

**Gold Standard for the Global Goals
Key Project Information & Project Design Document (PDD)**



Version 1.1 – August 2017

KEY PROJECT INFORMATION

Title of Project:	Sakarya Landfill Gas Power Plant
Brief description of Project:	<p>A landfill gas power plant will be built by Sakarya Entegre Katı Atık Yönetimi Anonim Şirketi which is a subsidiary of ERA Çevre, in boundaries of Sakarya Metropolitan Municipality, Turkey. The capacity of the power plant will be 4.68 MW and in addition to the energy generation, there will be additional facilities in the project area. Some of these facilities are mechanical waste separation, waste-derived fuel production, compost unit and an education center for the training of local people and the visitors. These facilities will be constructed after the completion of the proposed project activity.</p> <p>In the scope of the project, municipal wastes will be used as feedstock and the yields of the project will be clean electricity to Turkish grid and organic fertilizer. Therefore, the proposed project activity will reduce GHG emissions (1) by using electricity from a renewable energy source instead of a fossil fuel and therefore displacing electricity which otherwise would have been generated by thermal power plants connected to the national grid, and (2) capturing resulting methane of the municipal waste and using it for electricity production.</p>
Expected Implementation Date:	01.11.2018
Expected duration of Project:	28years
Project Developer:	Sakarya Entegre Katı Atık Yönetimi Anonim Şirketi
Project Representative:	Green Consult and Finance (Green Danışmanlık Finans Ltd. Şti.)
Project Participants and any communities involved:	Sakarya Entegre Katı Atık Yönetimi Anonim Şirketi
Version of PDD:	V01
Date of Version:	31.03.2019
Host Country / Location:	Turkey / Adapazarı - Sakarya
Certification Pathway (Project Certification/Impact Statements & Products)	Impact Statements & Products
Activity Requirements applied: (mark GS4GG if none relevant)	Gold Standard For The Global Goals Renewable Energy Activity Requirements
Methodologies applied:	ACM0001 (Version 18.1) ACM0002 (Version 19.0)
Product Requirements applied:	Gold Standard Verified Emission Reductions (GSVERs)
Regular/Retroactive:	Regular
SDG Impacts:	1 – SDG13 Climate Action 2 – SDG7 Affordable and Clean Energy 3 – SDG11 Sustainable Cities and Communities
Estimated amount of SDG Impact Certified	61,734tCO ₂ (Annual average)

SECTION A. Description of project

A.1. Purpose and general description of project

Sakarya Entegre Katı Atık Yönetimi Anonim Şirketi targeted to build a 5 MW landfill gas power plant (hereafter referred to as the “project”) on a area of around 200,000 m² in municipal landfill site of Sakarya, Turkey. According to the production license granted by the EMRA (Energy Market Regulatory Authority) the realized capacity of the project is 4.68 MW.

In the scope of the project, municipal wastes will be used as feedstock and the yields of the project will be clean electricity to Turkish grid and organic fertilizer. Therefore, the proposed project activity will reduce GHG emissions (1) by using electricity from a renewable energy source instead of a fossil fuel and therefore displacing electricity which otherwise would have been generated by thermal power plants connected to the national grid, and (2) capturing resulting methane of the municipal waste and using it for electricity production. The proposed project activity will stimulate the commercial use of municipal waste for electricity production as a renewable energy source in Turkey. In addition to existing renewable energy sources hydro, wind, geothermal and biogas it will significantly contribute to the sustainable development of the region by achieving the following benefits:

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

- Reduction of GHG in Turkey compared to the business-as-usual scenario (using fossil fuel for electricity production)
- Improvement of local livelihoods by creating local employment during the construction and operation phase of the facility
- The risk for explosion and fire of the municipal waste from open and uncontrolled dumping will be eliminated
- Reduction of the bad odour and thus improvement of the air quality for the region
- Knowledge transfer on municipal waste-to-energy principles and stimulation of the municipal waste-to-energy industry in Turkey
- Contribution to the decrease of Turkey's energy deficit and import dependency

The electricity production pre-license of the Project was granted by EMRA (Energy Market Regulatory Authority) on 31.05.2018. The construction time of the facility is Q1-Q2 2018 and the start of operation of the facility is Q4 2018.

Environmental Development

The project activity will not only avoid fossil fuel combustion and therefore reduce CO₂ emissions, but, through the avoided amount of municipal waste to be dumped in open areas near to the human habitats, the project activity will also lead to an improvement of the air quality by the decrease of the strong bad odour for the region. Also, the explosion risk of methane through its use for electricity generation will be reduced. The project activity will result in a negligible amount of SO_x, NO_x, and H₂S emissions since for Landfill Gas (LFG) fired plants they are significantly lower than the average (mainly coal-fired) grid-connected power plant in the baseline.

The project activity will also result in a high quality organic fertilizer which will enrich the soil and contribute to organic farming practices and therefore further improve soil conditions as compared to conventional practices.

Social Development

The project will generate permanent employment in the operation of the power plant itself as well as in the construction phase of the power plant. The employees in the facility are ensured to be provided by the project participant with health and safety training and also be trained in O&M of the project equipment and units by the machinery and equipment supplier. Furthermore, health and safety training procedures for laborers collecting, transporting and handling of municipality waste will be provided by the project owner such as to prevent transmission of diseases and maintain healthy site working conditions. All these jobs will have a significant impact on job quality.

Furthermore, the project owner will voluntarily provide training and information meetings for the local population and students for the creation and increase of their social and environmental awareness. For this purpose, an education center for the training of local people and the visitors will be built.

Economic Development

The project will lead to permanent employment both in the power plant itself and also for the services outsourced. The employees, most of them being unskilled, will be fully employed in the plant and receive social security. The project will also create part-time employment during the construction phase for construction workers, resulting in an improvement of their living conditions.

All these created jobs will have a significant impact on economic development and contribute to the economic well-being of the region.

Another benefit, related with the project activity is its positive contribution to the net foreign currency savings of Turkey related to natural gas imports by shifting some of the electricity generation away from natural gas towards using internally available renewable sources. This will result in an improvement of Turkey's balance of payments and investment, and thus making more money free for the re-investment in the economic well-being of the population in Turkey.

Technological Development

The proposed project activity will contribute to wider usage of waste-to-energy technology and encourage the entrepreneurs to invest in LFG power plants. As a result of that, expanding market volume will lead to interest of national industrialists to the wind power technologies. Hence, this will result in technology transfer and brand new research and development activities at the national level.

A.2. Eligibility of the project under Gold Standard

Sakarya Landfill Gas Power Plant is a renewable energy project which will reduce CO₂ and CH₄ emissions. Therefore, as per section 3.1.1 of GS4GG Principles & Requirements document; the project is associated with GS4GG Energy Activity Requirements. Moreover, the project is neither associated with geoen지니어ing or energy generated from fossil fuel or nuclear, fossil fuel switch, nor supports, enhances or prolongs such energy generation.

As per 1.0 General Eligibility Criteria of GS4GG Energy Activity Requirements;

- The Project will generate and deliver energy services from non-fossil and renewable energy sources,
- The Project is a waste to energy project which will supply electricity to the national grid,
- The project applies methodologies ACM0001 and ACM0002 which are the Gold Standard Approved Methodologies,

- The project is a large scale.

A.3. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

Sakarya Entegre Katı Atık Yönetimi Anonim Şirketi is the legal owner of the project and Gold Standard VERs that are generated under Gold Standard Certification.

A.4. Location of project

A.4.1. Host Country

Turkey

A.4.2. Region/State/Province etc.

Sakarya

A.4.3. City/Town/Community etc.

Adapazarı

A.4.4. Physical/Geographical location

The project is located in the Adapazarı District of Sakarya, Turkey¹. The closest settlement area to the project site is Taşkısığı Neighbourhood. The other settlement areas and their distances to the project location are as below;^{2, 3}

Table 1- Closest Settlement Areas and Their Distances

Settlement	Distance to the Project Location
Taşkısığı	760 m
Çiftlik	1,085 m
Keresteciler (Industrial timber site)	1,120 m

The coordinates of the project activity are as follows:

- Latitude (N): 40.847358°
- Longitude (E): 30.385517°

The exact project location of the project is illustrated in Figure 1.

¹ Google Maps

² EIA Report, Page 56

³ Google Earth

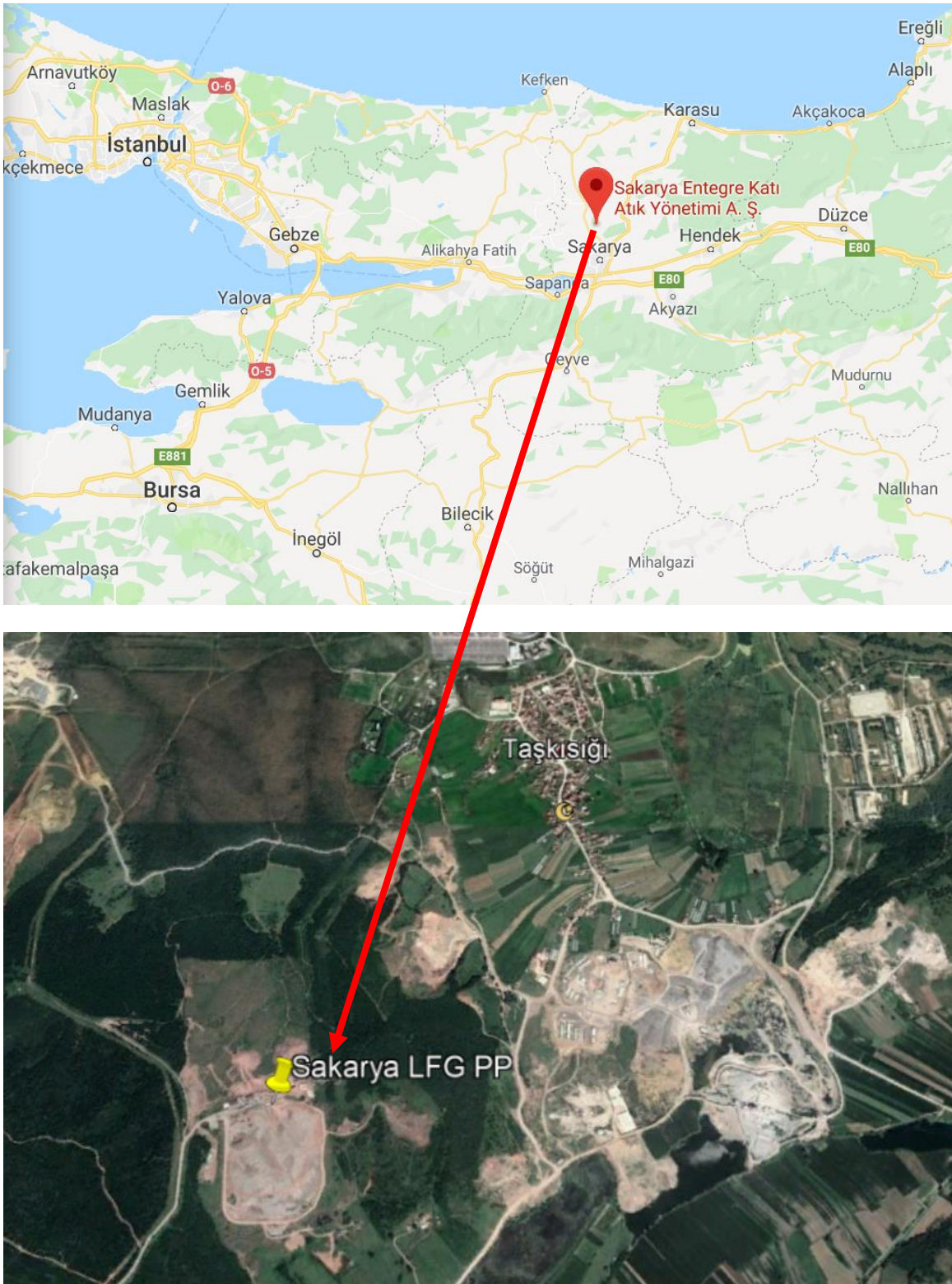


Figure 1- Map for The Exact Location of The Project Activity

A.5. Technologies and/or measures

>> (Describe the technologies and measures to be employed and/or implemented by the project, including a list of the facilities, systems and equipment that will be installed and/or modified by the project. Include information essential to understand the purpose of the project and how it will contribute positively to three SDGs.)

Sakarya Municipal Solid Waste Disposal Site has been started receiving waste in 2009. By the Q3 of 2018 the waste on the landfill site will be covered with soil to prevent methane emissions from getting into the atmosphere as well as make the conditions available for anaerobic stabilization so that the proposed project activity is expected to start its operations. The collected waste since 2009 and the waste projections after the project activity for the first crediting period is indicated in the table below.

Table 2- Waste Projection (2009-2023)

	Total	Wood and wood products	Textiles	Pulp, paper and cardboard (other than sludge)	Food, food waste, beverages and tobacco	Other (non-food) organic putrescible garden and park waste	Glass, plastic, metal other inert waste
2009 (tons)	146,482	10,254	7,324	13,183	54,198	2,930	58,593
2010 (tons)	161,000	11,270	8,050	14,490	59,570	3,220	64,400
2011 (tons)	171,372	11,996	8,569	15,423	63,408	3,427	68,549
2012 (tons)	164,440	11,511	8,222	14,800	60,843	3,289	65,776
2013 (tons)	159,804	11,186	7,990	14,382	59,127	3,196	63,922
2014 (tons)	177,053	12,394	8,853	15,935	65,510	3,541	70,821
2015 (tons)	207,503	14,525	10,375	18,675	76,776	4,150	83,001
2016 (tons)	248,519	17,396	12,426	22,367	91,952	4,970	99,408
2017 (tons)	268,907	18,823	13,445	24,202	99,496	5,378	107,563
2018 (tons)	286,804	18,786	13,910	26,099	106,834	6,683	114,492
2019 (tons)	312,248	20,452	15,144	28,415	116,313	7,275	124,650
2020 (tons)	269,990	16,421	14,488	26,698	85,441	5,593	121,348
2021 (tons)	183,645	7,521	12,729	22,390	18,330	1,911	120,765
2022 (tons)	188,237	7,709	13,047	22,950	18,788	1,959	123,784
2023 (tons)	192,942	7,901	13,373	23,523	19,258	2,008	126,879

It is planned to build a biogas facility in the project site by 2021. Therefore, some part of waste will be sent to the biogas facility and it is expected that the amount of the waste to remain in the LFG facility will be reduced by 2020. Thus, the fraction of the organic compounds varies after the operation of biogas facility. The proportions of the organic compounds is available in the excel file "1- Waste projection".

The below diagram indicates units and process flowchart of the proposed project.

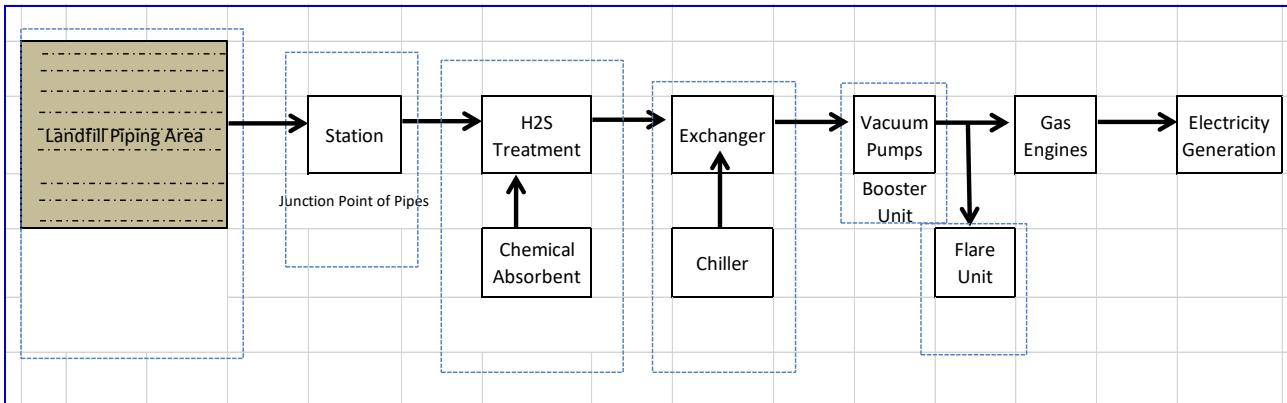


Figure 2- Units and Process Flowchart of the Project

The waste on the landfill site will be covered with soil to prevent methane emissions from getting into the atmosphere as well as make the conditions available for anaerobic stabilization. The landfill gas will be collected from landfill site by means of wells drilled in to the landfill. The collected gas is transmitted to Station which is the junction point of the gas collection pipes located in the wells. After the accumulation into the Station, landfill gas will be exposed to H₂S treatment. At the H₂S Treatment Unit, majority of H₂S will be removed from methane with the help of chemical absorbents. LFG is saturated with water vapor within the relatively warm landfill. Therefore, the second phase of the gas treatment is dehydration. Exchanger, Chiller and Booster Units will dehydrate the gas. Before totally ready for sending gas engines for electricity generation treated gas composition will be analyzed by the gas analyzer installed in Booster Unit. Treated gas will be combusted in the gas engines. The partial amount of the treated gas which can not be combusted in the gas engines will be flared. Therefore, all collected gas will be destroyed so that emitting methane to the atmosphere will be avoided.

Each step of the process including gas flow, gas treatment and electricity generation will be electronically monitored and the data will be logged and saved as log files.

The specifications of the equipment to be used are as in the below table;

Table 3- Technical Specifications of Gas Generators

Gas Generator	
Brand/Model	Caterpillar CG170-16
Max Continuous Rating	1560 kW
Max Electrical Efficiency	41.8 %
Frequency	50Hz

Table 4- Technical specifications of Gas Extraction and Combustion System

Gas Extraction and Combustion System	
Brand/Model	HT2000x2 (+2000) F1000 CO
Flow m³/h	4000
Blowers	2 (+1 predisposition)
Blower diff. pressure	300 mbar
Suction Pressure	-150 mbar
Outlet Pressure	+150 mbar

The facility will include three gas generators (3 x 1.56 MW) that will be in charge of electricity production regularly. Additionally, one gas generator will be in reserve for the purpose of substitution of the engine which might be stopped due to malfunction or maintenance issues.

Compare to the baseline scenario the project will reduce CO₂ and CH₄ emissions caused by the municipal waste stored in the Sakarya landfill area. The quantity of the emission to be reduced due to the project activity is detailed under section B.6.2. Therefore the project activity will contribute positively to **SDG13 Climate Action**. Moreover, the project activity will generate electricity from a renewable energy source which is fed into Turkish grid system dominated through fossil fuels so that the project activity will contribute positively to **SDG7 Affordable and Clean Energy**, as well. Lastly, since the project activity will use organic municipal wastes to generate electricity it will increase the proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated. Therefore, another positive contribution of the project activity will be for **SDG11 Sustainable Cities and Communities**.

A.6. Scale of the project

>> (Define whether project is micro scale, small scale or others. Justify the scale referring to relevant activity requirement.)

The average annual emission reduction of the project activity is more than 60,000 tCO₂e. Therefore, scale of the project is large.

A.7. Funding sources of project

>> (Provide the public and private funding sources for the project. Confidential information need not be provided.)

The funding sources of the project is equity provided by Sakarya Entegre Katı Atık Yönetimi Anonim Şirketi who is the owner of the project, and bank loans. The project is not supported by Official Development Assistance (ODA).

A.8. Assessment that project complies with 'gender sensitive' requirements

>> (Answer the four mandatory questions included under Step 1 to 3 in "Gold Standard Gender Equality Guidelines and Requirements" available [here](#).)

Q 1: Does the project reflect the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy? Explain how.

A1: As it is stated in the Gender Policy document of GS4GG(p.2); "To be eligible for Gold Standard certification, all applicants must satisfy the minimum criteria to prove the gender sensitivity of their project design and implementation. This includes compliance with the gender 'do no harm' safeguard, gender-gap analysis and gender-sensitive stakeholder consultations." As 'do no harm' safeguard Project proponent confirms that the project will not accept any kind of discrimination including gender inequality. On the other hand, the project does not have a proactive gender-responsive approach.

Q 2: Does the project align with existing country policies, strategies and best practices? Explain how.

A 2: The project will not accept any kind of discrimination including gender inequality. This is guaranteed by Laws and Acts;

- 1- Article 10 of the Turkish Constitution;” “Everyone is equal before the law without distinction as to language, race, colour, sex, political opinion, philosophical belief, religion and sect, or any such grounds. Men and women have equal rights. The State has the obligation to ensure that this equality exists in practice.”
- 2- Article 5 of the Labour Act of Turkey No. 4857 and ILO Convention 100&111 on “Equal Remuneration & Discrimination in Employment / Occupation”.

Q 3: Does the project address the questions raised in the Gold Standard Safeguarding Principles & Requirements document? Explain how.

A 3: The questions raised in the Gold Standard Safeguarding Principles & Requirements document were addressed in the Local Stakeholders’ Meeting Report. The questions and responses in detail are below:

- a) *Is there a possibility that the Project might reduce or put at risk women’s access to or control of resources, entitlements and benefits?*
 - No, the project location is nearby municipality landfill site which has just been used for waste storage area. By implementing the planned project, value-added products and services will be provided so that green jobs will be created for both women and men.
- b) *Is there a possibility that the Project can adversely affect men and women in marginalized or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?*
 - No, the project is a waste-to-energy project that does not have any adverse effect in terms of gender or community type.
- c) *Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project’s activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?*
 - No, project proponent is planning to build an education center in the project area to ensure both women and man participation independently from any obstacles such as lack of time, child care duties, low literacy or educational levels, or societal discrimination.
- d) *Does the Project take into account gender roles and the abilities of women or men to benefit from the Project’s activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?*
 - Yes, since the project is a waste to energy project, this issue is carefully handled by the project proponent while employing the staff and preparing job descriptions.
- e) *Does the Project design contribute to an increase in women’s workload that adds to their care responsibilities or that prevents them from engaging in other activities?*
 - No, the project will increase the electricity supply in the region. Therefore, it will improve access to affordable energy and decrease the workload of women as well as save time for themselves by providing the cheaper electricity for the use of home appliances.
- f) *Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?*

- No, the project is a waste-to-energy project. Therefore it does not include any elements potentially reproduce or further deepen discrimination against women based on gender.
- g) *Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?*
 - No, the project will facilitate the access to affordable energy for everybody independently from the gender.
- h) *Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?*
 - No. Before the project activity, the wastes in the landfill site was just stored. With the Project, the wastes will be reused - recycled, the methane and other harmful gasses will be captured and/or reduced. Therefore, the project will reduce the risks and hazards for all local people.

Q 4: Does the project apply the Gold Standard Stakeholder Consultation & Engagement Procedure, Requirements & Guidelines? Explain how.

A 4: Yes, the project applies the Gold Standard Stakeholder Consultation & Engagement Procedure, Requirements & Guidelines. Meeting. A Local Stakeholders' Meeting was held on 25.12.2017. Before the meeting, the possible barriers were analysed. In order to increase the local women participation, representatives of the project owner visited neighborhoods physically and distributed invitation cards. Additionally, national-international NGOs, local policy makers, regional authorities were contacted as well as newspaper ads were published to announce the LSC meeting details.

The details of the LSC meeting were reported and submitted to Gold Standard on 21.03.2018. Following the Preliminary Assessment of the Gold Standard a Stakeholder Feedback Round will be initiated.

SECTION B. Application of selected approved Gold Standard methodology

B.1. Reference of approved methodology

Reference	Title of methodology	Eligible (Yes/No)	Referred Tools
ACM0001 (V 18.1)	Flaring or use of landfill gas	Yes	Emissions from solid waste disposal sites (V 08.0)
ACM0002 (V 19.0)	Grid-connected electricity generation from renewable sources	Yes	Tool to calculate the emission factor for an electricity system (V 07.0)

B.2. Applicability of methodology

>> (Justify the choice of the selected methodology(ies) by demonstrating that the project meets each applicability condition of the applied methodology(ies))

Applicability of ACM0001

As per Applicability section of ACM0001 (V 18.1);

“The methodology is applicable under the following conditions:

- (a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or
- (b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that:
 - (i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and
 - (ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available;
- (c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways:
 - (i) Generating electricity;
 - (ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or
 - (iii) Supplying the LFG to consumers through a natural gas distribution network;
 - (iv) Supplying compressed/liquefied LFG to consumers using trucks;
 - (v) Supplying the LFG to consumers through a dedicated pipeline;
- (d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.”

The Project is a greenfield project which will use LFG for electricity generation. Moreover, the project has no effect on the amount of organic waste that would be recycled in the absence of the project activity, since there is no current treatment for the wastes on the landfill site.

Applicability of ACM0002

As per Applicability section of ACM0002 (V 19.0), the methodology is applicable to grid-connected renewable energy power generation project activities that install a Greenfield power plant.

The Project is a greenfield project which will use LFG as a renewable energy source for electricity generation and feed into the grid.

Since the average annual emission reduction of the project exceeds 60 kt CO₂ equivalent, the large scale methodologies has been applied.

B.3. Project boundary

>> (Present a flow diagram of the project boundary, physically delineating the project, based on the description provided in section A.5 above.)

The spatial extent of the project boundary is the Project site where the facility units of the project connected to the the grid-system are located. The project boundary is the physical and geographical site of the methane recovery and renewable energy production, respectively. Both the physical and geographical project boundaries is schematically illustrated in the Figure 3 below:

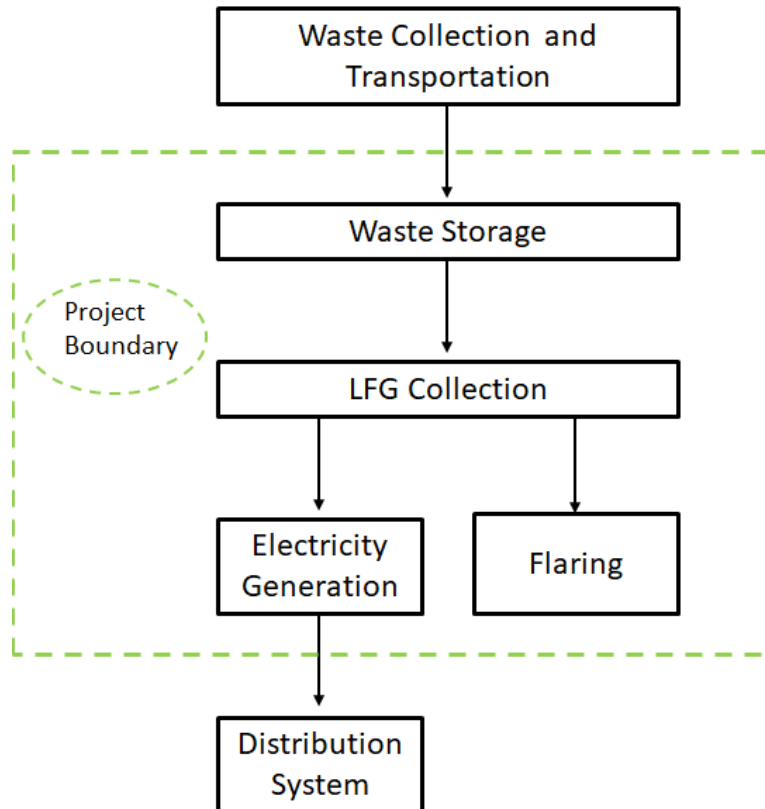


Figure 3- Physical and Geographical Boundaries of the Project

For the purpose of GHG mitigation/sequestration following table shall be completed (delete if not required)

	Source	GHGs	Included?	Justification/Explanation
Baseline scenario	LFG Emissions from decomposition of waste at SWDS site	CO ₂	No	CO ₂ emissions from decomposition of organic waste are not accounted since the CO ₂ is also released under the project activity
		CH ₄	Yes	The major source of emissions in the baseline
		N ₂ O	No	N ₂ O emissions are small compared to CH ₄ emissions from SWDS. This is conservative
	Emissions from electricity generation	CO ₂	Yes	Major emission source since power generation is included in the project activity
		CH ₄	No	Excluded for simplification. This is conservative
		N ₂ O	No	Excluded for simplification. This is conservative
	Emissions from heat generation	CO ₂	No	Heat generation is not included in the project activity
		CH ₄	No	Heat generation is not included in the project activity
		N ₂ O	No	Heat generation is not included in the project activity
Project scenario	Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity	CO ₂	Yes	May be an important emission source
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small
	Emissions from electricity consumption due to the project activity	CO ₂	Yes	May be an important emission source
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small
	Emissions from flaring	CO ₂	No	Emissions are considered negligible
		CH ₄	Yes	May be an important emission source
		N ₂ O	No	Emissions are considered negligible

B.4. Establishment and description of baseline scenario

>> (Explain how the baseline scenario is established in accordance with guidelines provided in GS4GG Principles & Requirements and the selected methodology(ies). In case suppressed demand baseline is used then same should be explained and justified.)

As per ACM0001 (V 18.1) project participants may either apply the simplified procedures to identify the baseline scenario and demonstrate additionality or the procedures according to the “Combined tool to identify the baseline scenario and demonstrate additionality” to select the most plausible baseline scenario and demonstrate additionality. For this project, simplified procedures to identify the baseline scenario and demonstrate additionality has been selected.

According to simplified procedures, (1) the baseline scenario for LFG is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons. Moreover, (2) if all or part of the electricity generated by the project activity is exported to the grid, the baseline scenario for all or the part of the electricity exported to the grid is assumed to be electricity generation in existing and/or new grid-connected power plants.

(1)Therefore, in the absence of the project activity, the organic waste would have otherwise been left to decay under clearly anaerobic conditions throughout the crediting period at the landfill site, thereby continuously emitting methane to the atmosphere. Thus, as per the approved methodological tool “Emissions from solid waste disposal sites”, the annual baseline emissions are calculated as the amount of methane that would otherwise have been emitted from the decay of the cumulative quantity of the waste diverted or removed from the disposal site, to date, by the project activity, calculated as the methane generation potential in accordance with the methodological tool.

(2)Additionally , without the existence of the project activity, supplied electricity to the grid by the project would have otherwise been generated by already grid-connected mainly fossil-fuel based power plants or by addition of new generation sources. Thus, the baseline emissions from electricity production will be calculated by multiplying the electricity (kWh) sold to the grid by the emission factor of the grid.

B.5. Demonstration of additionality

>> (If the proposed project is not a type of project that is deemed additional, as stated below, then follow guidelines in section 3.5.1 of GS4GG Principles & Requirements to demonstrate additionality.)

The table below is only applicable if the proposed project is deemed additional, as defined by the applied approved methodology or activity requirement or product requirement.

<p>Specify the methodology or activity requirement or product requirement that establish deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).</p>	<p>The Project is a greenfield project which will use LFG as a renewable energy source for electricity generation and feed into the grid. T Hence, the proposed project meets the criteria for deemed additionality.</p>
<p>Describe how the proposed project meets the criteria for deemed additionality.</p>	

The table below shows the chronology of key events with their related dates;

Table 5- Key Events


No.	Date	Key Event
1	08/03/2016	EIA Positive Decision
2	25/12/2017	LSC Meeting
3	01.01.2018	Land Delivery by Municipality
4	28/01/2018	Gas Engine Contract Date
5	04/10/2018	Issuance of EMRA License
6	01/11/2018	Start of Commercial Operation

B.6. Sustainable Development Goals (SDG) outcomes

B.6.1. Relevant target for each of the three SDGs

>> (Specify the relevant SDG target for each of three SDGs addressed by the project. Refer most recent version of targets [here](#).)

Sustainable Development Goals	Relevant SDG Target(s)	Contribution of the Project
	<ul style="list-style-type: none"> • Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning 	<ul style="list-style-type: none"> • The project reduces greenhouse gas emissions when compared to the Baseline Scenario in two ways; <ol style="list-style-type: none"> 1-Methane avoidance, 2-Electricity generation from renewable energy sources. The Project will measure and calculate its contribution to the greenhouse gas emission reduction in line with the Gold Standard requirements. This will improve awareness-raising and human and institutional capacity of Project investor company and the stakeholders on climate change mitigation, adaptation, impact reduction and early warning. In addition to that, the trainings for the visitors, local people, municipality and government officers, etc. in the education center unit which is going to be builded in the project site will also improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.
	<ul style="list-style-type: none"> • By 2030, ensure universal access to affordable, reliable and modern energy services • By 2030, increase substantially the share of renewable energy in the global energy mix • By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island 	<ul style="list-style-type: none"> • The Project will increase energy supply by means of a modern energy facility utilizing advanced technology. Moreover, the energy generated by the facility can be transferred to any location in a wide geographic area by means of grid lines. Hence the Project will ensure universal access to affordable, reliable and modern energy services. • The project will generate electricity from renewable energy sources, so it will increase substantially the share

	<p>developing States, and land-locked developing countries, in accordance with their respective programmes of support</p>	<p>of renewable energy in the global energy mix</p> <ul style="list-style-type: none"> • The Project will stimulate expanding infrastructure and use of advanced technology; <ul style="list-style-type: none"> ○ by purchasing electromechanical equipment from the technology developers so that it will create new budget to develop better technologies for supplying modern and sustainable energy services. ○ By demonstrating the waste-to-energy projects are economically viable so that it will be attractive for the other investors.
 <p>11 SUSTAINABLE CITIES AND COMMUNITIES</p>	<ul style="list-style-type: none"> • By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management. 	<ul style="list-style-type: none"> • The Project will use municipal waste to generate electricity. Project activities also include municipal waste management. In addition to these, the project will result in a substantial improvement in air quality in the region as compared to the common practice of dumping municipality waste in open areas near to the human habitats, causing strong bad odour (avoidance of H₂S).

B.6.2. Explanation of methodological choices/approaches for estimating the SDG outcome

>> (Explain how the methodological steps in the selected methodology(ies) or proposed approach for calculating baseline and project outcomes are applied. Clearly state which equations will be used in calculating net benefit.)

1 – SDG13 Climate Action

The project activity will reduce **308,672** tCO₂e GHG emissions during five years crediting period which refers **61,734** tCO₂e per annum

2 – SDG7 Affordable and Clean Energy

The project activity will increase clean energy supply to the national grid which is dominated by fossil fuel fired plants by producing 37,440 MWh of electricity per year.

3 – SDG11 Sustainable Cities and Communities

In order to generate electricity, the project activity is expected to use **1,724,996 tons** of organic municipal waste which was left to decay on landfill site, for 5 years crediting period.

1. Emission Reductions

As per the paragraph 74 of ACM0001 “Project participants should provide an ex ante estimate of emissions reductions in the CDM-PDD. This requires projecting the future GHG emissions of the SWDS for the calculation of baseline emissions.” Moreover, it is stated in the paragraph 58 of ACM0002 that “Project participants shall prepare as part of the CDM-PDD an estimate of likely emission reductions from the proposed project activity during the crediting period.” Therefore, realized ex post emission reductions will be calculated in the monitoring period after the the operation.

According to both ACM0001 and ACM0002, emission reductions are calculated as follows;

$$ER_y = BE_y - PE_y \quad \text{Equation (1)}$$

Where:

ER_y	=	Emission reductions in year y (t CO ₂ e/yr)
BE_y	=	Baseline emissions in year y (t CO ₂ e/yr)
PE_y	=	Project emissions in year y (t CO ₂ /yr)

2. Baseline Emissions

Baseline emissions are determined according to equation (2) and comprise the following sources:

- Methane emissions from the SWDS in the absence of the project activity;
- Electricity generation using fossil fuels or supplied by the grid in the absence of the project activity;
- Heat generation using fossil fuels in the absence of the project activity; and
- Natural gas used from the natural gas network in the absence of the project activity.

$$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y} \quad \text{Equation (2)}$$

Where:

BE_y	=	Baseline emissions in year y (t CO ₂ e/yr)
$BE_{CH4,y}$	=	Baseline emissions of methane from the SWDS in year y (t CO ₂ e/yr)

- $BE_{EC,y}$ = Baseline emissions associated with electricity generation in year y (t CO₂/yr)
- $BE_{HG,y}$ = Baseline emissions associated with heat generation in year y (t CO₂/yr)
- $BE_{NG,y}$ = Baseline emissions associated with natural gas use in year y (t CO₂/yr)

a. Emissions of methane from the SWDS

As per the paragraph 31 of ACM0001, 31; Baseline emissions of methane from the SWDS are determined as follows, based on the amount of methane that is captured under the project activity and the amount that would be captured and destroyed in the baseline (such as due to regulations). In addition, the effect of methane oxidation that is present in the baseline and absent in the project is taken into account:

Equation (3)

$$BE_{CH_4,SWDS,y} = \varphi_y \times (1 - f_y) \times GWP_{CH_4} \times (1 - OX) \times (16/12) \times F \times DOC_{f,y} \times MCF_y \times \sum_{x=1}^y \sum_j (W_{j,x} \times DOC_j \times e^{-k_j \times (y-x)} \times (1 - e^{-k_j}))$$

- $BE_{CH_4,SWDS,y}$ = Baseline, project or leakage methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO₂e/yr)
- x = Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year y ($x = y$)
- y = Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
- $DOC_{f,y}$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction) (0.5)
- $W_{j,x}$ = Amount of solid waste type j disposed or prevented from disposal in the

b. Emissions associated with electricity generation

Baseline emissions associated with electricity generation are calculated using the ACM0002. According to paragraph 42 of ACM0002, baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.

The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Equation (4)

φ_y	=	Model correction factor to account for model uncertainties for year y (0.75)
f_y	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
GWP_{CH_4}	=	Global Warming Potential of methane
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste) (0.1)
F	=	Fraction of methane in the SWDS gas (volume fraction) (0.5)
MCF_y	=	Methane correction factor for year y (1)
DOC_j	=	Fraction of degradable organic carbon in the waste type j (weight fraction)
k	=	Decay rate for the waste type j (1 / yr)
j	=	Type of residual waste or types of waste in the MSW

Where:

BE_y	=	Baseline emissions in year y (t CO ₂ /yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of “Tool to calculate the emission factor for an electricity system” (t CO ₂ /MWh)

Therefore, “Tool to calculate the emission factor for an electricity system” (V 07.0) is applied to calculate combined margin. The following six steps below, provided in the Methodological Tool are applied to calculate the combined margin (CM) emission factor:

STEP 1 - Identify the relevant electricity systems

Turkey has nationwide single electricity grid and imports/exports electricity power from/to neighbour countries.⁴ Therefore, these are the connected electricity systems for the Project activity.

STEP 2 - Choose whether to include off-grid power plants in the project electricity system (optional)

For the calculation of the operating margin and build margin emission factor, “Option 1: Only grid power plants are included in the calculation”, will be used.

STEP 3 - Select a method to determine the operating margin (OM)

According to the Methodological Tool, the calculation of the OM emission factor is based on one of the following four methods:

⁴ <https://www.teias.gov.tr/tr/v-ithalat-ihracat>

- (a) Simple OM; or
- (b) Simple adjusted OM; or
- (c) Dispatch data analysis OM; or
- (d) Average OM.

Table 6 illustrates the share of low-cost/must-run (LCMR) resources in electricity generation in Turkey for the five most recent years. Hydro, geothermal, wind, low-cost biomass, nuclear and solar resources are accepted as low cost/must run resources. There exists no nuclear power plant in Turkey. Moreover, electricity generation from low-cost biomass and solar resources ignorable.

Table 6 - Share of low-cost/must-run (LCMR) resources in electricity generation , 2013 – 2017⁵

	2013	2014	2015	2016	2017
Hydro	59,420.5	40,644.7	67,145.8	67,230.9	58,218.5
Renewables and Waste	1,171.2	1,432.6	1,758.2	2,371.6	2,972.3
Geothermal and Wind	8,921.0	10,884.1	15,077.0	20,335.6	24,031.3
Total LCMR Generation	69,512.7	52,961.4	83,981.0	89,938.1	85,222.1
GENERAL TOTAL	240,154.0	251,962.8	261,783.3	274,407.7	297,277.5
Share of LCRs	28.95%	21.02%	32.08%	32.78%	28.67%
Average	28.70%				

Low-cost/must-run resources constitute less than 50 per cent of total grid generation average of the five most recent years; **28.7%** .Thus, in accordance with the Methodological Tool, (a) Simple OM method will be used in the calculations.

STEP 4 - Calculate the operating margin emission factor according to the selected method

With regard to the calculation of the Simple OM, as per the Methodological Tool “Tool to calculate the emission factor for an electricity system” (Version 07.0), Option B “Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system”, can only be used if

- (a) The necessary data for Option A is not available; and
- (b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- (c) Off-grid power plants are not included in the calculation.

Since for the use of Option A necessary data is not available, only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known as well as off-grid power plants are not included in the calculation, we will use Option B.

Under this option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

⁵ <https://www.teias.gov.tr/tr/iii-elektrik-enerjisi-uretimi-tuketimi-kayiplar-0>

$$EF_{\text{grid,OMsimple},y} = \frac{\sum FC_{i,y} \cdot NCV_{i,y} \cdot EF_{\text{CO}_2,i,y}}{EG_y} \quad \text{Equation (5)}$$

where

$EF_{\text{grid,OMsimple},y}$ = Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)

$FC_{i,y}$ = Amount of fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)

$EF_{\text{CO}_2,i,y}$ = CO₂ emission factor of fuel type i in year y (tCO₂/GJ)

EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)

i = All fuel types combusted in power sources in the project electricity system in year y

y = The relevant year as per the data vintage chosen in Step 3 (three most recent year data available)

Since in the case for Turkey, electricity generated by solar and low cost biomass facilities are insignificant and there is no nuclear plant in Turkey, only hydro, wind and geothermal facilities are accepted as the low cost /must run plants.

The following official data are available on the website of the Turkish Electricity Transmission Company (TEIAS):

- Annual fuel consumption by fuel type⁶,
- Annual heating values for fuels consumed for electricity generation⁷,
- Annual electricity generation by fuel type, import and export⁸

Annual heating values for each fuel type are directly related with the fuel consumption and are used to calculate average Net Calorific Values (TJ/kt).

The calculation is based on data from 3 most recent years available 2015, 2016 and 2017 at TEIAS. The coefficients required for the calculation of CO₂ emission factor (tCO₂/TJ) have been obtained through IPCC 2006 Guidelines for National Greenhouse Gas Inventories⁹.

Table 7 shows the resulting CO₂ emissions from electricity generation for the years 2015-2017.

Table 7 – CO₂ emissions from electricity generation in tons (2015-2017)¹⁰

	2015	2016	2017	Total CO ₂ emissions (2015-2017)
CO₂ emissions	115,835,688	125,913,521	135,610,570	377,359,779

⁶ <http://www.teias.gov.tr/sites/default/files/2018-10/73.xls>

⁷ <http://www.teias.gov.tr/sites/default/files/2018-10/75.xls>

⁸ <http://www.teias.gov.tr/sites/default/files/2018-10/49%282003-2017%29.xls>

⁹ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

¹⁰ Calculations will be submitted to DOE

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Table 8 illustrates the data with regard to the gross electricity production by all the relevant energy sources. Low-cost/must run resources like hydro, wind, MSW, geothermal and biomass do not emit fossil CO₂ and thus are not taken into account in calculations.

Table 8 – Gross electricity production by fossil energy sources 2015-2017 (GWh)

Fuel Type	2015	2016	2017
Hard Coal + Imported Coal	44,829.9	53,703.2	56,781.9
Lignite	31,335.7	38,569.9	40,694.4
Fuel Oil	980.4	969.1	520.6
Diesel Oil	1,243.6	957.2	679.3
LPG	0.0	0.0	0.0
Naphta	0.0	0.0	0.0
Natural Gas	99,218.7	89,227.1	110,490.0
Total fossil fuels	177,608.3	183,426.5	209,166.2

Net electricity generated and supplied to the grid by thermal power plants has been calculated by making use of data obtained from TEIAS. The ratio between total gross and total net generation (including low-cost/must run plants) has been calculated for each year. The same ratio is assumed to be valid for all thermal plants and accordingly, total net generation by the plants has been calculated. Summing up total net generation with the imported electricity, total supply excluding low cost / must run sources for each year is determined and given in Table 9.

Table 9 - Net electricity generation from thermal power plants and total supply electricity to the grid (units in GWh)

Year	Gross generation	Net generation	Net/Gross Ratio	Net gen. Fossil Fuels	Import	Total Supply to the Grid
2015	261,783.3	249,889.5	95.46%	169,538.9	7,135.5	176,674.4
2016	274,407.7	261,936.8	95.46%	175,090.4	6,330.3	181,420.7
2017	297,277.5	284,257.5	95.62%	200,005.2	2,728.3	202,733.5
Total Net Generation Thermal				544,634.5	16,194.1	560,828.6

As a result, OM emission factor considering the years 2015 - 2017 has been calculated as simply dividing the total CO₂ emission (Table 6) by the total net electricity supply to the grid (Table 8) which is:

$$EF_{\text{grid,OMsimple,y}} = 0.6729 \text{ tCO}_2/\text{MWh}$$

STEP 5 - Calculate the build margin (BM) emission factor

As per indicated in the Methodological Tool, the project participant chose Option 1; “For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For

the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period”

The project participant proceeded according to the defined procedure and diagram in the Methodological Tool.

- a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5 \text{ units}}$) and determine their annual electricity generation ($AEG_{SET-5-units}$, in MWh);
- b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20 per cent of AEG_{total} (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20 \text{ per cent}}$) and determine their annual electricity generation ($AEG_{SET-\geq 20 \text{ per cent}}$, in MWh);
- c) From $SET_{5-units}$ and $SET_{\geq 20 \text{ per cent}}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Therefore, we can use SET_{sample} to calculate the build margin. Thus, we can ignore the next steps (d), (e) and (f), defined in the Methodological Tool.

The build margin emissions factor is the generation-weighted average emission factor (t CO₂/MWh) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \text{Equation (8)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (tCO₂/MWh)

- m = Power units included in the build margin
- y = Most recent historical year for which electricity generation data is available

According to the Methodological Tool, the CO₂ emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 for the simple OM, using options A1, A2 or A3, using for *y* the most recent historical year for which electricity generation data is available, and using for *m* the power units included in the build margin.

Since power plant specific fuel consumption data is not available for Turkey, option A2 has been selected for the calculation of the CO₂ emission factor of each power unit *m* ($EF_{EL,m,y}$) as follows:

$$EF_{EL,m,y} = \frac{EF_{CO_2,m,i,y} \cdot 3.6}{\eta_{m,y}} \quad \text{Equation (9)}$$

Where:

- $EF_{EL,m,y}$ = CO₂ emission factor of power unit *m* in year *y* (t CO₂/MWh)
- $EF_{CO_2,m,i,y}$ = Average CO₂ emission factor of fuel type *i* used in power unit *m* in year *y* (t CO₂/GJ)
- $\eta_{m,y}$ = Average net energy conversion efficiency of power unit *m* in year *y* (ratio)
- m* = All power units serving the grid in year *y* except low-cost/must-run power units
- Y* = The most recent year for which power generation data is available at the time of submission of the VER-PDD to the DOE for validation (ex-ante option)
- 3.6 = Conversion factor (GJ/MWh)

Table 10 illustrates the average CO₂ emission factor of fuel types ($EF_{CO_2,m,i,y}$) and the average net energy conversion efficiency of the power plants ($\eta_{m,y}$) used for the calculation of CO₂ emission factor of the power units ($EF_{EL,m,y}$). The values of both $EF_{CO_2,m,i,y}$ and $\eta_{m,y}$ has been taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table 10- Calculation of CO₂ emission factor of the power units ($EF_{EL,m,y}$)

Fuel Type	Effective CO ₂ emission factor (tCO ₂ /GJ)	Average Efficiency ($\eta_{m,y}$)	Emission factor of the power unit $EF_{EL,m,y}$ (tCO ₂ /MWh) Efficiency ($\eta_{m,y}$)
Imported Coal	0.0895	50.00%	0.6444
Lignite	0.0909	50.00%	0.6545
Natural Gas	0.0543	62.00%	0.3153

As explained above power plant specific fuel consumption data is not available for Turkey. Therefore it is assumed as if all power plants operate at full capacity for whole year. As a result of this assumption, all power plants would operate for same time duration, their capacities are considered as gross electricity production and is used to calculate net electricity generation ($EG_{m,y}$).

Table 11- Installed capacity of the power units included in the SET_{sample} and the resulting CO_2 emissions for the build margin calculation

Fuel Type	Total Net Installed Capacity (Production) (MW)	Emission factor of the power unit $EF_{EL,m,y}$ (tCO ₂ /MWh) Efficiency ($\eta_{m,y}$)	CO ₂ emissions(tCO ₂)
Imported Coal	4,638.2841	0.6444	2,988.91
Lignite	883.4901	0.6545	578.23
Natural Gas	5,876.0025	0.3153	1,852.65

As a result, the calculated build (BM) margin emission factor $EF_{grid,BM,y}$ is **0.3324 tCO₂/MWh**.

STEP 6 - Calculate the combined margin emissions factor

For the calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) option “ (a) Weighted average CM” was applied which is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{Equation (10)}$$

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (t CO₂/MWh)
- $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (t CO₂/MWh)
- w_{OM} = Weighting of operating margin emissions factor (per cent)
- w_{BM} = Weighting of build margin emissions factor (per cent)

According to the Methodological Tool, default weights for the operating margin and build margin emission factors for landfill gas power generation activities are defined as:

$$w_{OM} = 0.5; w_{BM} = 0.5$$

As a result:

$$EF_{grid,CM,y} = 0.6729 \text{ tCO}_2/\text{MWh} * 0.50 + 0.3324 \text{ tCO}_2/\text{MWh} * 0.50 = 0.5027 \text{ tCO}_2/\text{MWh}$$

3. Project Emissions

According to the methodology ACM0001 (V18.1) project emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y} \quad \text{Equation (11)}$$

Where:

PE_y	=	Project emissions in year y (t CO ₂ /yr)
$PE_{EC,y}$	=	Emissions from consumption of electricity due to the project activity in year y (t CO ₂ /yr)
$PE_{FC,y}$	=	Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (t CO ₂ /yr)
$PE_{DT,y}$	=	Emissions from the distribution of compressed/liquefied LFG using trucks, in year y (t CO ₂ /yr)
$PE_{SP,y}$	=	Emissions from the supply of LFG to consumers through a dedicated pipeline, in year y (t CO ₂ /yr)

Project activity does not include consumption of fossil fuels, distribution of compressed/liquefied LFG and supply of LFG to consumers through a dedicated pipeline. Therefore the only project emission are emissions from consumption of electricity due to the project activity. ACM0001 (V18.1) refers the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (V 03.0)” to calculate emissions from consumption of electricity due to the project activity and this tool directs to the methodological tool “Tool to calculate the emission factor for an electricity system (V 07.0)”. “Tool to calculate the emission factor for an electricity system (V 07.0)” is applied in the above section to calculate the combined margin emission factor of the applicable electricity system for the calculations of baseline emissions. Thus, project emissions can be considered ex post during the monitoring period by subtracting the total electricity consumed from the total electricity generation. However, since expected project emissions are quite insignificant compare to the emission reductions, it will be ignored.

4. Leakage

No leakage effects are accounted for under ACM0001 (V18.1) and ACM0002 (V 19.0). The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

B.6.3. Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

(Include a compilation of information on the data and parameters that are not monitored during the crediting period but are determined before the design certification and remain fixed throughout the crediting period like IPCC defaults and other methodology defaults. Copy this table for each piece of data and parameter.)

a. For the emissions of methane from the SWDS

Data / Parameter table 1.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	Φ_{default}
Unit	-
Description	Default value for the model correction factor to account for model uncertainties
Source of data	-
Value(s) applied	0.75
Choice of data or Measurement methods and procedures	Default value for the model correction factor to account for model uncertainties for Application A
Purpose of data	To calculate baseline emissions due to methane from the SWDS
Additional comment	-

Data / Parameter table 2.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	OX
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	Default value
Purpose of data	To calculate baseline emissions due to methane from the SWDS

Additional comment	
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Data / Parameter table 3.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	F
Unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value. As a result of biodegradation, organic material is converted to a mixture of methane and carbon dioxide
Purpose of data	To calculate baseline emissions due to methane from the SWDS
Additional comment	-

Data / Parameter table 4.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	DOC_{f,default}
Unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value
Purpose of data	To calculate baseline emissions due to methane from the SWDS
Additional comment	-

Data / Parameter table 5.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	MCF_{default}
Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	1
Choice of data or Measurement methods and procedures	The project site is anaerobic managed solid waste disposal site which has controlled placement of waste and cover material.
Purpose of data	To calculate baseline emissions due to methane from the SWDS
Additional comment	-

Data / Parameter table 6.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	DOC_j
Unit	-
Description	Fraction of degradable organic carbon in the waste type j (weight fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)

Value(s) applied	For MSW, the following values for the different waste types j should be applied:														
	Default values for DOC_j														
	<table border="1"> <thead> <tr> <th>Waste type j</th> <th>DOC_j (% wet waste)</th> </tr> </thead> <tbody> <tr> <td>Wood and wood products</td> <td>43</td> </tr> <tr> <td>Pulp, paper and cardboard (other than sludge)</td> <td>40</td> </tr> <tr> <td>Food, food waste, beverages and tobacco (other than sludge)</td> <td>15</td> </tr> <tr> <td>Textiles</td> <td>24</td> </tr> <tr> <td>Garden, yard and park waste</td> <td>20</td> </tr> <tr> <td>Glass, plastic, metal other inert waste</td> <td>0</td> </tr> </tbody> </table>	Waste type j	DOC_j (% wet waste)	Wood and wood products	43	Pulp, paper and cardboard (other than sludge)	40	Food, food waste, beverages and tobacco (other than sludge)	15	Textiles	24	Garden, yard and park waste	20	Glass, plastic, metal other inert waste	0
	Waste type j	DOC_j (% wet waste)													
	Wood and wood products	43													
	Pulp, paper and cardboard (other than sludge)	40													
	Food, food waste, beverages and tobacco (other than sludge)	15													
	Textiles	24													
Garden, yard and park waste	20														
Glass, plastic, metal other inert waste	0														
Choice of data or Measurement methods and procedures	The percentages listed in table above are based on wet waste basis which are concentrations in the waste as it is delivered to the SWDS.														
Purpose of data	To calculate baseline emissions due to methane from the SWDS														
Additional comment	-														

Data / Parameter table 7.

Relevant SDG Indicator	<p>SDG13 Climate Action</p> <p>Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p> <p>Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula</p>
Data/parameter	k_j
Unit	1/yr
Description	Decay rate for the waste type j
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)

Value(s) applied						
	Waste type j		Boreal and Temperate (MAT≤20°C)		Tropical (MAT>20°C)	
			Dry (MAP/PET<1)	Wet (MAP/PET >1)	Dry (MAP< 1000mm)	Wet (MAP > 1000mm)
Slowly degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04	0.06	0.045	0.07	
	Wood, wood products and straw	0.02	0.03	0.025	0.035	
	Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.05	0.10	0.065	0.17
	Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40
Choice of data or Measurement methods and procedures	<p>Climatic conditions for Sakarya where project site located in:</p> <p>MAT – mean annual temperature: 14.6 °C MAP – Mean annual precipitation: 840.3 mm PET – potential evapotranspiration: 750 mm (max-annual)</p> <p>Therefore Boreal and Temperate (MAT≤20°C) and wet (MAP/PET >1) conditions are observed in the project site and</p> <p>Sources: https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?m=SAKARYA</p>					
Purpose of data	To calculate baseline emissions due to methane from the SWDS					
Additional comment	-					

Data / Parameter table 8.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	GWP_{CH4}
Unit	t CO ₂ e/t CH ₄
Description	Global Warming Potential of methane
Source of data	IPCC
Value(s) applied	25
Choice of data or Measurement methods and procedures	Default Value
Purpose of data	To calculate baseline emissions due to methane from the SWDS
Additional comment	-

Data / Parameter table 9.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	η_{PJ}
Unit	Dimensionless
Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data	-
Value(s) applied	Technical specifications of the LFG capture system to be installed (if available) or a default value of 50 per cent
Choice of data or Measurement methods and procedures	Technical specifications of the LFG capture system to be installed is not available so a default value of 50 per cent is used.
Purpose of data	To calculate baseline emissions due to methane from the SWDS
Additional comment	-

b. For the emissions associated with electricity generation

Data / Parameter table 9.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	FCi,y
Unit	Mass or volume unit
Description	Amount of fuel type i consumed in the project electricity system in year y (2015, 2016, 2017)
Source of data	TEİAŞ; http://www.teias.gov.tr/sites/default/files/2018-10/73.xls
Value(s) applied	Please see excel file for OM Calculations
Choice of data or Measurement methods and procedures	TEİAŞ is publicly owned transmission company which publishes official statistics about electricity generation and distribution.
Purpose of data	To calculate baseline emissions due to electricity generation
Additional comment	-

Data / Parameter table 10.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	NCVi,y
Unit	GJ/mass or volume unit
Description	Net calorific value (energy content) of fuel type i in year y (2015, 2016, 2017)
Source of data	Calculations based on data of TEİAŞ for heating values of fuels consumed in thermal plants and FCi,y: http://www.teias.gov.tr/sites/default/files/2018-10/75.xls
Value(s) applied	Please see excel file for OM Calculations
Choice of data or Measurement methods and procedures	TEİAŞ is publicly owned transmission company which publishes official statistics about electricity generation and distribution.
Purpose of data	To calculate baseline emissions due to electricity generation
Additional comment	-

Data / Parameter table 11.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	EF_{CO₂,m,i,y}
Unit	tCO ₂ /GJ
Description	CO ₂ emission factor of fuel type i in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95 per cent confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value(s) applied	Please see excel file for OM Calculations
Choice of data or Measurement methods and procedures	There is no official information on the fuel specific default emission factor in Turkey. Therefore, IPCC values have been applied as referred in the “Tool to calculate the emission factor for an electricity system (V 07.0)”
Purpose of data	To calculate baseline emissions due to electricity generation
Additional comment	-

Data / Parameter table 12.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	EG_y
Unit	MWh
Description	Net electricity generated in the project electricity system in year y (2015, 2016, 2017)
Source of data	Calculations based on data of TEİAŞ for energy generation, consumption and losses http://www.teias.gov.tr/sites/default/files/2019-03/56%2893-2017%29.xls
Value(s) applied	Please see excel file for OM Calculations
Choice of data or Measurement methods and procedures	TEİAŞ is publicly owned transmission company which publishes official statistics about electricity generation and distribution. Net electricity production for each type of fuel is calculated by using gross-net production and import data.
Purpose of data	To calculate baseline emissions due to electricity generation
Additional comment	

Data / Parameter table 13.

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data/parameter	$\eta_{m,y}$
Unit	-
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	The default values provided in in Table 2, Appendix of TOOL09: "Determining the baseline efficiency of thermal or electric energy generation systems" https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v2.0.pdf
Value(s) applied	Please see excel file for BM Calculations
Choice of data or Measurement methods and procedures	Largest default values are used to be conservative.
Purpose of data	To calculate baseline emissions due to electricity generation
Additional comment	-

B.6.4. Ex ante estimation of outcomes linked to each of the three SDGs

>> (Provide a transparent ex ante calculation of baseline and project outcomes (or, where applicable, direct calculation of net benefit) during the crediting period, applying all relevant equations provided in the selected methodology(ies) or as per proposed approach. For data or parameters available before design certification, use values contained in the table in section B.6.3 above. For data/parameters not available before design certification and monitored during the crediting period, use estimates contained in the table in section B.7.1 below)

1. Emission Reductions

According to both ACM0001 and ACM0002, emission reductions are calculated as follows;

$$ER_y = BE_y - PE_y \quad \text{Equation (1)}$$

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

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

2. Baseline Emissions

a. Emissions of methane from the SWDS

Methodological choices and data-parameters to be used for calculations are explained in the sections B.6.2 and B.6.3, respectively.

As per equations (3), (4) and (5) ex ante estimation of baseline emissions due to methane from the SWDS are as below:

Table 12- Baseline emissions due to methane from the SWDS

	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
BE_{CH4,SWDS,y} (t CO_{2e})	39,722	41,986	43,171	44,306	45,392

Detailed calculations will be submitted to DOE in excel files.

b. Emissions associated with electricity generation

As per equation (10), the calculated value for **EF_{grid,CM,y}** is **0.5027 tCO₂/MWh**.

Therefore, according to equation (6),

Where;

EG_{PJ,y} **37,440¹¹** Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

EF_{grid,CM,y} **0.5027** Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of “Tool to calculate the emission factor for an electricity system” (t CO₂/MWh)

Thus;

$$BE_y = 18,819 \text{ tCO}_2/\text{year}$$

Summary of the above ex ante calculations for the baseline emissions due to electricity generation (in tCO_{2e}) for the years 2018-2023 are provided in Table 13 below:

Table 13 – Baseline emissions due to electricity generation

	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
BE_y (tCO_{2e})	18,819	18,819	18,819	18,819	18,819

3. Project Emissions

Project activity does not include consumption of fossil fuels, distribution of compressed/liquefied LFG and supply of LFG to consumers through a dedicated pipeline . Therefore the only project emission are emissions from consumption of electricity due to the project activity. ACM0001 (V18.1) refers the methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (V 03.0)” to calculate emissions from consumption of electricity due to the project activity and this tool directs to the methodological tool “Tool to calculate the emission factor for an electricity system (V 07.0)”. “Tool to calculate

¹¹ Capacity of Project activity is 4.68 MWe and expected annual operation time is 8000 hours

the emission factor for an electricity system (V 07.0)" is applied in the above section to calculate the combined margin emission factor of the applicable electricity system for the calculations of baseline emissions. Thus, project emissions can be considered ex post during the monitoring period by subtracting the total electricity consumed from the total electricity generation. However, since expected project emissions are quite insignificant compare to the emission reductions, it will be ignored.

4. Leakage

No leakage effects are accounted for under ACM0001 (V18.1) and ACM0002 (V 19.0). The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

Hence, emission reductions due to methane and electricity component equal to quantities indicated in Table 12 and Table 13.

B.6.5. Summary of ex ante estimates of each SDG outcome

1 – SDG13 Climate Action

Year	Baseline estimate		Project estimate	Net benefit
	Baseline emissions due to methane from the SWDS (tCO _{2e})	Baseline emissions due to electricity generation (tCO _{2e})	Project Emissions (tCO _{2e})	Emission Reductions (tCO _{2e})
1 st Year	39,722	18,819	0	58.541
2 nd Year	41,986	18,819	0	60.805
3 rd Year	43,171	18,819	0	61.990
4 th Year	44,306	18,819	0	63.125
5 th Year	45,392	18,819	0	64.211
Total	214,577	94,095	0	308,672
Total number of crediting years	5 Years			
Annual average over the crediting period	42,915	18,819	0	61,734

2 – SDG7 Affordable and Clean Energy

Year	Baseline estimate	Project estimate	Net benefit
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	Baseline electricity generation (MWh)	Project electricity generation (MWh)	Electricity supplied to the grid from renewable energy source (MWh)
1st Year	0	37,440	37,440
2nd Year	0	37,440	37,440
3rd Year	0	37,440	37,440
4th Year	0	37,440	37,440
5th Year	0	37,440	37,440
Total	0	187,200	187,200
Total number of crediting years	5 Years		
Annual average over the crediting period	0	37,440	37,440

3 – SDG11 Sustainable Cities and Communities

Year	Baseline estimate	Project estimate	Net benefit
	Amount of <u>organic</u> municipal waste used for electricity generation (tons)	Amount of <u>organic</u> municipal waste used for electricity generation (tons)	Amount of <u>organic</u> municipal waste used for electricity generation (tons)
Total Amount of Disposed Organic Waste Before the Project Activity	0	1,023,048	1,023,048
2018	0	172,312	172,312
2019	0	187,599	187,599
2020	0	148,641	148,641
2021	0	62,880	62,880
2022	0	64,452	64,452

2023	0	66,063	66,063
Total	0	1,724,996	1,724,996
Total number of crediting years	5 Years		
Annual average over the crediting period	0	344,999	344,999

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Include specific information on how the data and parameters that need to be monitored in the selected methodology(ies) or proposed approaches or as per mitigation measures from safeguarding principles assessment or as per feedback from stakeholder consultations would actually be collected during monitoring. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator	SDG13 Climate Action Target: 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Indicator: 13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
Data / Parameter	$EG_{PJ,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y
Source of data	Electricity meter measurement at project site
Value(s) applied	37,440
Measurement methods and procedures	The quantity of net electricity generation supplied to the grid by the project plant will recorded and reported based on the TEIAS meters at the project site.
Monitoring frequency	The quantity of net electricity generation supplied to the grid will be measured continuously and recorded at least monthly.
QA/QC procedures	Maintenance and calibration of TEIAS meters will be carried out according to the instructions of the manufacturer or legal requirements. Since TEIAS meters are sealed by TEIAS, the project participant cannot intervene with the devices.
Purpose of data	To calculate baseline and project emissions due to electricity generation
Additional comment	-

Relevant SDG Indicator	SDG7 Affordable and Clean Energy Target: 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix Indicator: 7.2.1 Renewable energy share in the total final energy consumption
Data / Parameter	$EG_{p,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y
Source of data	Electricity meter measurement at project site
Value(s) applied	37,440
Measurement methods and procedures	The quantity of net electricity generation supplied to the grid by the project plant will be recorded and reported based on the TEIAS meters at the project site.
Monitoring frequency	The quantity of net electricity generation supplied to the grid will be measured continuously and recorded at least monthly.
QA/QC procedures	Maintenance and calibration of TEIAS meters will be carried out according to the instructions of the manufacturer or legal requirements. Since TEIAS meters are sealed by TEIAS, the project participant cannot intervene with the devices.
Purpose of data	To measure the quantity of net electricity generation that is produced from a renewable energy source and fed into the grid
Additional comment	-

Relevant SDG Indicator	SDG11 Sustainable Cities and Communities Target: 11.6 By 2030, increase substantially the share of renewable energy in the global energy mix Indicator: 11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities
Data / Parameter	W_x
Unit	tons
Description	Total amount of organic waste prevented from disposal in year x (tons)
Source of data	Measurements by project participants and plant records.
Value(s) applied	For detailed values please see excel file "Detailed Waste"
Measurement methods and procedures	The garbage truck which carries municipal waste will be weighed and printed receipts will be filed
Monitoring frequency	The total amount of waste will be continuously measured and the data will be aggregated at least annually.
QA/QC procedures	Maintenance and calibration of weighbridges will be carried out according to the instructions of the manufacturer or legal requirements.
Purpose of data	To measure organic waste prevented from disposal
Additional comment	-

B.7.2. Sampling plan

>> *(If data and parameters monitored in section B.7.1 above are to be determined by a sampling approach, provide a description of the sampling plan.)*

There is no sampling plan applied.

B.7.3. Other elements of monitoring plan

>>

All monitoring procedures and requirements of the proposed project activity will be in accordance with the methodologies ACM0001 “Flaring or use of landfill gas (V 18.1)” and ACM0002 “Grid-connected electricity generation from renewable sources (V 19.0)”.

The project developer SEKAY A.Ş. has planned and will implement monitoring procedures and measures with regard to the monitoring methodology chosen for this project activity, guaranteeing that emission reductions are calculated in an accurate and conservative manner.

SEKAY A.Ş. will designate a person in charge for monitoring and recording of all the required information and documentation related with the GHG emissions covered in this PDD. The designated person in charge will be directly under the control of the Managing Director of the company. He will collect, record and store all the information for further archival or verification. Detailed responsibilities and authorities for project management, monitoring procedures and QA/QC procedures would be drawn up for the purpose and put in place. Duties therefore will be incorporated in the personnel’s daily activity schedules to ensure data continuity and high-quality data collection. The collected information will be stored in the form of raw data in log books developed especially for the purpose of monitoring and recording data related to VER GS protocols.

These records will form part of the registered monitoring protocol for the use by verification companies. All the parameters monitored under the monitoring plan will be kept for a period of 2 years after the end of the crediting period or the last issuance of GS VERs, whichever occurs later.

SECTION C. Duration and crediting period

C.1. Duration of project

C.1.1. Start date of project

>> *(Specify start date of the project, in the format of DD/MM/YYYY. Describe how this date has been determined as per the definition of start date provided in section 3.4.3 of GS4GG Principles & Requirements document and provide evidence to support this date.)*

28.01.2018, the contract date of gas engine supply.

C.1.2. Expected operational lifetime of project

>> *(Specify in years)*

As per “Tool to determine the remaining lifetime of equipment (V 01)” expected operational lifetime of the SAKARYA LFG Power Plant is 19 years. (150,000 hours)

C.2. Crediting period of project

C.2.1. Start date of crediting period

>> (Specify in dd/mm/yyyy. This can be start of project operation or two years prior to the date of Project Design Certification, whichever is later.)

01 /11/2018; the date of provisional acceptance for starting electricity production or two years prior to the date of Project Design Certification, whichever occurs later.

C.2.2. Total length of crediting period

>> (Specify the total length of crediting period sought in line with GS4GG Principles & Requirements or relevant activity requirements.)

5 years, 0 months for the first crediting period.

SECTION D. Safeguarding principles assessment

D.1. Analysis of social, economic and environmental impacts

>> (Refer the GS4GG Safeguarding Principles and Requirements document for detailed guidance on carrying out this assessment.)

Please refer to the Local Stakeholders Consultation (LSC) Report.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from stakeholders

>> (Describe how stakeholder consultation was conducted in accordance with GS4GG Stakeholder Procedure Requirements and Guidelines.)

Please refer to the Local Stakeholders Consultation (LSC) Report for solicitation of comments from stakeholders.

E.2. Summary of comments received

>> (Provide a summary of key comments received during the consultation process.)

A detailed table with all the stakeholder comments and the responses is provided in the LSC Report.

E.3. Report on consideration of comments received

>> (Describe how the comments have been addressed by providing a clarification to the stakeholder or by altering the design of the project or by proposing to monitor any anticipated negative impacts etc.)

A detailed table with all the stakeholder comments and the responses is provided in the LSC Report.

Appendix 1. Contact information of project participants

Organization name	Sakarya Entegre Katı Atık Yönetimi A. Ş. (SEKAY A.Ş.)
Registration number with relevant authority	
Street/P.O. Box	Altunizade Mah. Ord.Prof.Fahrettin Kerim Gökay Cad. No:34 Üsküdar
Building	
City	İstanbul
State/Region	
Postcode	
Country	Turkey
Telephone	+90 (216) 316 55 23-24
Fax	+90 (216) 428 33 72
E-mail	sekay@sekay.com.tr
Website	http://sekay.com.tr/
Contact person	
Title	
Salutation	Mr.
Last name	ARSLAN
Middle name	
First name	Serkan
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	serkanarslan@eracevre.com

Appendix 2. Summary of post registration design changes

Revision History

Version	Date	Remarks
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1	10 July 2017	Initial adoption