03	0.00	0.00	0.00	0.03
September 2011	0.14	0.08	0.00	0.00	0.00	0.08
October 2011	0.33	0.19	0.00	0.00	0.00	0.19
November 2011	0.08	0.04	0.00	0.00	0.00	0.04
December 2011	0.08	0.04	0.00	0.00	0.00	0.04
January 2012	0.42	0.24	0.00	0.00	0.00	0.24
February 2012	0.09	0.05	0.00	0.00	0.00	0.05
March 2012	0.34	0.19	0.00	0.00	0.00	0.19
April 2012	0.13	0.07	0.00	0.00	0.00	0.07
May 2012	0.09	0.05	0.00	0.00	0.00	0.05
June 2012	0.18	0.10	0.00	0.00	0.00	0.10
July 2012	0.20	0.11	0.00	0.00	0.00	0.11
August 2012	0.18	0.10	0.00	0.00	0.00	0.10
September 2012	0.27	0.15	0.00	0.00	0.00	0.15
October 2012	0.25	0.14	0.00	0.00	0.00	0.14
November 2012	0.29	0.16	0.00	0.00	0.00	0.16
December 2012	0.42	0.24	0.00	0.00	0.00	0.24
Total 2011 (01.01.2011-31.12.2011)	2.37	1.33	0.00	0.00	0.00	1.33
Total 2012 (01.01.2012-31.12.2012)	2.86	1.60	0.00	0.00	0.00	1.60

Total Monitoring Period (01.01.2011-31.12.2012)	5.23	2.9	0.00	0.00	0.00	2.9
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E.3. Calculation of leakage

The project activity does not include processing/combustion of RDF, composting nor off-site transportation of waste materials. There is no incineration of MSW within the project activity. The project activity does not result in a change in transport in emissions.

Leakage emissions are calculated as follows:

$$LE_y = LE_{r,y}$$

Equation 14

Where:

LE_y is the leakage emissions in the year y (tCO₂e)

$LE_{r,y}$ is the leakage emissions from the residual waste from the anaerobic digestion (tCO₂e)

As the residual waste is delivered to the landfill, CH₄ emissions are calculated through the equation 8. In line with the applicable methodology, as a conservative approach, the residue is assumed to only include a single waste type (food waste) that was fed into the anaerobic digester.

Leakage emission calculations are summarised as follows:

Table 6. Leakage Emissions

Month/Year	ACM0001	AM0025	Total LE _y
	LE _y	LE _y	
	tCO ₂ eq	tCO ₂ eq	
January 2011	0	116.51	116.51
February 2011	0	116.51	116.51
March 2011	0	116.51	116.51
April 2011	0	116.51	116.51
May 2011	0	116.51	116.51
June 2011	0	116.51	116.51
July 2011	0	116.51	116.51
August 2011	0	116.51	116.51
September 2011	0	116.51	116.51
October 2011	0	116.51	116.51
November 2011	0	116.51	116.51
December 2011	0	116.51	116.51
January 2012	0	474.78	474.78
February 2012	0	474.78	474.78
March 2012	0	474.78	474.78
April 2012	0	474.78	474.78
May 2012	0	474.78	474.78

June 2012	0	474.78	474.78
July 2012	0	474.78	474.78
August 2012	0	474.78	474.78
September 2012	0	474.78	474.78
October 2012	0	474.78	474.78
November 2012	0	474.78	474.78
December 2012	0	474.78	474.78
Total 2011 (01.01.2011-31.12.2011)	0	1,398.10	1,398.10
Total 2012 (01.01.2012-31.12.2012)	0	5,697.31	5,697.31
Total Monitoring Period (01.01.2011-31.12.2012)	0	7,095.41	7,095.41

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e) rounded down
Total 2011 (01.01.2011-31.12.2011)	178,587.41	1.33	1,398.10	177,187.98	117,187
Total 2012 (01.01.2012-31.12.2012)	224,743.00	1.60	5,697.31	219,044.08	219,044
Total Monitoring Period (01.01.2011-31.12.2012)	403,330.40	2.93	7,095.41	396,232.06	396,231

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	The ex-ante estimations in the PDD are as followed:	Ex-post calculations during the monitoring period are as followed:
	Vintage	Emission Reduction
	01.01.2011 – 31.12.2011	295,620
	01.01.2012 – 31.12.2012	319,790
	Total (01.01.2011 – 31.12.2013)	615,410

E.6. Remarks on difference from estimated value in registered PDD

The actual emissions achieved are lower to the expected emission reductions in the PDD. The ex-post achievements are lower due to the slow pace of the capacity increase.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO₂e)	396,231	n.a.

SECTION F. Gold Standard Sustainable Development Indicators

According to the requirements of Gold Standard, the project activity must be assessed a matrix of sustainable development indicators. The contribution of the proposed project activity to the sustainable of the country is based on indicators of local/global environment sustainability, social sustainability & development and economic & technological development.

With regards to the project activity, 9 indicators were added to the monitoring plan under the registered GS Project Passport. All documents regarding these additional parameters can be presented to the DOE during the verification process.

F.1 Sustainability Monitoring Plan

No		SD.1																							
Indicator:		Air Quality																							
Chosen Parameter		Electricity delivered to the grid.																							
Estimation of baseline situation of parameter		The majority of the energy generation is dependent on fossil fuels which result in high emission levels of SO_x and NO_x in the baseline situation. SO2 and NO₂ emissions per MWh electricity generation from fossil fuels are as follows: <table><tr><td></td><td>SO₂ (kg/MWh)</td><td>NO₂ (kg/MWh)</td></tr><tr><td>Natural Gas</td><td>0.45</td><td>7.71</td></tr><tr><td>Coal</td><td>5.89</td><td>2.72</td></tr><tr><td>Oil</td><td>5.44</td><td>1.81</td></tr></table>					SO ₂ (kg/MWh)	NO ₂ (kg/MWh)	Natural Gas	0.45	7.71	Coal	5.89	2.72	Oil	5.44	1.81								
	SO ₂ (kg/MWh)	NO ₂ (kg/MWh)																							
Natural Gas	0.45	7.71																							
Coal	5.89	2.72																							
Oil	5.44	1.81																							
Way of Monitoring	How	In line with the registered GS Project Passport, the electricity delivered to the grid by the project activity result in 0.45 kg/MWh SO ₂ and 1.81 kg/MW NO ₂ emission reductions.																							
	When	Each monitoring period																							
	By who	ITC																							
Monitoring Result		<table><tr><td>Vintage</td><td>Electricity delivered to the grid</td><td>Amount of SO₂ Emission Reduction</td><td>Amount of NO₂ Emission Reduction</td></tr><tr><td></td><td>MWh</td><td>kg</td><td>kg</td></tr><tr><td>01.01.2011 – 31.12.2011</td><td>44,157</td><td>19,870</td><td>79,924</td></tr><tr><td>01.01.2012 – 31.12.2012</td><td>73,687</td><td>33,159</td><td>133,373</td></tr><tr><td>TOTAL</td><td>117,844</td><td>53,029</td><td>213,297</td></tr></table> It is calculated that 53,029 kg of SO₂ and 213,297 kg of NO₂ has been reduced due to the project activity within this monitoring period.				Vintage	Electricity delivered to the grid	Amount of SO ₂ Emission Reduction	Amount of NO ₂ Emission Reduction		MWh	kg	kg	01.01.2011 – 31.12.2011	44,157	19,870	79,924	01.01.2012 – 31.12.2012	73,687	33,159	133,373	TOTAL	117,844	53,029	213,297
Vintage	Electricity delivered to the grid	Amount of SO ₂ Emission Reduction	Amount of NO ₂ Emission Reduction																						
	MWh	kg	kg																						
01.01.2011 – 31.12.2011	44,157	19,870	79,924																						
01.01.2012 – 31.12.2012	73,687	33,159	133,373																						
TOTAL	117,844	53,029	213,297																						
Additional comment:																									

No		SD.2
Indicator:		Water Quality
Chosen Parameter		Collection of leachate
Estimation of baseline situation of parameter		Leachate from the landfill drains into surrounding water resources in the baseline situation
Way of Monitoring	How	In line with the registered GS Project Passport, the collection of leachate is documented.
	When	Each monitoring period
	By who	ITC
Monitoring Result		The leachate from the landfill area is collected and transferred to the Municipalities Waste Water Treatment Centre. During the site visit Mrs. Hülya Kuş from Ministry of Environment and Urban Planning, head of Environmental Protection Department Bursa Province has been interviewed by the DOE.
Additional comment:		

No		SD.3															
Indicator:		Other pollutants															
Chosen Parameter		Levels of sulphide combusted in the landfill gas engines															
Estimation of baseline situation of parameter		No sulphide is combusted in the baseline situation															
Way of Monitoring	How	In line with the registered GS Project Passport, the amount of sulphide is calculated based on the amount of landfill gas combusted in the engines as followed: $V_{\text{sulphide destroyed}} = V_{\text{LFG destroyed}} * 0.005$ Where "V" represents the volume of LFG in m ³ .															
	When	Each monitoring period															
	By who	ITC															
Monitoring Result		<table border="1"> <thead> <tr> <th>Vintage</th><th>Amount of LFG destroyed</th><th>Amount of H₂S destroyed</th></tr> <tr> <td></td><td>m³</td><td>m³</td></tr> </thead> <tbody> <tr> <td>01.01.2011 – 31.12.2011</td><td>19,765,603</td><td>98,828</td></tr> <tr> <td>01.01.2012 – 31.12.2012</td><td>21,770,504</td><td>108,852</td></tr> <tr> <td>TOTAL</td><td>41,536,107</td><td>207,680</td></tr> </tbody> </table> It is calculated that 207,680 cubic meters of H₂S has been reduced due to the project activity within this monitoring period.	Vintage	Amount of LFG destroyed	Amount of H ₂ S destroyed		m ³	m ³	01.01.2011 – 31.12.2011	19,765,603	98,828	01.01.2012 – 31.12.2012	21,770,504	108,852	TOTAL	41,536,107	207,680
Vintage	Amount of LFG destroyed	Amount of H ₂ S destroyed															
	m ³	m ³															
01.01.2011 – 31.12.2011	19,765,603	98,828															
01.01.2012 – 31.12.2012	21,770,504	108,852															
TOTAL	41,536,107	207,680															
Additional comment:		-															

No		SD.4
Indicator:		Quality of employment
Chosen Parameter		Number of contracts, number of training & attendance
Estimation of baseline situation of parameter		There are no employment opportunities in the baseline situation
Way of Monitoring	How	In line with the registered GS Project Passport, the number of contracts with social security has been monitored during the monitoring period. Furthermore trainings are organised for the employees on several scopes.
	When	Each monitoring period
	By who	ITC

Monitoring Result

Date	Scope	Period	Trainees	Training Entity
14.09.2011	Personnel Training on waste collection	48 hours	12	Ministry of Education, Department of Apprenticeship Trainings
20-21.12.2011	Basic First Aid	2 days	14	Adana Province, Directorate of Provincial Health
20.04.2012	Management of Hazardous Waste	1 day	1	Chamber of Chemical Engineers
15.06.2011	Environmental Regulations and SEVESO II	1 day	1	Chamber of Chemical Engineers
04.08.2012	Fire hazards	1 day	27	Blngöl Training
06.09.2012	Electricity	1 day	14	Murat Özbek
08.09.2012	Occupational Health and Safety	1 day	27	Yıldırım Çakar (Class A Occupational Safety Expert)
12.09.2012	Biogas hazards	1 day	15	İbrahim Çaputçu
19.09.2012	Occupational Illness	1 day	21	Dr. Ahmet Uğur (Doktor)
26.09.2019	Heat Pumps and Air Compressors	1 day	15	Özgür Dağtaş
05.10.2012	Occupational Health and Safety	1 day	16	R. Kaan Sinan
08.10.2012	Steam Boiler Operations		1	Chamber of Mechanical Engineers
10.10.2012	Electricity and Safety	1 day	17	Murat Özbek
10.10.2012	Electrofusion Welding Course	1 day	3	Wavin Pilsa
16.10.2012	Safe Driving	1 day	23	Çağatay Vural
17.10.2012	Dangers of Biogas	1 day	13	İbrahim Çaputçu
23.10.2012	Safe Driving 2	1 day	17	Çağatay Vural
30.10.2012	Safe Driving 3	1 day	19	Çağatay Vural
31.10.2012	Occupational Illness	1 day	17	Dr. Ahmet Uğur
07.11.2012	Pneumatic Systems	1 day	21	Ufuk Yavuz / SMC
07.11.2012	How to talk through the radio	1 day	12	Mustafa Üstüner
15.11.2012	Fire Hazards	1 day	31	Süleyman Türker
20.11.2012	Safe Driving	1 day	10	Çağatay Vural
22.11.2012	Dangers of Biogas	1 day	14	İbrahim Çaputçu
26.11.2012	Lubricant oil and use	1 day	26	Sedat Bişkin Kavi
28.11.2012	Safe Driving	1 day	16	Çağatay Vural
29.11.2012	Occupational Health and Safety	1 day	90	M. Çağlar Çakar
11.12.2012	Safe Driving	1 day	11	Çağatay Vural
12.12.2012	The use of oxygen tube	1 day	17	Dr. Ahmet Uğur
18.12.2012	Safe Driving	1 day	9	Çağatay Vural
20.12.2012	Medical Emergency Intervention	1 day	25	M. Çağlar Çakar

There are 134 contacted employees under the project activity. Trainings have been organised within the monitoring period. Certificates and other related documents are available to the DOE.

Additional comment:

-

No	SD.5
Indicator:	Soil Condition
Chosen Parameter	Collection of leachate
Estimation of baseline situation of parameter	Leachate from the landfill drains into the soil in the baseline situation
Way of Monitoring	How
	When
	By who
	In line with the registered GS Project Passport, the collection of leachate is documented.
	Each monitoring period
	ITC

Monitoring Result		The leachate from the landfill area is collected and transferred to the Municipalities Waste Water Treatment Centre.
Additional comment:		-
No		SD.6
Indicator:		Livelihood of the poor
Chosen Parameter		Number of scavengers receiving a contract with social security
Estimation of baseline situation of parameter		There are no employment opportunities for scavengers in the baseline situation
Way of Monitoring	How	In line with the registered GS Project Passport, the number ex-scavengers contracted with social security has been monitored during the monitoring period.
	When	During first monitoring period
	By who	ITC
Monitoring Result		In total there are 90 ex-scavengers contracted as an employee in Total. 6 of them are directly employed by ITC and 84 of them are employed under a company working as a subcontractor of to the project. All employees received a social security. The list of employees is available to the DOE.
Additional comment:		-
No		SD.7
Indicator:		Access to affordable and clean energy services
Chosen Parameter		Electricity generated by the project activity
Estimation of baseline situation of parameter		The LFG is not destroyed and utilized to generate electricity in the baseline situation.
Way of Monitoring	How	In line with the registered GS Project Passport, the electricity generated and delivered to the grid is monitored through the main electricity meter.
	When	Each monitoring period
	By who	ITC
Monitoring Result		Within the monitoring period, 117,844 MWh of electricity has been generated and delivered to the grid through destruction of 41,536,108 m ³ of LFG.
Additional comment:		-
No		SD.8
Indicator:		Human and Institutional Capacity
Chosen Parameter		Awareness campaign
Estimation of baseline situation of parameter		No campaigns are organised in the baseline situation
Way of Monitoring	How	In line with the registered GS Project Passport, records of the campaign (such as brochures) are provided as evidence on the campaign(s).
	When	Each monitoring period

	By who	ITC
Monitoring Result	Awareness campaigns have been arranged in corporation with national NGO “ÇEVKO Foundation” (Environmental Protection and Packaging Waste Recycling Foundation) (http://www.cevko.org.tr/cevko/home.aspx?lang=fr-CA). Over 100 seminars have been arranged towards awareness building including universities and public. Also recycling waste collection points have been established such as Sarıçam Administrative District, Sarıçam Municipality, health centres, state buildings within the municipality, ÇEAŞ kindergartens, university campus, and educational facilities within the university campus, shopping malls and dormitories etc.	
Additional comment:	-	

No		SD.9
Indicator:		Quantitative employment and income generation
Chosen Parameter		Number of contracts
Estimation of baseline situation of parameter		There are no employment opportunities available in the baseline situation
Way of Monitoring	How	In line with the registered GS Project Passport, the number of contracts with social security has been monitored during the monitoring period.
	When	Each monitoring period.
	By who	ITC
Monitoring Result		There are 134 contacted employees under the project activity. In addition there are 84 of employment opportunities created through sub-contracting due to the project activity.
Additional comment:		-

SECTION G. Forward Action Requests

G.1 Forward Action Requests from DOE

The following FARs has been raised during the validation and registration process of the project activity.

#	Description	Background	Actions taken during the monitoring period
1	Ensure that emission reductions from facilities that are part of the “general project” but are not eligible for VERs under Gold Standard regulation are effectively excluded from the emission reduction calculations. This should be reflected in the monitoring electricity generation.	This FAR has been raised by the DOE and addressed under the validation report. A gasification system is planned within the Adana facility, which is not eligible under GS and therefore carbon credits will not be claimed. Regarding the	Since the gasification is not yet implemented, no actions have been taken. Once the gasification is included in the generic project, the electricity generated by the gasification activity will be measured by a separate electricity meter and will be deducted from the total electricity generation read

		separation of both the gasifier and the sorting facility for the purpose of calculating emission reductions, emissions from the electricity consumption of both gasification and sorting plant will be added to those of the GS project activity as a conservative approach. Therefore the gasification system will be completely separated from the rest of the system (AD and LFG system), where the syngas will be separately collected and utilized at dedicated gas engines. Since the gasification system has not yet been built at the time of validation, its effective separation from the AD and LFG systems will have to be checked in the course of future verifications.	at the main meters. Once the gasification system is included, the PP will request a change in the monitoring plan if required.
2	The technical specifications of the anaerobic digester to be installed as part of the project activity need to be checked to ensure that emissions due to physical leakage are correctly accounted for	The FAR has been raised by Gold Standard during the registration process. The DOE is requested to check the specifications of the anaerobic digester installed during the first periodic verification. The DOE is also requested to include this FAR in the validation report so that the verifying DOE can check the verification site visit.	Please refer to section B.1. "Description of the implemented registered project activity" for more detail on the anaerobic digester system.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory		
Document Type: Form		
Business Function: issuance		
Keywords: monitoring report, performance monitoring		