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

Version 1.1 – August 2017

Gold Standard

KEY PROJECT INFORMATION

Title of Project:	Samsun Landfill Gas to Energy Project, Turkey
Brief description of Project:	The Samsun Landfill Project is a Landfill Gas ("LFG") to Energy Project, developed by "Samsun Avdan Enerji Üretim ve Tic. A.Ş." which is located south-west of Samsun city centre, at an air distance of ca. 8 km in Turkey. The proposed activity involves the collection and utilization of the LFG with an electricity component with an installed capacity 8.4 MWe. The project also has Biogas application but it is not added to project boundary. The sime pipe has biogas and LFG gas. Both LFG and Biogas sides have their own flowmeters. The electricity energy produced from LFG is calculated based on conservative assumptions and measurements Calculations will be done through the Biogas and LFG Gas amounts. Expected disposed waste amount is 304,466 tonnes, corresponding to an average of 800 t/day. This amount is expected to rise in coming years, reaching 848,232 tonnes in 2040 when the landfill site will be filled up and closed. Estimated electricity generation is 54,600 MWh per year. The construction start date of the Project is 13/09/2010. Therefore, the starting date of the project activity shall be considered as 13/09/2010 .The Project is registered on 01/06/2011. The first crediting period has been started on 09/02/2011. After the capacity addition project commissioning date is 22/05/2018 for phase 4. This landfill site is expected to be operational until 2040.Total emission reduction will be 805,435tonnes of CO2e for the second crediting period. Annual average over the crediting period will be 115,062 tCO2e. The project operational lifetime is 28 years, according to the contract with the Samsun Municipality.
Expected Implementation Date of the Project: Expected duration of Project:	13/09/2010 28 Years and 00 Months
Project Developer:	Samsun Avdan Enerji Üretim ve Tic. A.Ş.
Project Representative:	Rüzgar Danışmanlık-Çağla Balcı Eriş
Project Participants and any communities involved:	Samsun Avdan Enerji Üretim ve Tic. A.Ş.
Version of PDD: Date of Version:	The first crediting period PDD Version: 04 13/04/2012 After Revalidation and design change PDD

	Version: 08 15/10/2019
Host Country / Location:	TURKEY / South-west of Samsun city centre
Certification Pathway (Project Certificatin/Impact Statements & Products	Impact Statements & Products – SDG 13: Gold Standard Verified Emission Reductions (GS VERs – carbon credits)
Activity Requirements applied: (mark GS4GG if none relevant)	GS4GG (GS935)
Methodologies applied:	ACM0001 v.19.0 (Grid-connected electricity generation from renewable sources) ACM0002 v.19.0 (Flaring or use of landfill gas)
Product Requirements applied:	
Regular/Retroactive:	Regular
SDG Impacts:	1 – SDG 7 Affordable and Clean Energy 2 – SGD 8 Decent Work and Economic Growth 3 – SDG 13 Climate Action
Estimated amount of SDG Impact Certified	1– SDG 7 Affortable and Clean Energy The electricity generation is predominantly composed by fossil fuel fired power plants in Turkey. The project is expected to generate 54,600 MWh of clean energy per annum. 2 – SDG 8: Decent Work and Economic Growth The project provides employment to between 20 and 25 people. **3 –** SDG 13 Climate Action The project would lead to reduction of approximately 115,062 tCO_2 per annum

SECTION A. Description of project

A.1. Purpose and general description of project

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

The capacity increased to 8.4 MWe on dd. 24/03/2016.[2] After the capacity increase amount of the waste is planned to be 304,466 tonnes, corresponding to an average of 800 t/day. In 2017, the province established and operated a landfill site. The number is 59. It has an irregular distribution area number is 900. The project will collect the wastes regularly and will help the decrease irregular distribution areas in Turkey.

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

The starting date of the project activity shall be considered as 13/09/2010 and The Project is registered on 01/06/2011. The first crediting period has been started on 09/02/2011 because the project is started operation on 09/02/2011. Commissioning of the additional capacity is 22/05/2018.

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

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

[1] Samsun Avdan Technical Feasibility Report

[2] License upgrade – 24/03/2016

grid. A flare device installed to destroy excess LFG when the LFG generation amount exceeds the utilization capacity of the LFG power generators.

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

Phase 1: Capacity 2.4 MWe – 09/03/2012
Phase 2: Capacity 3.6 MWe – 27/09/2013
Phase 3: Capacity 6.0 MWe – 27/09/2014
Phase 4: Capacity 8.4 MWe – 22/05/2018

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

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

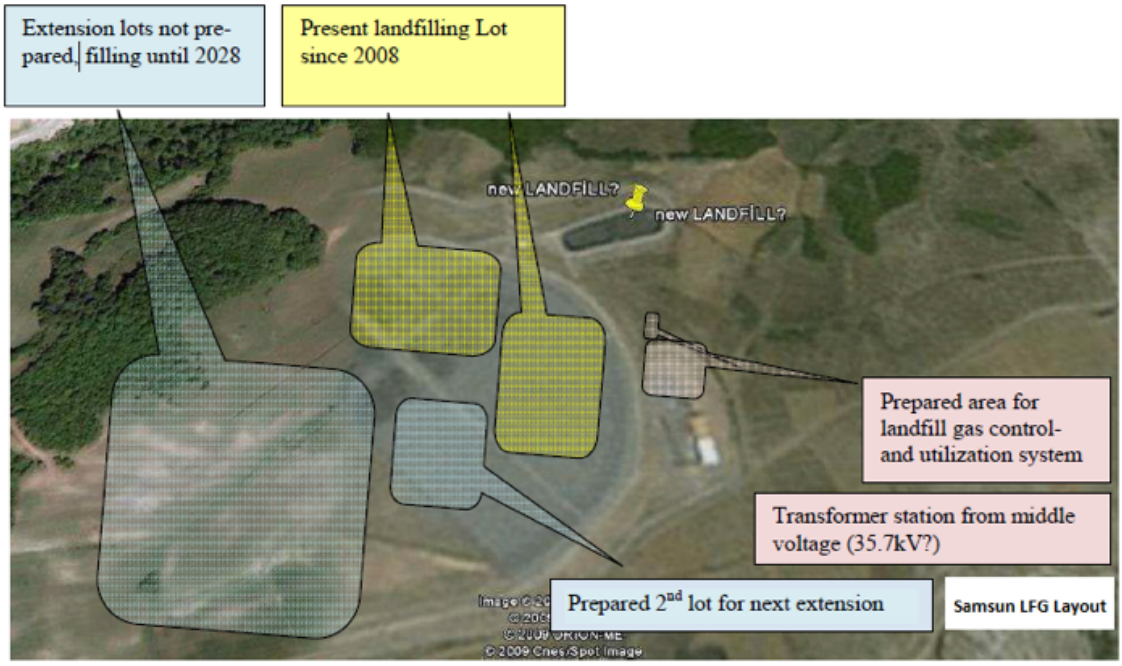

Figure 1 :The Project Site Layout

The extraction system shall include a network of vertical gas extraction wells, de-watering units and gas transport pipelines connected to a main collector system. The gas has been driven to gas engine and the flare via an aspiration system. "Samsun Aydan Enerji Üretim ve Tic. A.Ş" also has Biogas utilization application but this part has not been included to project boundary. The Biogas yearly produce estimated as 180,000-181,000 m3 gas .Biogas and LFG blends in same pipe and goes to the electricity generators. Both LFG and

Biogas sides have their own flowmeters. The electricity energy produced from LFG is calculated based on conservative assumptions and measurements.The generation will depend on the quantity of the LFG.

The estimated electricity and heat generation is 54,600 MWh[3] per year by the project activity.

The project has supply the Turkish National Grid (hereafter referred to as „the Grid") with zero emission energy, generated by the LFG . Electricity currently generated by the grid is relatively carbon intensive, with a combined margin emission factor of 0.3953 tCO_2 tCO2/MWh. The connection point of the project activity is Kavak 31,5 KV TM-39 TRA-DM. Thorugh the estimated electricity generation and methane capture total emission reduction will be 115,062tCO2e per year and 805,435tCO2e for the second crediting period. The project operational lifetime is 28 years.

The Project is started operation on 09/02/2011. Commissioning of the additional capacity is 22/05/2018.

This electricity amount have contributed to the following goals:

- Reduction in fossil fuel use (imported or local) by using renewable energy resources.
- Displacement of ecologically unsound and climate unfriendly power generation
- Extension of nationally sourced power generation.
- Improvement of environmental conditions (GHG and odour) and safety in the landfill area
- Reduce the greenhouse gas emissions

[3] Samsun Avdan Technical Feasibility Report

A.2. Eligibility of the project under Gold Standard

The project activity meets the eligibility criteria as per section 3.1.1 of GS4GG Principles & Requirements document as described below.

- The project applies methodologie ACM0001 v19.0 and ACM0002 v19., which is an approved methodology under Gold Standard.

- The project type is Waste Handling and Disposal which is an eligible project type as it is in accordance with 1.2.2 c) of the Eligible Project Types & Scope under Gold Standard For The Global Goals
  Community Services Activity Requirements.

- The project activity results in displacement of electricity from thermal power stations while contributing to sustainable development of Turkey. Hence, the project contributes to the Gold Standard Vision and Mission.

- Waste Handling and Disposal is an approved project type and does not require approval from Gold Standard.

- This project activity is not associated with geo-engineering or energy generated from fossil fuel or nuclear, fossil fuel switch, nor does it enhances or prolongs such energy generation.

General Eligibility Criteria under Renewable Energy Activity Requirements

Project Type: As discussed above, the project type is eligible.

The Samsun LFF project also does not claim certificates from another Certification Scheme other than GS or not register for energy labels (such as RECs), therefore no double counting occurs and thus it is eligible under the Gold Standard.

A.3. Project Location

South-west of Samsun city centre, at an air distance of ca. 8 km. The closest neighbourhoods are Gurgendag and Asagiavdan, both having an air distance of ca. 1 km., Turkey. Thus, the project is eligible.

Project scale: Emission reduction is more than 60 kt CO_2 equivalent annually. Therefore the large scale methodology is used. The project activity capacity is 8.4 MWel.

A.4. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

The project participant Samsun Avdan Enerji Üretim ve Tic. A.Ş. is the legal owner of the project and has the legal rights for the credits.

Rüzgar Danışmanlık act as carbon consultants for the Project. Contact details are provided in Annex 1.

A.5. Location of project

A.5.1. Host Country

Turkey

A.5.2. Region/State/Province etc.

Black Sea Region / Samsun Province.

A.5.3. City/Town/Community etc.

The Project is located south-west of Samsun city centre, at an air distance of ca. 8 km. The closest neighbourhoods are Gurgendag and Asagiavdan villages, both having an air distance of 1 km.

A.5.4. Physical/Geographical location

The GPS coordinates of the Project activity are as the following:

- Latitude: 41°14'45"N
- Longitude: 36°13'16"E

Please see below the maps showing the location of the project activity in Turkey and the locations of the project area:

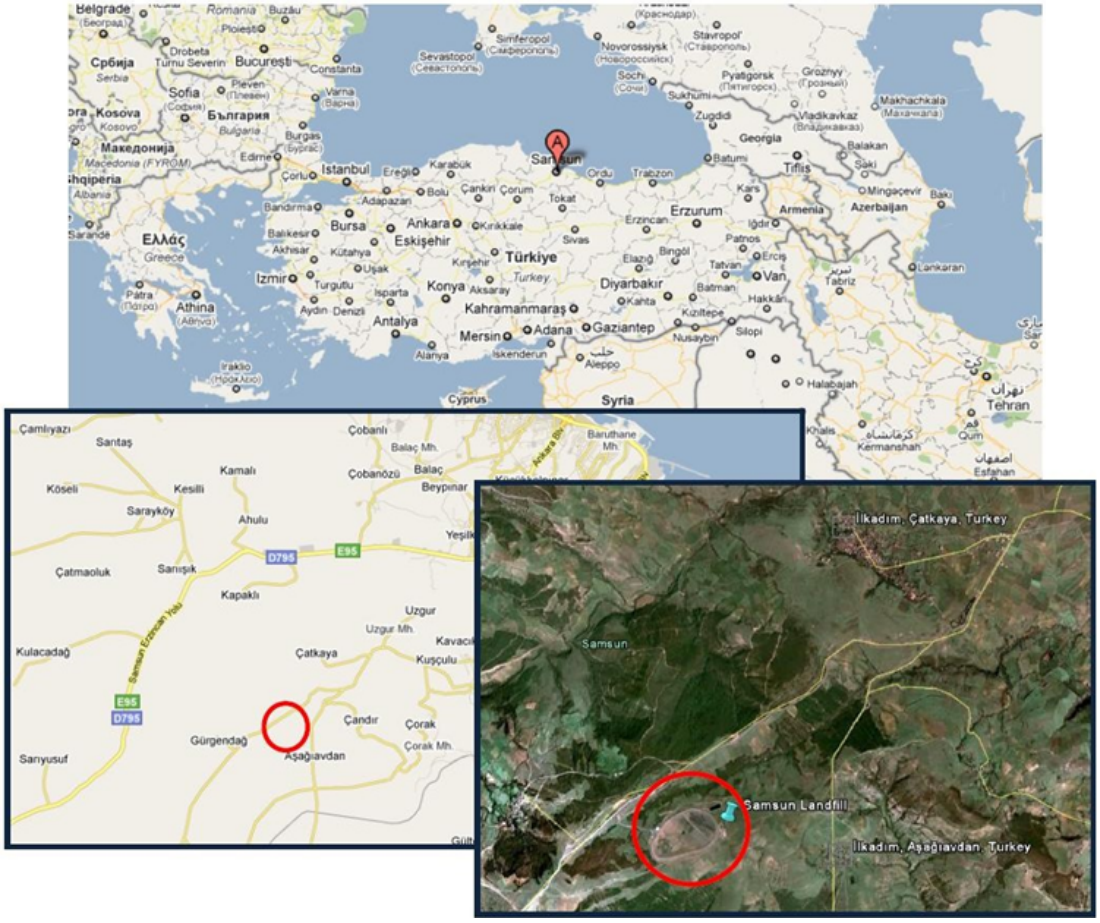

Figure 2: The location of the project activity[4]

Technologies and/or measures

The proposed activity involves the collection and utilization of the LFG with an electricity component with an installed capacity 8.4 MWe. During the first crediting period expected disposed waste amount was 182,500 tonnes, corresponding to an average of 500 t/day. For the second crediting period expected disposed waste amount is 304,466 tonnes, corresponding to an average of 800 t/day.

The Project mainly consists of the following components:

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

[4] Feasibility Report 02/11/2009

Table 1: Technical specifications of the typical modules will be as follows[5]

Equipment	Specifications
Gas Engine	Manufacturer: Deutz
Number of Units	7
Blower	Capacity: 1.23 MWm, 1.2 MWe Efficiency at full capacity: 40.4% Type: Packaged in container
Flare	Manufacturer: Jenbacher

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

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

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

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

[5] Deutz Technical Data Sheet

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

- The measurement system is able to store the measured data electronically. The control and monitoring system is allow these readings to be obtained remotely.

Project technical lifetime is determined through " Tool to determine the remaining lifetime of equipment" (Version 01). The project option is selected as (a) as below;

(a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;

The Project is designed for an operation lifetime of 28 years, according to the contract with the Samsun Municipality.mThis is plausible, considering the estimated 8,000 hours/year operating hours of the Project and the suggested equipment lifetime of 150,000 operating hours given in the "Tool to determine the remaining lifetime of equipment", v.1.

The amount of annual production is 54,600 MWh. The project is planned to connect to Samsun TM that has 31,5 kV medium voltage. Latest building technologies will be used in the project. National and international standard values will be based in used materials. The annual average over the crediting period of estimated emission reductions will result 115,062 tonnes of CO2e/year and total emission reduction will be 805,435 tonnes of CO2e for the second crediting period.

The Project prevents methane emissions to the atmosphere and produce electricity which will reduce fossil fuel consumption and associated CO_2 emissions. "Samsun Aydan Enerji Üretim ve Tic. A.Ş" also has Biogas utilization application but this part has not been included to project boundary. The Biogas yearly produce estimated as 180,000-181,010 m3 gas. Biogas and LFG blends in same pipe and goes to the electricity generators. Both LFG and Biogas sides have their own flowmeters. The electricity energy produced from LFG is calculated based on conservative assumptions and measurements The generation will depend on the quantity of the LFG.The Project is expected to generate 54,600 MWh of electricity per year without emitting GHGs. The electricity generation is mainly done by fossil fuel fired power plants in Turkey. The share of resources in the electricity generation in Turkey[6] has been shown in the Figure as below;

[6] https://www.teias.gov.tr/tr/i-installed-capacity

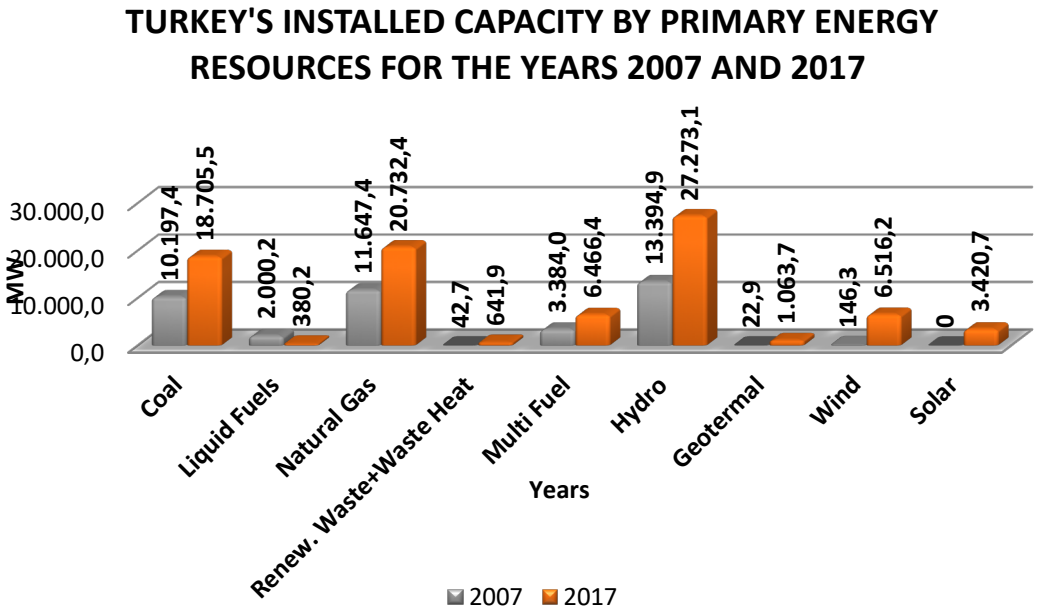

Figure 3: Turkey Total Capacity (2007-2017)

Total capacity is 85.200 MW in Turkey and Renewable + Waste+Waste Heat Power projects 641,9 MW capacities.

Generation of emission reduction and crediting period will start with the first day of the documented electricity supply to the national grid. The first 7 years will be the second crediting period of the project activity as 09/02/2018 to 08/02/2025 after the commissioning. Applying the approved methodology to the project annual avarege emission reduction will be 115,062tCO2e by electricity generation and methane capture. Totally 805,435 tCO_2e emission reduction is expected over the period of 7 years.

A.6. Scale of the project

Large Scale

A.7. Funding sources of project

The project activity does not have any public funding or Official Development Assistance (ODA) funding.

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

(*https://globalgoals.goldstandard.org/101-1-g-gold-standard-gender-equality-requirements-guidelines/*)

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

Response: As per Gold Standard Gender Policy (https://globalgoals.goldstandard.org/101-1-g-gold-standard-gender-policy/), p. 10

"Foundational gender-sensitive requirement - This strengthens Gold Standard's 'do no harm' approach and addresses safeguards to prevent or mitigate adverse impacts on women or men and girls and boys. Such action is mandatory for all projects seeking Gold Standard certification and includes compliance with the gender 'do no harm' safeguards, gender gap analysis and gender sensitive stakeholder consultations."

The project being a LFG project is not gender sensitive project. The project does not adversely impact women or men.

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

Response: The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis. Turkey is party to Convention on Discrimination since 1972 to prevent any form of discrimination. (https://treaties.un.org/pages/ViewDet ails.aspx?src=TREATY&mtdsg_no=I V-2&chapter=4&lang=en)

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

Response: The Project shall complete the following gender assessment questions (https://globalgoals.goldstandard.org/101-4-gold-standard-for-the-global-goals-safeguarding-principles-requirements/) below:

1. 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 being a LFG project does not reduce access to or control of resources for women.

2. Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)? No, the Project beneficiaries in terms of employment and social upliftment of the area are common for both the gender. The project does not involve in any form discrimination in any kind of form.

3. 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, The project does not involve in any form discrimination in any kind of form.

4. 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 the project takes into account gender roles and abilities of women/men. Job profile is allocated based on the type of work to be carried out.

5. 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, on the contrary the project leads to increased availability of electricity in the regional grid thereby uplifiting the living standards.

6. 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, since the project is a renewable electiricity generation project, thus it will not have discriminated against women.

7. 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, in fact, the project leads to improved electricity in the regional grid.

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

Response: The Stakeholder Consultation meeting had done on 01st of September 2010 at the Local Agenda 21 Hall, in Samsun city. All relevant stakeholders had been invited through the project consultant's websites and through local newspaper announcements and written and personal invitations one week before the initial stakeholder meeting.The general outcome of the stakeholder consultation interview was positive verbally

And the project is currently applying for renewal crediting period of GS registration as GS4GG now. As required by the Gold Standard complementary stakeholder consultation process has been undertaken by the project owner in order to involve stakeholders participation to the project for a renewal crediting period of Samsun Landfill Gas to Energy Project. There is no need to make local stakeholder consultation physical meeting.

For complemantary stakeholder consultation; the documents including the non-technical project summary for design change, renewal crediting period and the Enviromental and Social Impact questionnaire related with the Sustainable Development Indicators (SD Assestment according to GS4GG) have been delivered to the stakeholders who have been selected as stakeholders to the project activity. The main communication method has been through e-mails and delivery of hard copies of the mentioned documents for those who don't have an email address (specifically the locals) to the mukhtar of the Aşağıavdan village.

The feedback request for design change and renewal crediting period has started on 13/03/2019 with sending out the documents to the stakeholders and verbally on the same day and 13/02/2019 via mukhtar of the Aşağıavdan village and no feedback has been received until now. The beginning of Complemantary Stakeholder Feedback Round has

be announced from the mukhtar's offices, mosques and coffe houses of the Aşağıavdan village. This public announcement, emails and documents contain information such as location of available these documents, the procedure to commit comments, timing and the contact's details.

Furthermore, the GS continuous input mechanism was explained and discussed that whenever they have a complaint or a request, they can be able to fill in the grievance book which can be located at mukhtar. The project owner has also explained that would be regularly checked by the project manager. The local stakeholders agreed on this mechanism and the book was given to the mukhtar of Aşağıavdan village with a protocol.[7]

SECTION B. Application of selected approved Gold Standard methodology

B.1. Reference of approved methodology

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

Methodology: ACM0001 Version 19.0 Flaring or use of landfill gas

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

Project type: Waste Handling and disposal

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

Sectoral Scope: 01 Energy industries (renewable - / non-renewable sources) as per

[7] The protocol and letter have been provided to the GS and VVB

'Sectoral scopes related approved methodologies and DOEs.

Project type: Type I – Renewable Energy Projects

Category: Electricity generation for a system

The methodology refers to[8]:

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

B.2. Applicability of methodology

ACM0001 Applicability

Methodology applicability	The proposed project activity
ACM0001, version 19.0	
1. *This methodology is applicable to project activities which* (a) *Install a new LFG capture system in a new or existing SWDS; 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:*	This methodology is applicable to Samsun landfill gas project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situations such as:

8 https://cdm.unfccc.int/methodologies/DB/Y88077XT5O83TZ2PYEZ36LFIAMAODR

(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 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:* ***(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.***	(a) Install a new LFG capture system in an existing SWDS; or (b) ***Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG*** In Turkey; generally SWDS still do not have LFG recovery and resulting methane emissions. [9] (c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity. Samsun LFG is a new LFG system in a new SWDS.[10] Before the Samsun LFG there was not any LFG system and SWDS. In Turkish waste management inventory there is no organic waste recycle facility at the reasonable proximity of the project. The project activity generates electricity through

[9] Municipal Waste Statistics – Turkish GHG Inventory 1990 - 2016

[10] Samsun LFG Generation License – 24/03/2016

	LFG and do not reduce the amount of organic waste that would be recycled.[11]
2.The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is: *(a) 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; and* *(b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln:* *(i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or* *(ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary;* *(c) In the case of LFG supplied to the end-user(s) through natural gas distribution network, trucks or the dedicated pipeline, the baseline scenario is assumed to be displacement of natural gas.* *(d) In the case of LFG from a Greenfield SWDS, the identified baseline scenario is atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.*	The proposed project activity will utilize the recovered LFG to produce electrical energy directly, i.e. 2 (b i)[12]
3) This methodology is not applicable: *(a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement*	a) The methodology is not applied with other approved methodologies. b) The management of the SWDS before the implementation of the

[11] Samsun Avdan Technical Feasibility Report

[12] Samsun LFG Generation License – 24/03/2016

energy efficiency measures at a kiln or glass melting furnace; *(b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.*	project is handled by the the Samsun Municipality. The project proponent does not have any control over SWDS management which is under management of Samsun Municipality. Thus the SWDS management is not delibaretely worsened to increase methane generation prior to the project implementation. The para 5.b of the ACM0001, "If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity", is not valid so the project is applicable to ACM001.

Applicability of Tools	The proposed project activity
Project emissions from flaring (version 03.0.0)	
a) Methane is the component with the highest concentration in the flammable residual gas; and *b) The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g.biogas, landfill gas or wastewater treatment gas).*	LFG does not contain any combustible gases other than methane, carbon monoxide and hydrogen. LFG is obtained from the decomposition of organic material in landfills.

Methodological Tool --Emissions from solid waste disposal sites. (version 08.0.0)	
Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. *Methane emissions are mitigated by capturing and flaring* *or combusting the methane (e.g. "ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS);* *Application B: the CDM project activity avoids or involves the disposal of waste at a SWDS.* *An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions.*	It is easily identified that the project activity meets the tool's applicability conditions Application A. The proposed activity involves the collection and utilization of the LFG with an electricity component with an installed capacity 8.4 MWe. During the first crediting period expected disposed waste amount was 182,500 tonnes, corresponding to an average of 500 t/day. For the second crediting period expected disposed waste amount is 304,466 tonnes, corresponding to an average of 800 t/day.[13]
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)	
The tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: *Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of*	The project activity is expected not to consume electricity from grid. However, when electricity generators are under regular

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electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; *Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or* *Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.* *The tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of* *Leakage. The tool only accounts for CO2 emissions.*	maintenance and sometimes shut down, the electricity will be imported from the Power Grid during this period of time.[14]
Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0.0)	
a) Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or *project emissions.* *b) Methodologies where CO2 is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may*	The composition and flow of the LFG are measured to determine baseline emissions in the context of the project activity. However, CO_2 is not a gas of interest in the project activity.[15]

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not adopt this tool as material balances are the cost effective way of monitoring flow of CO2. *The underlying methodology should specify:* *(a) The gaseous stream the tool should be applied to;* *(b) For which greenhouse gases the mass flow should be determined;* *(c) In which time intervals the flow of the gaseous stream should be measured; and* *(d) Situations where the simplification offered for calculating the molecular mass of the gaseous stream (equations (3) or (17)) is not valid (such as the gaseous stream is predominantly composed of a gas other than N2).*	
"Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period"(Version 03.0.1)	
Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions;	Only the project capacity is increased but the conditions used to determine baseline emissions in the previous crediting period are still valid.[16]

"Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" Applicability

Step 1: Assess the validity of the current baseline for the next crediting period

The validity of the current baseline is assessed using the following Sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The list of laws and regulations that are valid at the beginning of the crediting period are given Section B.5 Demonstration of Additionality. The compliance of laws and regulations for both electricity generation and the environment at the beginning of the crediting period is explained in the Section B.5.From the beginning of the first crediting period to current date (beginning of the second crediting period), there has been no changes related with given laws and regulations and also there has been change to the project concerning the compliance status of the project.

Result of Substep 1.1: No change regarding the compliance to laws and regulation is determined. So we follow to Step 1.2.

Step 1.2: Assess the impact of circumstances

The baseline scenario, identified at the first crediting period, was the continuation of the current practice without any investment. The baseline scenario was the release of methane gaseous

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(resulting from the wastes) to the atmosphere and supply of electicity to the grid by grid connected power plants.

There is no significant change to the investment environment and to the electricity tariff had happened during first crediting period to the current date. The fuel types, the distribution of power plants according to their fuel sources have not been significantly changed.

The number of SWDS with methane recovery and the amount of recovered methane also did not significantly change when compared to total SWDS and amount of methane released to the atmosphere.
The change of SWDS in Turkey has not been significantly changed after the first crediting period as below;[17]

Table 7.18 Methane recovery, 1990-2016

Year	Number of SWDS with landfill gas recovery	Recovered methane (kt)
1990	NA	NO
1991	NA	NO
1992	NA	NO
1993	NA	NO
1994	NA	NO
1995	NA	NO
1996	NA	NO
1997	NA	NO
1998	NA	NO
1999	NA	NO
2000	NA	NO
2001	NA	NO
2002	1	1.5
2003	1	2.5
2004	1	2.3
2005	1	1.7
2006	1	2.2
2007	2	8.3
2008	3	21.4
2009	4	36.5
2010	5	47.9
2011	8	56.7
2012	13	96.2
2013	16	159.7
2014	19	179.8
2015	25	184.6
2016	34	239.2

Result of Substep 1.2: The conditions used to determine the baseline emissions in the previous crediting period are evaluated as still valid.

Step 1.3 Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.
The equipments lifetime exceeds the crediting period for which renewal is requested. Equipment only requires regular maintenance. The landfill site also does not require any investments.

Result of Substep 1.3 Current baseline equipment is still in use and expected to be use in for the next crediting period.

Step 1.4 Assessment of the validity of the data and parameters

The data and parameters regarding the emission reduction benefited from substitution of electricity generated by grid connected power plant do change annually. The data that has changed can be found in Combined Margin Calculation. GWP has been revised through UNFCCC accepted value as 25[18]). New power plants have been added to the grid, the annual production of power plants have been changed so OM and BM values have changed and they are needed to be updated.

Result of Substep 1.4. The data and parameters are not valid for the next crediting period.

Result of Step 1: The result of Substep 1.4 states that the data and parameters are not valid for the subsequent crediting period so we proceed to the Step 2.

Step 2: Update the current baseline and the data and parameters

Substep 2:1 Update the current baseline

The former tools were:

For the emission reductions stemming from LFG capture, the ACM0001 v.19.0 "Consolidated baseline and monitoring methodology for landfill gas project activities", hereinafter referred to as the methodology, is used. The methodology refers to the following tools:

- "Tool for the demonstration and assessment of additionality"; v.5.2 ("Additionality Tool")
- "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"; v.4
- "Tool to determine project emissions from flaring gases containing methane"; EB28, Annex 13

For the emission reductions stemming from electricity generation, the ACM0002 v.19 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources is used. This methodology refers to the following tool:

"Tool to calculate the emission factor for an electricity system", v.2.

[17] Turkish Greenhouse Gas Inventory 1990-2016

[18]https://unfccc.int/sites/default/files/7_edited__ghg_inv_guidelines_cleared_dv_lg_ks_dv.pdf

The current tools are:

- The project applies methodologie ACM0001 v.19.0 which is an approved methodology under Gold Standard.

- "Tool for the demonstration and assessment of additionality" v.07.0.0
- The tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" v.6
- Tool to determine project emissions from flaring gases containing methane"; EB102, Annex 6

For the emission reductions stemming from electricity generation, the ACM0002 v.19 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources is used. This methodology refers to the following tool:

- "Tool to calculate the emission factor for an electricity system", v.7.

Substep 2.2 Update the data and parameters

The application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore. The data and parameters are updated. The Methane is the largest constituent of LFG and its global warming potential (GWP) is 25 times than CO_2. And this GWP is changed 25 from to 21 according to UNFCCC accepted value). The data used for calculation of OM and BM is changed and the updated data is given section B.6.4. The parameters of W_{OM} and W_{BM} are also changed and CM is also calculated according to the new parameters.

ACM0002 Applicability

Methodology "ACM0002 "Grid-connected electricity generation from renewable sources, version 19", is applicable to the proposed project activity because it fulfils the required criteria:

Table 2 Applicability of ACM0002 Version 19

Applicability Condition	Justification
This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity; (b) Involve a capacity addition; (c) involve a	The project activity involves installation of a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity. The proposed project activity is a greenfield project activity . [19]

[19] Generation License – 18.05.2011

retrofit of (an) existing plant(s); or (d) Involve a replacement of (an) existing plant(s). (e) Involve a replacement of (an) existing plant(s)/unit(s).	
The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	a) The proposed project activity is a greenfield project activity . [20] b) This condition is not applicable to the project activity since the project activity is a Greenfield grid connected LFG project[21].
In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or	This condition is not applicable to the project activity as it does not involve the installation of a hydro power plant.[22] The proposed activity involves the collection and utilization of the LFG with an electricity component with an installed capacity 8.4 MWe. During the first crediting period expected disposed

[20] Generation License – 18.05.2011

[21] Generation License – 18.05.2011

[22] Generation License – 18.05.2011

(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m2 ; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2 ; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	waste amount was 182,500 tonnes, corresponding to an average of 500 t/day. For the second crediting period expected disposed waste amount is 304,466 tonnes, corresponding to an average of 800 t/day.[23]
The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	The proposed project activity involves the installation of a LFG project with a total capacity of 8.4 MWel and there is no non-renewable component to the proposed project activity. This condition is not applicable to the project activity since the project activity is a Greenfield grid connected LFG project .[24]

[23] Samsun Avdan Technical Feasibility Report

[24] Generation License – 18.05.2011

In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity is a Greenfield grid connected LFG plant. No retrofit or replacement exists in the project activity.[25]

The Project have a total capacity up to 8.4 MWel and is therefore eligible for the use of AMS I.D. However, Emission reduction is more than 60 kt CO2 equivalent annually, for the sake of conservative approach, the large scale methodology ACM0002 is preferred.Therefore the large scale methodology is used.

B.3. Project boundary

According to the ACM0001 methodology, the project boundary is the site of the project activity where the gas is captured and destroyed/used. The project boundary include the power generator, which is connected to the grid. For the proposed project activity, electricity is sourced and transmitted to the grid. The difference is the net generation of the project activity. Outside of the project boundary there exists biogas collection and the collected biogas is also fed to the electricity generation engine. Both LFG and Biogas sides have their own flowmeters. The electricity energy produced from LFG is calculated based on conservative assumptions and measurements. Furthermore, it will not be sourced from a captive generation source or power plant. The project boundary for the project activity is as demonstrated in the figure below:

[25] Generation License – 18.05.2011

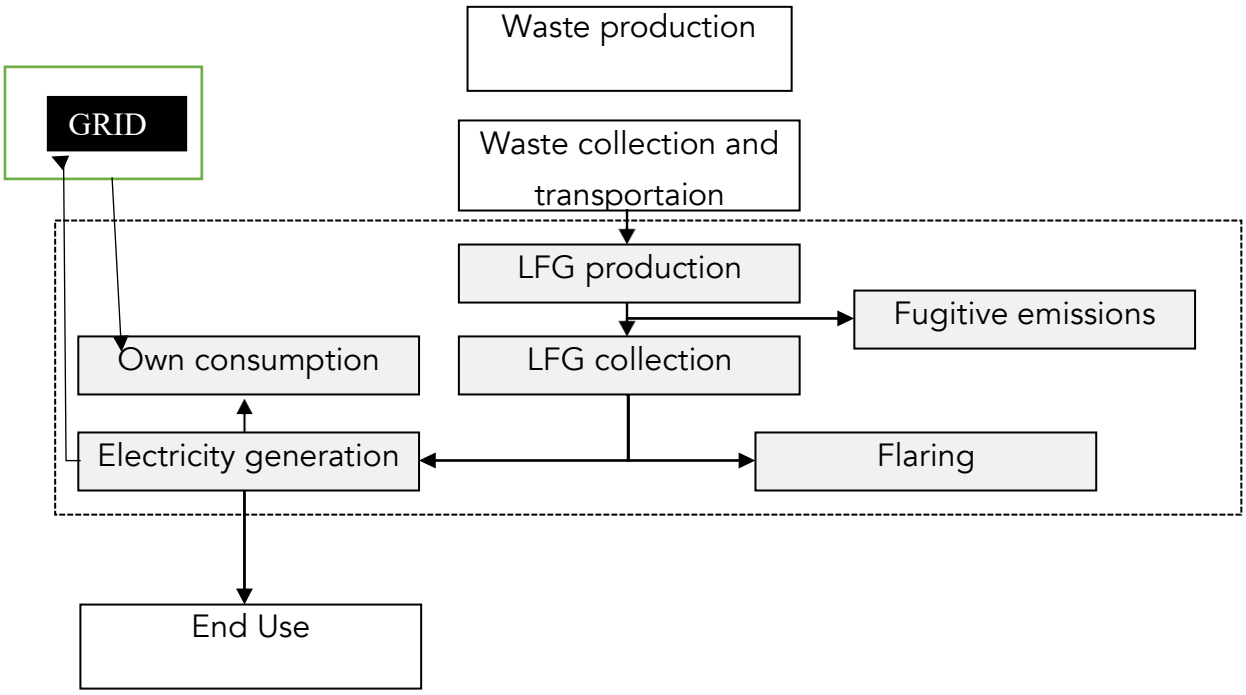


Figure 4 : Project Boundary

Table 3: The greenhouse gases and emission sources

ACM0001 Version 19.0

Source		Gas	Included	Justification/Explanation
Baseline	Emissions from decomposition of waste at the SWDS site	CH_4	Yes	The major source of emissions in the baseline
		N_20	No	N2O emissions are small compared to CH4 emissions from SWDS. This is conservative
		CO_2	No	CO2 emissions from decomposition of organic waste are not accounted since the CO2 is also released under the project activity
	Emissions from electricity generation	CO_2	Yes	Major emission source if power generation is included in the project activity
		CH_4	No	Excluded for simplification. This is conservative
		N_20	No	Excluded for simplification. This is conservative

Project Activity	Emissions from fossil fuel consumption for purposes other than electricity generation	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_20	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	This is an important source of emissions in the project activity
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_20	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_20	No	Emissions are considered negligible

ACM0002 Version 19

According to the methodology, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system.

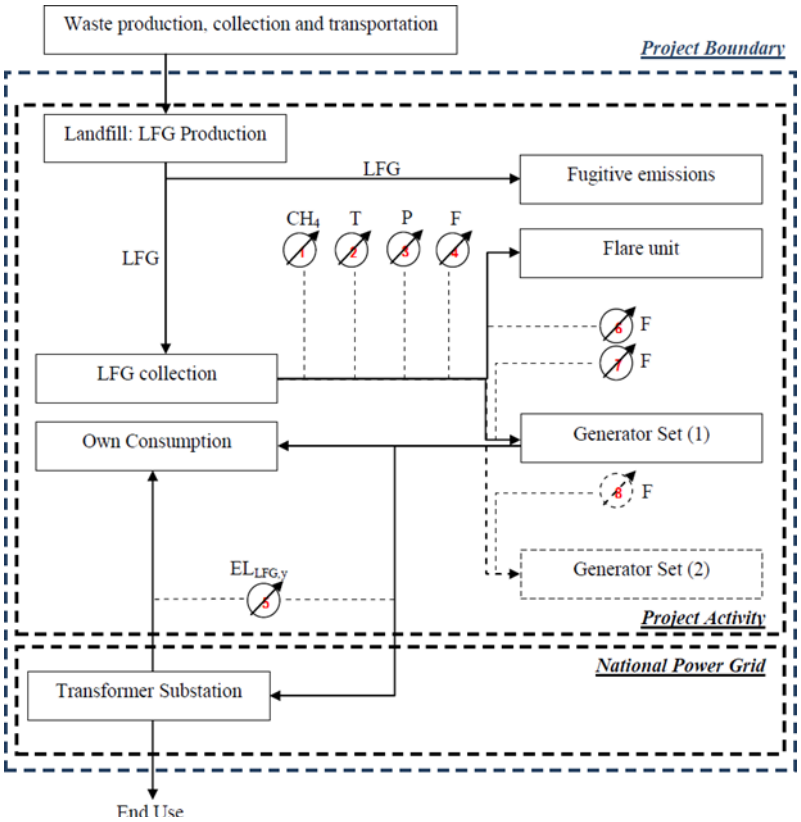
The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the table below:

Source		Gas	Included	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO2	Yes	Main emission source
		CH4	No	Minor emission source
		N20	No	Minor emission source

In context of the ACM0002 the project emission is described for renewable power plant, geothermal or hydro power plant. For most renewable power plant project activity emissions are neglected.

The following figure represents the line diagram of the project activity, including metering points:

Figure 5: Single Line Diagram



The scheme shows the connection points of Samsun LFG Project with the national grid. The Samsun LFG has to be connected to the national grid via 31.5 kV Medium Voltage overhead transmission line. Two electricity meters have been installed at Samsun LFG Project. These meters are working in parallel. System has been connected to the meters through a step-up transformer 154/31.5 kV

B.4. Establishment and description of baseline scenario

As the ACM0001 suggests, the baseline scenarios shall be identified and assessed according to the Additionality Tool. The ACM0001 further requires certain scenarios to be included among alternatives. These default scenarios are included in Section B.5.

There is no incentive to utilise the LFG to produce thermal energy, since there is no demand for thermal energy in the surroundings of the Project site. The Project is a green field investment, which does not modify or retrofit any existing facility. There is no national regulation which would require the recovery or flaring of the LFG emitted from landfill sites. The relevant environmental legislation does not force municipalities to effectively control LFG emissions from landfills.5 The tender opened by the Samsun Municipality does not force the Project owner to effectively collect and destroy LFG emissions, it is rather a tender for the rights to use the site for power generation purposes.

The active collection and flaring of LFG is not mandatory at the Project site, however there already is a limited amount of piping for LFG venting to the atmosphere. Piping is not available at the whole site and the main purpose of the installed pipes is to reduce explosion risks. The LFG is not being flared.
According to the "Baseline Methodology Procedure" in "Tool to calculate the emission factor for an electricity system, Version 07.0.0" baseline emissions are calculated under Section B.6.3.

In respect of large scale consolidated methodology ACM0002: Grid-connected electricity generation from renewable sources, version 19, EB 100, Annex 6", the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

Since the proposed project activity is "The installation of a new grid-connected renewable power plant ", the baseline scenario is defined as the consolidation of electricity delivered to the grid by the project activity and electricity generated by the operation of grid-connected power plants in Turkey and electricity produced by the new generation sources.

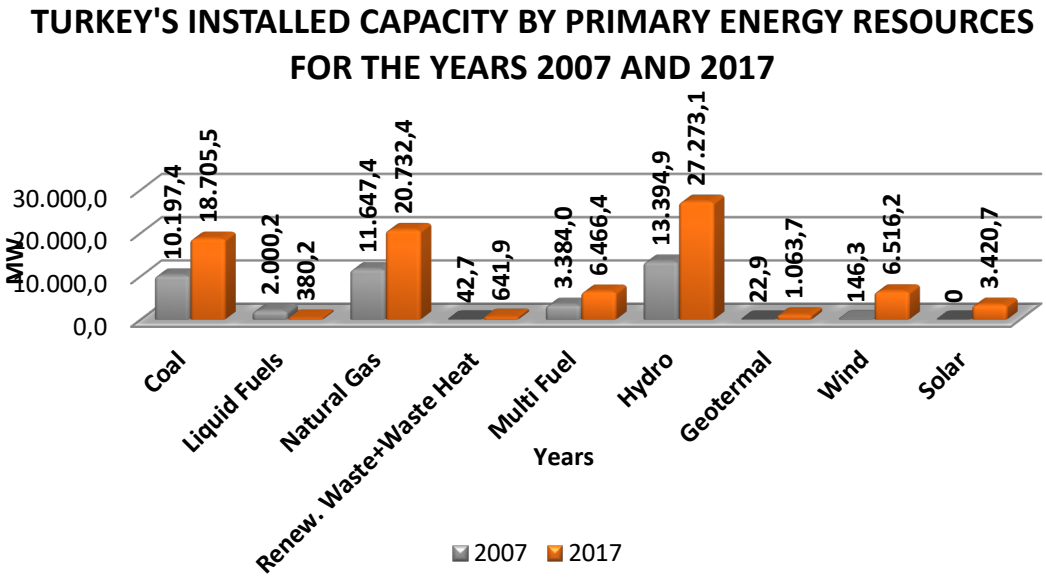
The Project owner does not have control over the emissions stemming from the baseline scenario. In this framework, the baseline scenario can be defined as the reduction of LFG emissions from the landfill by methane destruction and substitution of the electricity generated by grid-connected power plants, thereby reducing the overall greenhouse gas emissions.

Installed electricity generation capacity in Turkey has reached 85,200 MW as of 2017. Renewable + Waste+Waste Heat Power projects have totally have above the 500 MW.

The electricity generation is predominantly composed by fossil fuel fired power plants in Turkey. The share of resources in the electricity generation in Turkey may be seen in Figure 6 The contribution to annual electricity generation from waste energy was very small volume.

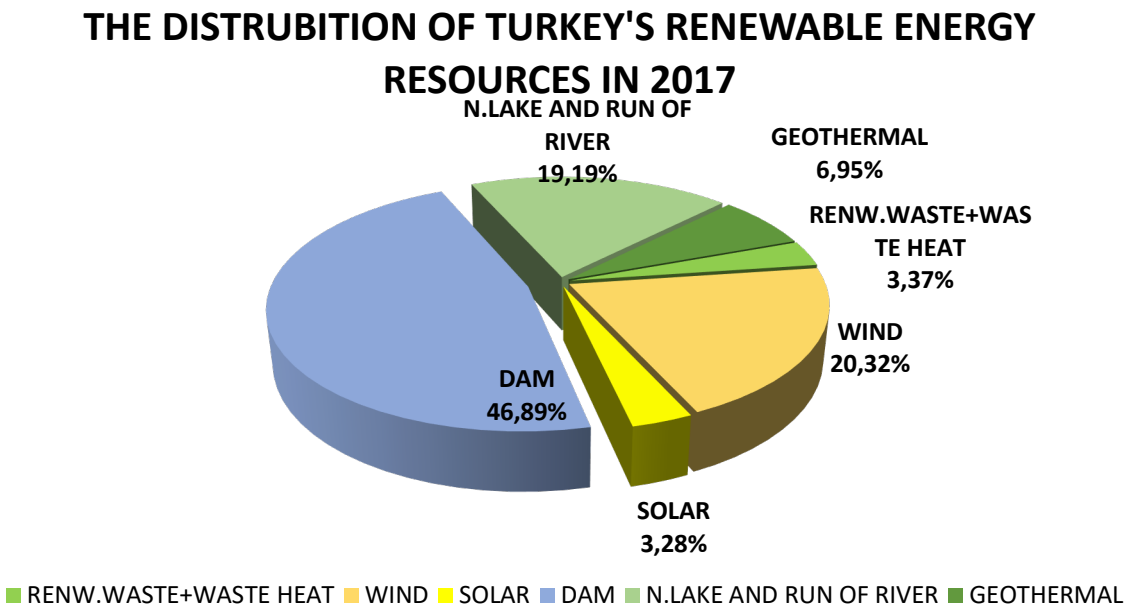
Figure 6: Projected Electricity Generation Mix[26]

[26] https://www.teias.gov.tr/tr/i-installed-capacity



According to the 5-year projection it is clear that fossil fuels will remain the main sources for electricity generation (71.5 % in 2019). Natural gas will continue to dominate the market. Hydro will account for 22.1% of the mix whereas all non-hydro renewable combined (geothermal/biogas/waste/wind/solar) will only account for 6.4% of all electricity generation. This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector.

Figure 7: Fossil Fuels and Renewable in Turkish Electricity Mix (2017)[27]



"Simplified procedures to identify the baseline scenario and demonstrate additionality" are followed. Since they are valid from the date of entry into force of Version 19.0 of ACM0001 on 14 June 2019; and any update of the simplified procedures does not affect the projects

[27] https://www.teias.gov.tr/tr/iii-electricity-generation-consumption-losses

that request registration as a CDM project activity or a programme of activities by 4 May 2020 and apply the simplified procedures contained in Version 19.0 of ACM0001.

Samsun LFG project fulfills the condition of (a) from the conditions given below (para 5.3.1 of Large-scale Consolidated Methodology Flaring or use of landfill gas Version 19.0)

"The following types of project activities at new or existing landfills (greenfield or brownfield) are deemed automatically additional, if prior to the implementation of the project activity the LFG was or would have been only vented and/or flared but not utilized for energy generation:

(a) The LFG is used to generate electricity in one or several power plants with a total
nameplate capacity that equals or is below 10 MW;
(b) The LFG is used to generate heat for internal or external consumption;
(c) The LFG is flared."

The project baseline scenario for LFG is " the atmospheric release of the LFG". The baseline scenario for electricity generation is "electricity generation in existing and/or new grid-connected power plants".

Simplified procedures to identify the baseline scenario and demonstrate additionality" are followed. Since they are valid for from the date of entry into force of Version 19.0 of ACM0001 on 14 June 2019. Samsun LFG project is eligible for the above condition, "Combined tool to identify the baseline scenario and demonstrate additionality" is also applied under the section B.5.

B.5. Demonstration of additionality

This section utilizes the Additionality Tool, as required by the methodology. In agreement with the ACM0001, when defining alternative scenarios, relevant policies and regulations related to the management of landfill sites are taken into account.

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

The project is not first one of its-kind. So Step-1 is followed.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Realistic and credible alternatives to the project activity(s) are defined through the following Sub-steps;

In applying Step 1 of the tool, baseline alternatives for the destruction of LFG, shall take into consideration, inter alia, the following alternatives:

(a) LFG1: The project activity implemented without being registered as a CDM project activity (i.e. capture and flaring or use of LFG);
(b) LFG2: Atmospheric release of the LFG or capture of LFG in a managed SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons;
(c) LFG3: Atmospheric release of the LFG or capture of LFG in an unmanaged SWDS and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons;
(d) LFG4: LFG generation is partially avoided because part of the organic fraction of the solid waste is recycled and not disposed in the SWDS;
(e) LFG5: LFG generation is partially avoided because part of the organic fraction of the solid waste is treated aerobically and not disposed in the SWDS;
(f) LFG6: LFG generation is partially avoided because part of the organic fraction of the solid waste is incinerated and not disposed in the SWDS.

In addition to the alternative baseline scenarios identified for the destruction of LFG, alternative scenarios for the use of LFG shall also be identified (if this is an aspect of the project activity):

(a) For electricity generation, alternative(s) shall include, inter alia:
(i) E1: Electricity generation from LFG, undertaken without being registered as CDM project activity;
(ii) E2: Electricity generation in existing or new renewable or fossil fuel based captive power plant(s);
(iii) E3: Electricity generation in existing and/or new grid-connected power plants;

Sub-step 1a: Define alternatives to the project activity:

The Project includes the LFG and electricity generation components; therefore different alternatives to these two components will be described;

Alternatives to Landfill Gas Component	Alternatives to Power Generation Component
LFG1: The project activity implemented without being registered as a CDM project activity (i.e. capture and flaring or use of LFG).	E1: Electricity generation from LFG, undertaken without being registered as CDM project activity
LFG2: Atmospheric release of the landfill gas or partial capture of landfill gas and destruction to comply with regulations or	E3: Electricity generation in existing and/or new grid-connected power plants .

contractual requirements, or to address safety and odour concerns.	

Based on the barrier and investment analyses, it is clear that the E1 and LFG1 scenarios are not feasible for the Project owner and are therefore not applicable.

The Project being a voluntary initiative, the only plausible baseline scenario is the combination of:
E3: Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system"; and,
LFG2: Maintaining the status quo, where LFG is emitted into the atmosphere without conducting any management, destruction or utilization on the landfill site.
The alternative scenario is defined as the combination of both Landfill Gas and Power Generation components, since the Project has both components.

Outcome of Sub-step 1a: Realistic and credible alternative scenarios to the Project activity are identified.

Sub-step 1b: Consistency with mandatory laws and regulations:
For the electricity generation component, the following laws and regulations apply;

Laws and Regulations Applicable in the Electricity Market

<u>Legal Framework Concerning Electricity Generation</u>

Electricity Market Balancing and Settlement Regulation

- The repealed Electricity Market Balancing And Settlement Regulation published in the Official Gazette No. 25632 dated 03/11/2004
- Regulation Concerning Electricity Demand Forecast
- Communiqué Regarding Connection to and Use of Transmission and Distribution Systems in the
- Electricity Market
- Communiqué Regarding Preparation of Retail Contract in The Electricity Market
- Communiqué Concerning Principles and Procedures for Selection in the Existence of More Than One
- Application for Generation of Electricity from the Same Source and on the Same Region
- Communiqué Regarding Regulation of Market Management Revenue
- Regulation on Principles and Procedures for Granting Guarantee of Origin
- Electricity Transmission System Supply Reliablity and Quality Regulation
- Electricity Market Grid Regulation
- Communiqué Regarding The Principles and Procedures of Financial Settlement In The Electricity Market

- Electricity Market Import and Export Regulation
- Communiqué Regarding Regulatory Accounting Guidelines
- Electricity Market Distribution Regulation
- Communiqué Regarding the Meters to be used in the Electricity Market
- Electricity Market Customer Services Regulation
- Electricity Market Eligible Consumer Regulation
- Electricity Market License Fees
- Electricity Market Tariffs Regulation
- Electricity Market Licensing Regulation
- Electricity Market Law

Other relevant laws:

- Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy (Nr.
- 5346)
- Energy Efficiency Law (Nr. 5627)
- Forest Law (Nr. 6831)

Table 4 Laws and Regulations governing the landfill gas component

Legal Framework Concerning the Environment	
The Environment Law	Packaging Waste Control Regulation
Air Quality Control Regulation	Soil Protection Law
Noise Control Regulation	Air Pollution from Heating Regulation
Water Pollution Control Regulation	Hazardous Chemicals Regulation
Control of Solid Waste Regulation	Waste Batteries Regulation
Environmental Impact Assessment Regulation	Soil Pollution Control Regulation
Medical Waste Regulation	Air Pollution from Vehicles Regulation
Toxic Chemical Substance and Prod Regulation	Medical Waste Control Regulation
Hazardous Waste Regulation	Water Resources Protection from Hazardous Materials Regulation
Waste Oils Control Regulation	Urban Waste Water Treatment Regulation
Industrial Air Pollution Control Regulation	Drinking Water Quality Regulation

The Environment Law[28] does not require a tipping fee for accepting municipal solid waste at the sanitary solid waste disposal sites. There is an "environment tax" and another "waste water surcharge" collected by municipalities from households for waste management activities. There exists no controlling system for monitoring how and for what purposes these taxes and surcharges are used by municipalities. Municipalities in the host country tend to subsidize waste collection and dumping activities from the municipal budgets. Under these circumstances, municipalities or households are not familiar with additional

[28] http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=1.5.2872&MevzuatIliski=0&sourceXmlSearch=)

costs of proper waste management. Therefore, waste management is one of the everlasting problems of municipalities and is an unattractive field for private companies.

The "Metropolitan Municipalities Law[29]" sets out the legal framework of solid waste management in metropoles. Being subject to this law, the Samsun Metropolitan Municipality is responsible for the collection, management and proper disposal of municipal waste. Accordingly, it is supposed to build and operate the necessary facilities or let 3rd parties do so. In agreement with this law, a tender can be organized for certain types of goods and services the municipalities purchase. Based on this law, the Municipality has organized a tender and the Project owner has been awarded, at no cost to the Municipality.

The Project is a voluntary investment managed by a special contract between the Samsun Metropolitan Municipality and the Project owner. Therefore the Project has to be in compliance with all relevant legislation. The Project is licensed and permitted by public authorities. All scenarios identified in Sub- step 1a are also valid according to national laws, regulations and communiqués.
For scenario LFG2, the most relevant regulation governing landfill sites is the "Control of Solid Waste Regulation". According to its Article 27, landfill sites are not enforced to capture and/or to destroy LFG emissions. This regulation does not set any obligations or penalties but only suggests the reduction of GHG emissions. Therefore, this alternative reflects current practice and is in agreement with current laws and regulations.

For scenario E3, maintaining the status quo, without the realization of the Project activity, is in agreement with the relevant legislation by definition.

Outcome of Sub-step 1b: Realistic and credible alternative scenarios to the Project activity and the Project activity itself are in compliance with mandatory legislation and regulations.

Step 2: Investment analysis

According to the Additionality Tool, this step involves the determination whether the proposed Project activity is not:
(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of emission reductions.

Sub-step 2a: Determine appropriate analysis method

The "Combined tool to identify the baseline scenario and demonstrate additionality,Version 07.0.0", lists three possible analysis methods:

- Option I: Simple cost analysis;
- Option II: Investment comparison analysis; and

[29] The Metropolitan Municipalities Law (Nr: 5216), Article 7

- Option III: Benchmark analysis.

Since the proposed project generates financial and economic benefits via the sales of electricity other than carbon revenues, Option I cannot be used.

Option II is only applicable to projects where alternatives should be similar investment projects in terms of generation capacity. Between Option II and Option III, benchmark financial analysis (Option III) is selected as the analysis method.

As a result Option III: Benchmark Analysis is selected as the analysis method and the Project IRR is selected as the financial indicator for the demonstration of the additionality of the project.

Outcome of Sub-step 2a:
Option III: Benchmark Analysis is selected as the analysis method and the Project IRR is selected as the financial indicator for the demonstration of the additionality of the project.

Sub-step 2b: Option III. Apply benchmark analysis
Given that power generation based on LFG is not a common practice in the host country and different unpredictable risks are involved, this benchmark rate of return should be considered conservatively by taking project risk premium into account. The likelihood of the development of this Project will be determined by analyzing its Project IRR based on the scenarios with and without the sales of carbon credits.

IRR is a measure of investment profitability. According to the Additionality Tool, the assessment of the financial performance of the Project with and without carbon revenues shall be carried out according to benchmarks. The chosen benchmark for the Project is the discount rate. The "Guidelines on the Assessment of Investment Analysis" v.3, EB51 ("Guidelines") suggest that the IRR shall be calculated without considering financial expenses such as principal and interest payments. This means that the "Project IRR" shall be calculated. This means that the Project would be attractive only if the IRR exceeds the discount rate.

Outcome of Sub-step 2b: Apply Benchmark Analysis: The benchmark analysis is applied.

Sub-step 2c: Calculation and comparison of financial indicators
The following parameters are used for calculations;

Table 5: Parameters used for Investment Analysis

Parameter	Unit	Figure	Source	Justification
Investment Horizon	years	27	Actual	The aggrement with Samsun municipality is valid for 27 years.
Corporate Tax	%	20%	www.invest.gov.tr	This is the official corporate tax rate in the host country.
Interest Rate	%	5.50	Assumption	This figure is in agreement with commercial market conditions.
Discount Rate (Benchmark)	%	13.30%	WACC calculations	Pre-tax WACC is suggested by the Guidelines.
Electricity Price	EUR¢/kWh	6.6	Project Owner's own feasibility	This figure is used in the investment decision.
Initial Investment	tEUR	20,80.5	Project Owner's own feasibility	This figure is used in the investment decision.
Operation & Maintenance Costs	tEUR	2,223.661	Project Owner's own feasibility	This figure is used in the investment decision.

According to the agreement between the Municipality and the Project owner, the Project owner does not receive any revenues from the Municipality. The Project owner will pay a certain share of the Project's proceeds to the municipality, in return of the landfill site usage rights. This share is also included in the feasibility calculations.

Financial Performance of the Project

Indicator	Unit	Source	IRR	Benchmark	Result
Results:	%	Calculations	7.2%	13.30 %	Unfeasible

Outcome of Sub-step 2c: Financial indicators are calculated and compared.The project is not financially attractive.

Sub-step 2d: Sensitivity Analysis

The purpose of the sensitivity analysis is to check how much the Project's financial performance depends on main variables of the investment analysis. The Additionality Tool

requires including those financial parameters in the analysis, that have 20% or more impact on the results. Four parameters are identified which satisfy this condition;

i. Electricity prices (impact on revenues)
ii. Capital expenditures (impact on costs)
iii. Operation and maintenance expenses (impact on costs)
iv. LFG Collection ratio (impact on revenues)

All four parameters are changed +/- 10% to check how far they affect the Project profitability. The results are as the following;

Table 6 Sensitivity Analysis of the Project IRR with changes in investment cost, production expenses and revenue

Parameter	Value Applied	Project IRR	Value Applied	Project IRR
Electricity Prices	(-10 %) 0.060 euro per KWh	-0.7 %	(+10%) 0.072 euro per KWh	12.9%
Capital expenses	(-10 %)	9.0%	(+10%)	5.7%
Operation and Maintenance Expenses	(-10 %)	13.4%*	(+10%)	-1.8%
LFG Collection Ratio	(-10 %)	1,7 %	(+10%)	%11,6

The Internal Rate of Return (IRR) is calculated as 7.2. %. This is obviously below the financial benchmark of 13.3 % and the project activity cannot be considered to be a financially attractive alternative.

*The 10% decrease of Operation and Maintenance Expenses is not possible. Because the The Turkish annual inflation rate fell to 19.50 percent in April 2019 from 19.71 percent in the previous month and below market expectations of 19.57 percent. This is the lowest inflation rate since August last year, as prices slowed mostly for housing & utilities and transport. However, cost continued to rise. Inflation Rate in Turkey averaged 34.93 percent from 1965 until 2019, reaching an all time high of 138.71 percent in May of 1980 and a record low of -4.01 percent in June of 1968.[30]

[30] https://tradingeconomics.com/turkey/inflation-cpi?continent=g20

Outcome of Step 2

The sensitivity analysis shows that the Project IRR of the proposed project does not overcome the financial benchmark despite favourable conditions.

The sensitivity analysis further substantiates that the project activity is not a feasible alternative and so additional.

Step 3: Barrier Analysis

The analysis is not applied.

Step 4: Common Practice Analysis

According to "Tool for the demonstration and assessment of additionality" version 07.0.0, the proposed project activity applies the measures listed in the definitions section of the tool. So, Sub-step 4a is applied.

Sub-step 4a Analyze other activities similar to the proposed project activity:

The proposed VER project activity(ies) applies measure(s) that are listed in the definitions section "Methodological Tool Common Practise " version 03.1 is applied for the proposed project activity.

Step 1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

The installed capacity of the proposed project activity is 8.4 MW. Therefore, the lower limit of the applicable output range is 4.2 MW and upper limit is 12.6 MW.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

The projects within the host country and the output range that have started commercial operation and are connected to the national grid system are shown in the excile file Named Samsun LFG_Common Practice_.xlsx.[31]

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall.

Nall is 0.

Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.

According to the guidance on common practice, classification of different technologies has been realised taking into account the main criteria "energy source/fuel", "size of installation (power capacity)" and "Investment oclimate in the date of investment decision (subsidies or other financial flows, promotional policies and legal regulations)". The power plants which have different fuel types such as hydro, lignite, natural gas, fuel oil, coal etc., are accepted as different technologies. In addition, the company types of the power plants are considered while defining the different power plants because different company types have different promotional policies, legal regulations, subsidies and other financial flows. As a result, when both the fuel types of the power plants and the company types are taken into account, the number of companies that apply technologies different that the technology applied in the proposed project activity, Ndiff, is 0.

Step 5: Calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

The factor F defined in the guideline is calculated with the formula below:

F = 1 – 0/0
F = 1 – Undefined
= 0 .0

Nall-Ndiff is 0 and the factor F is "Undefined ,so the proposed project activity is not a "Common Practice".

[31] http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf

Outcome of Step4

The project activity is not regarded as "common practice", then the proposed project activity is additional.

Milestones of the project activity is listed as below;

Date	Action
02.11.2009	Feasibility study is submitted to the project owner.
04.01.2010	First talks with the carbon consultant about carbon finance
01.06.2010	Publication of the tender by Samsun Metropolitan Municipality
18.06.2010	Tender organisation by Samsun Metropolitan Municipality
28.07.2010	Contract signature date with the Municipality
02.08.2010	Carbon development contract signature date
21.08.2010	First equipment order date
13.09.2010	Mobilization on site
24.09.2010	Energy Market Regulatory Authority (EMRA) License application
06.09.2011	First loan agreement - 9207368
18.5.2011	License awarded for 2.4 MWe
09.03.2012	Commissioning of the power plant
06.12.2012	Amendment to the municipality law 6360
04.06.2013	Capacity increase to 3,6 MWe - License upgrade
27.9.2013	Commissioning of the additional capacity
04.06.2013	Capacity increase to 3,6 MWe - License upgrade
27.09.2013	Commissioning of the additional capacity
07.05.2014	Capacity increase to 6,0 MWe - License upgrade
27.09.2014	Commissioning of the additional capacity
2015	Amount of waste deposited increased
24.03.2016	Capacity increase to 8,4 MWe - License upgrade
22.05.2018	Commissioning of the additional capacity

B.6. Sustainable Development Goals (SDG) outcomes

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

a) SDG 7 : Affordable and Clean Energy : The project is expected to generate 54,600 MWh[32] of clean energy per annum

b) SDG 8 : Decent Work and Economic Growth : The project provides between 20 and 25 employments to people.

[32] Samsun Avdan Technical Feasibility Report

c) SDG13 : Climate Action : The project would lead to reduction of approx.105,062 tCO_2 per annum.

Furthermore, in 2017, the province established and operated a landfill site. The number is 59. It has an irregular distribution area number is 900. The project will collect the wastes regularly and will help the decrease irregular distribution areas in Turkey. Waste amount estimated to be 304,466 tonnes, corresponding to an average of 800 t/day.

No	SDGs	Target ("T") and Indicators ("I")
1	Goal 7. Affordable and Clean Energy	T: 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix I: 7.2.1 "Renewable energy share in the total final energy consumption
2	Goal 8. Decent Work and Economic Growth	T: 8.5 By 2030 achieve full and productive employment and decent work for all women and men I: 8.5.2 Unemployment rate, by sex, age and persons with disabilities
3	Goal 13. Climate Action	T:13.3. Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning I:13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions

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

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

The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel. The clean energy generated by the project is calculated based on the amount of electricity generated by the project per annum. The project is expected to generate 54,600 MWh of clean energy per annum. This is the net generation.

The net generation and internal consumption identified and approved by authorized electricity company.

The project contributes to the following indicators 7.2.1 "Renewable energy share in the total final energy consumption" and following target: 7.2 ''By 2030, increase substantially the share of renewable energy in the global energy mix."

The electricity generation is predominantly composed by fossil fuel fired power plants in Turkey. Natural gas will continue to dominate the market. Hydro will account for 22.1% of the mix whereas all non-hydro renewable combined (geothermal /biogas/waste/wind/solar) will only account for 6.4% of all electricity generation. But this project increases the renewable energy sharing of global energy mix and contribute to improved air quality by reducing air pollution.

SDG 8 : Decent Work and Economic Growth

The project leads to employment opportunities which would not have been possible in the baseline scenario. The project provides employment to between 20 and 25 people during the opration phase.

The project contributes to the following indicators 8.5.2 "Unemployment rate, by sex, age and persons with disabilities" and following target: "8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value"

The target will be monitored by the number of full-time employees (between 20 and 25 employee) full time employees with the SGK records during the verification process. Because of the social conditions of the project area, employment of woman and persons with disabilities is not possible.

Furthermore, number of people are trained on health and safety issues during per each monitoring period. This will help to achieve "the project labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment." Training records or certificates will be provided during each monitoring period.

SDG13 : Climate Action :

Prior to the proposed project activity, the wastes are left to decay within Samsun landfill site and methane is emitted to the atmosphere without any control or utilization. The baseline scenario is the same as the existing scenario, i.e. atmospheric release of the landfill gas and power supply by the grid. With the proposed project, LFG generated in the

involved landfill site will be captured by newly constructed LFG collection and utilization system.

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

The project will collect the wastes regularly. During the first crediting period waste amount was 182,500 tonnes, corresponding to an average of 500 t/day. Waste amount estimated to be 304,466 tonnes, corresponding to an average of 800 t/day during the second crediting period.

The project leads to mitigation of 105,062 tCO2 per annum.

The project contributes to the following indicators 13.3.2 "Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target 13.3 "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning"
The project's contribution is done through training and awareness raising of local people and setting good example by investing to the climate friendly technology.

As developing the baseline and calculation of the emission reductions for the proposed project activity are calculated according to "Tool to calculate the emission factor of an electricity system" version 07.0.0.

Emission Reductions

The emission reductions are calculated based on the below formula:

$$ER_y = BE_Y - PE_Y - LE_y \quad (1)$$

Where:

ER_y = Emission reductions in year y (tCO_2e/yr)
BE_y = Baseline emissions in year y (tCO_2/yr)
PE_y = Project emissions in year y (tCO_2e/yr)
LE_y = Leakage emissions in year *y* (t CO2/y)

Project Emissions

As the proposed project activity is a new grid-connected power plant. For this reason, PE_y is considered as "0" in line with ACM0002 Version 19.

$PE_y=0$

Leakage

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

Baseline Emissions

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

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

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

Where:

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

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

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

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

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

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

Step A.1: Ex post determination of $F_{CH4, PJ,y}$

During the crediting period, $F_{CH4, PJ,y}$ is determined as the sum of the quantities of methane flared and used in power plant(s), boiler(s), air heater(s), kiln(s) and natural gas distribution network, as follows:

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

Where:

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

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

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

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

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

The amount of methane that is destroyed/ combusted in project scenario during year y is determined by monitoring the quantity of methane actually flared and by monitoring the gas used to generate electricity, and the total quantity of methane captured. There is neither methane used for generation of thermal energy (HG) nor sent to the pipeline for feeding to the natural gas (NG) distribution network or flared.

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

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

Determination of $F_{CH4,flared,y}$ and $F_{CH4,EL,y}$

The sum of the quantities fed to the flares ($F_{CH4,flared,y}$) and to the power plant ($F_{CH4,EL,y}$)will be summed up annually be adopted as $F_{CH4,PJ,y}$

- $F_{CH4,PJ,y}$ is determined using the "Methodological Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 03.0.0. The following requirements apply:The gaseous stream the tool shall be applied to is the LFG delivery pipeline to electricity.
- $F_{CH4,PJ,y}$ is then calculated as the sum of mass flows to electricity generation.
- CH4 is the greenhouse gases for which the mass flow should be determined;
- The flow of the gaseous stream should be measured on continuous basis;

- The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 or 17 in the tool); and
- The mass flow should be summed to a yearly unit basis (t CH4/yr).

$F_{CH4,\ sent_flare,n}$ and $F_{CH4,EL,y}$ are determined directly using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", applying the requirements described above where the gaseous stream the tool will be applied to is the LFG delivery pipeline to the flares.

According to the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 03.0.0) the mass flow of greenhouse gas *I (CH4)* in the gaseous stream in time interval *t* (F_{CH4}, t) is calculated based on measurements of
a) the total volume flow or mass flow of the gas stream and
b) the volumetric fraction of the gas in the gaseous stream and
c) the water content and gas composition.

Option C:
The tool covers possible measurement options, providing six different calculation options to determine the volume or mass flow of a particular greenhouse gas (A-F). Furthermore, the tool provides several options for the determination of the moisture content of the gaseous stream. Option C is applied for determination of mass flow of the gas stream.

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

$$F_{CH4,t} = V_{t,db} * v_{CH4,wb,t} * \rho_{CH4,n}$$

(5)

With

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

Where:

$F_{CH4,t}$ Mass flow of greenhouse gas (*CH4)* in the gaseous stream in time interval *t* (kg gas/h)

$V_{t,wb}$ Volumetric flow of the gaseous stream in time interval *t* on a wet basis (m^3 dry gas/h)

$v_{CH4,t,wb}$ Volumetric fraction of greenhouse gas *CH4* in the gaseous stream in a time interval *t* on a wet basis (m^3 gas *i*/m^3 dry gas)

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

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

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

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

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

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

$$F_{CH4,n} = \sum_{h=1}^{h=hn} F_{CH4,t} \quad (7)$$

Amount of methane destroyed by flaring ($F_{CH4,flared,y}$)

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

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

Where:

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

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

$PE_{flare,y}$ Project emissions from flaring of the residual gas stream in year *y* (t CO2e/yr)

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

$F_{CH4,\ sent_flare,n}$ is determined directly using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", applying the requirements described above where the gaseous stream the tool will be applied to is the LFG delivery pipeline to the flares. Thus as in formula below.

$PE_{flare,n}$ will be determined using the "Tool to determine project emissions from flaring gases containing methane".

Application of "Tool to determine project emissions from flaring"

According to "Project emission from flaring" Version 03.0.0", the project emissions from flaring of the residual gas stream $PE_{flare,y}$ are determined considering the following steps:

STEP 1: Determination of the mass flow rate of the residual gas
STEP 2: Determination of the hourly flare efficiency
STEP 3: Calculation of project emissions from flaring

The calculation procedure in this tool determines the flow rate of methane before and after the destruction in the flare, taking into account the amount of air supplied to the combustion reaction and the exhaust gas composition (oxygen and methane).

The calculation procedure in this tool determines the project emissions from flaring the residual gas ($PE_{flare,y}$) based on the flare efficiency ($\eta_{flare,m}$) and the mass flow of methane to the flare ($F_{CH4,RG,m}$). The flare efficiency is determined for each minute m of year y based either on monitored data or default values.

The project activity applies an enclosed flare. The temperature in the exhaust gas of the flare is measured to determine whether the flare is operating or not.

STEP 1. Determination of the mass flow rate of the residual gas
This step calculates the residual gas mass flow rate in each hour h, based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas.

The following requirements apply:
• The gaseous stream tool shall be applied to the residual gas;
• The flow of the gaseous stream shall be measured continuously;
• CH4 is the greenhouse gas i for which the mass flow should be determined;
• The simplification offered for calculating the molecular mass of the gaseous stream is valid (equation 3 and 17 in the tool); and
• The time interval t for which mass flow should be calculated is every minute m $F_{CH4,m}$ which is measured as the mass flow during minute m,shall then be used to determine the mass of methane in kilograms fed to the flare in minute m ($F_{CH4, RG, m}$). $F_{CH4, m}$ is determined on wet basis due to difficulties to demonstrate that the temperature is above 60 Celcius.

The calculation follows the procedure as described by the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream". Option C is applied: Same basis (wet basis) is considered for the measurement of the volumetric flow rate of the residual gas and the measurement of the volumetric fraction of methane in the residual gas.

In order to determine the mass flow of CH4, the equations (5) to (6) mentioned above in the present document shall be used.

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

$$F_{CH4,RG,t} = V_{t,db} * v_{CH4,wb,t} * \rho_{CH4,n}$$

With

$$\rho_{CH4,n} = \frac{P_n * MM_{CH4}}{Ru * T_n}$$

Where:

$F_{CH4,t}$ Mass flow of greenhouse gas (*CH4)* in the gaseous stream in time interval *t* (kg gas/h)

$V_{t,wb}$ Volumetric flow of the gaseous stream in time interval *t* on a wet basis (m^3 dry gas/h)

$v_{CH4,t,wb}$ Volumetric fraction of greenhouse gas *CH4* in the gaseous stream in a time interval *t* on a wet basis (m^3 gas *i*/m^3 dry gas)

$\rho_{CH4,n}$ Density of greenhouse gas CH4 in the gaseous stream at normal conditions *t* (kg gas *i*/m^3 gas *i*)

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

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

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

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

STEP 2. Determination of flare efficiency

The determination of the hourly flare efficiency depends on the operation of flare (e.g. temperature), the type of flare used (open or enclosed) and, in case of enclosed flares, the approach selected by project participants to determine the flare efficiency (default value or continuous monitoring).

In the case of Samsun Landfill Project, an enclosed flare is used and the flare efficiency is determined by default value, **thus Option A**. For enclosed flares that are defined as low height flares, the flare efficiency in the minute m ($\eta_{flare,m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B

Option A: Default value

In case of enclosed flares and use of the default value for the flare efficiency, the flare efficiency in the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

- • the temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is with in the manufacturer's specifications fort he flare ($SPEC_{flare}$) in minute m; and
- • the flame is detected in minute m ($Flame_m$)

Otherwise, ($\eta_{flare,m}$) is 0 %

STEP 3. Calculation of project emissions from flaring

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

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

Where:

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

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

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

Step A.1.1: Ex ante estimation of $F_{CH4,PJ,y}$

An *ex ante* estimate of $F_{CH4,PJ,y}$ is required to estimate baseline emission of methane from the SWDS (according to equation 2) in order to estimate the emission reductions of the proposed project activity in the PDD. It is determined as follows:

$$F_{CH4,PJ,y} = \eta_{PJ} * BE_{CH4,SWDS,y} / GWP_{CH4} \quad (10)$$

Where:

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

$BE_{CH4,SWDS,y}$ Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year *y* (t CO2e/yr)

η_{PJ} Efficiency of the LFG capture system that will be installed in the project activity (%)

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

$BE_{CH4,SWDS,y}$ is determined using the methodological tool "Emissions from solid waste disposal sites". The following guidance will be taken into account when applying the tool:

• *fy* in the tool shall be assigned a value of 0 because the amount of LFG that would have been captured and destroyed is already accounted for in equation 2 of this methodology;
• In the tool, x begins with the year that the SWDS started receiving wastes (e.g. the first year of SWDS operation); and
• Sampling to determine the fractions of different waste types is not necessary because the waste composition can be obtained from previous studies.

The project will capture only a fraction of the whole LFG due to following reasons:

- The degassing system has its own efficiency
- The enclosed flares have their destruction efficiency

Samsun Landfill project has a 70% efficiency of gas collection system according to the feasibility.
According the methodological tool "Emissions from solid waste disposal sites" version 08.0, ex-ante calculation of $BE_{CH4,SWDS,y}$ based on the formulation below:

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

(11)

where

ϕ	model correction factor to account for model uncertainties (0.75)
f	fraction of methane captured at SWDS and flared, combusted or used in another manner (default value as per ACM 0001 is zero)
OX	oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or another material covering waste)
F	fraction of methane in the SWDS gas (volume fraction (0.1))
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 [t]
DOC_j	fraction of degradable organic carbon (by weight) in the waste type j
k_j	decay rate for waste type j
j	waste type category (index)
x	year of receiving wastes at the landfill site: x runs from the first year of landfill operation x=1 to the year for which avoided emissions are calculated (x = y)
y	year for which methane emissions are calculated

In application of the Tool "Emissions from solid waste disposal sites" version 08.0, option A is applied. The calculation is provided for validation as Samsun_Landfill_calculation file.

Step A.2: Determination of $F_{CH4,BL,y}$

This steps provides a procedure to determine the amount of methane that would have been captured and destroyed (by flaring) in the baseline due to regulatory or contractual requirements, or to address safety and odour concerns (collectively referred to as *requirement* in this step). The motholdogy ACM0001 version 19.0 provide for cases to determine the amount, while there is "*no requirement to destroy methane exists and no existing LFG capture system" for Samsun Landfill*, as in the case 1,

$F_{CH4,BL,y} = 0$

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

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

Where:

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

$EF_{CO2grid\ y}$ = CO2 emission factor of the grid in year *y* (t CO2/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants; (b) retrofits and replacements and; (c) capacity additions. Since the proposed project activity falls under the description greenfield plants, the following method has been adopted:

Greenfield renewable energy power plants

$$EG_{PJ,y} = EG_{facility,y} \quad (13)$$

Where:

$EG_{PJ,y}$ = 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)
$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Calculation of $EF_{grid,CM}$

$EF_{grid,CM}$ is calculated according to the "Tool to calculate the emission factor for an electricity system" version 07.0.0.

This tool provides the following steps to calculate combined margin (CM) emission factor:

Step 1. Identify the relevant electric systems;
Step 2. Choose whether to include off-grid power plants in the project electricity system (optional);
Step 3. Select a method to determine the operating margin (OM);
Step 4. Calculate the operating margin emission factor according to the selected method;
Step 5. Calculate the build margin (BM) emission factor;
Step 6. Calculate the combined margin (CM) emissions factor

Step 1. Identify the relevant electric systems

According to the "Tool to calculate the emission factor for an electricity system" (version 07.0.0), a project electricity system has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.
Similarly, a connected electricity system, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.
The transmission lines in Turkey are operated by TEİAŞ (Turkish Electricity Transmission Co), which is a state owned company. The grid is 56,744 km long and constitutes of 701 transformer stations with a total transformer capacity of 138,951 MVA and 10 interconnections to neighbour countries.[33] The interconnected grid system is operated continuously and there are no electricity price differences throughout the regions. For this reason, the relevant electric power system is defined as the national grid system of Turkey.

[33] http://www.teias.gov.tr/FaaliyetRaporlari/faaliyet2015/teias%20ing_2015.pdf The emission factor from neighbouring countries is taken as 0 tCO2eq/MWh for determining the OM.

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

According to the applicable tool, Project Participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I : Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I has been chosen for the project activity and therefore only grid power plants are considered
in the calculation.

Step 3. Selection of an operating margin (OM) method

According to "Tool to calculate the emission factor for an electricity system" (version 07.0.0), the calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM.
The data specific to the power plants connected to the grid, such as the dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour, are not available. Therefore, Simple OM has been selected as the methodology.

Option (a) Simple OM method has been selected for calculation of the operating margin emission factor. This choice is applicable since low-cost/must-run resources constitute less than 50% of total grid generation in:

1)Average of the five most recent years or
2)Based on long-term averages for hydroelectricity production

The low-cost/must-run resources include hydro, geothermal, wind, low-cost biomass, nuclear and wind power generation.There is no indication that coal is used as a must-run and no nuclear energy plants are located in Turkey. The requirements for the use of the Simple OM calculations are satisfied.

Table 5. Below shows the share of hydro and renewable resources in generation for the five most recent years (2013-2017) and it is below %50 of the total grid generation[34].

YEAR							
	THERMAL (GWh)	THERMAL Ratio	HYDRO (GWh)	HYDRO Ratio	GEOTHERM + WIND + WiND (GWh)	GEOTHER M + WIND + WiND Ratio	TOTAL (GWh)
2013	171812.5	71.6%	59420,5	24.7%	8921	3.7%	240154
2014	200416.6	79.5%	40644,7	16.1%	10901.5	4.3%	251962.8
2015	179366.4	68.5%	67145.8	25.6%	15271	5.8%	261783.3
2016	185798.1	67.7%	67230.9	24.5%	21378.7	7.8%	274407.7
2017	212138.5	71.4%	58218.5	19.6%	26920.6	91.%	297277.5

Table 7 Share of primary sources in electricity generation 2012-2017

Generation Shares							
Years	Coal Total	Liquid Total	Natural Gas	Wastes	Hydro	Geotherm al +Wind + Wind	Total (GWh)
2012	13.9%	0.7%	43.6%	0.3%	24.2%	2.8%	239496.8
2013	26.6%	0.7%	43.8%	0.5%	24.7%	3.7%	240154
2014	30.2%	0.9%	47.9%	0.6%	16.1%	4.3%	251962.8
2015	29.1%	0.9%	37.9%	0.7%	25.6%	5.8%	261783.3
2016	33.6%	0.7%	32.5%	0.9%	24.5%	7.8%	274407.7
2017	32.8%	0.4%	37.2%	1.0%	19.6%	9.1%	297277.5

Table 8 Breakdown of shares by sources of the electricity generation from the Turkish grid[35]

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM PDD to the DOE for validation.

[34] http://www.teias.gov.tr/sites/default/files/2018-10/38ing.docx

[35] www.teias.gov.tr/sites/default/files/2018-10/62.xls

- Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

The ex ante option has been selected for the proposed project activity. Data from the period 2015-2017 has been obtained for calculating the three year average. This period is standing for the most recent data available at the time of submission of the PDD to DOE.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. The simple OM emission factor might be calculated as follows:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;

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.

Since the fuel consumption and the average efficiency data for each power plant/unit are not available Option B is used for simple OM calculation.

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:

$$EF_{grid,OMsimple,y} \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (14)$$

Where:

$EF_{grid,OMsimple}$ = Simple operating margin CO2 emission factor in year *y* (t CO_2/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 fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fuel type *i* in year *y* (t CO_2/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 three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (ex-ante option)

Step 5: Calculate the build margin (BM) emission factor

The Build Margin have been calculated for the year 2017.

There are two main information sources for the Turkish electricity system: TEİAŞ(www.teias.com.tr) and Ministry of Energy and Natural Resources (www.etkb.gov.tr).

In terms of vintage of data, project participants can choose between one of the following two options:

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.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Project Proponent chooses Option 1 in terms of vintage of data for the proposed project activity.

Data from the period 2015-2017 has been obtained for this calculating. This period is standing for the most recent data available at the time of submission of the PDD to DOE.

Step 6: Calculate the combined margin emissions factor

According to the applicable methodological tool, the calculation of the combined margin (CM) emission factor (EFgrid, CM) is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

The Project Participant chooses option (a), weighted average CM.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM}$$
(15)

Where:

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (t CO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (per cent)
w_{BM} = Weighting of build margin emissions factor (per cent)

According to the "Tool to calculate the emission factor for an electricity system" (version 07.0.0), the default weights for the operating margin and build margin emission factors for landfill gas power plant generation is defined as:

w_{OM}=0.25
w_{BM}=0.75

for the second and third crediting period.

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

a. SDG 7 : Affordable and Clean Energy : The project is expected to generate MWh of clean energy per annum. The project contributes to the following indicators 7.2.1 "Renewable energy share in the total final energy consumption" and following target: 7.2 ''By 2030, increase substantially the share of renewable energy in the global energy mix."

b. SDG 8 : Decent Work and Economic Growth : The project provides employment to between 20 and 25 people. The project contributes to the following indicators 8.5.2 Unemployment rate, by sex, age and persons with disabilities and following target 8.5 'By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value'.

This will also help to achieve "the project labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment." Training records or certificates will be provided during each monitoring period.

c.SDG13 : Climate Action :: Prior to the proposed project activity, the wastes are left to decay within Samsun landfill site and methane is emitted to the atmosphere without any control or utilization. The baseline scenario is the same as the existing scenario, i.e. atmospheric release of the landfill gas and power supply by the grid. With the proposed project, LFG generated in the involved landfill site will be captured by newly constructed LFG collection and utilization system.

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

The project will collect the wastes regularly. During the first crediting period waste amount was 182,500 tonnes, corresponding to an average of 500 t/day. Waste amount estimated to be 304,466 tonnes, corresponding to an average of 800 t/day during the second crediting period.

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	GWP_{CH4}
Unit	tCO2e/tCH4
Description	Global warming potential of CH4
Source of data	UNFCCC accepted value[36]
Value(s) applied	25
Choice of data or Measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	DCH4
Unit	tCH4/ m3tCH4
Description	Methane Density
Source of data	
Value(s) applied	0.0007168 tCH4/ m^3t_{CH4}
Choice of data or Measurement methods and procedures	At standard temperature and pressure(0 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH4/m3 CH4
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

[36] https://unfccc.int/sites/default/files/7_edited__ghg_inv_guidelines_cleared_dv_lg_ks_dv.pdf

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

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

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	OX
Unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Table 3.2.

Value(s) applied	0.1
Choice of data or Measurement methods and procedures	As the landfill was covered by soil, the default value for oxidation could be applied.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

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

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

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	DOC_j
Unit	-
Description	Fraction of degradable organic carbon (by weight) in the waste type j

Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Tables 2.4 and 2.5.
Value(s) applied	

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

Choice of data or Measurement methods and procedures	Medium Average temperature MAT [°C]: 14.5 Medium Average Precipitation MAP [kg/m^2]: 59.7 Source: https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=SAMSUN The selection of appropriate kj values are made according to a "boreal and temperate" and "wet" climate, thus values are used in accordance to "Emissions from solid waste disposal sites" version 8 and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 5 Waste, Tables 2.4 and 2.5. The temperatures are below 60 C
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

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

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

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

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	η_{PJ}
Unit	Dimensionless
Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data	Feasiblity study
Value(s) applied	70%[37]
Choice of data or Measurement methods and procedures	The collection system which will be installed on the Project site will be able to collect a certain fraction of the total LFG generation. This collection ratio is affected principally by the Project's technical design, therefore the value suggested in the feasibility study is used.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

[37] Samsun Avdan Technical Feasibility Report

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	Ru
Unit	Pa.m3/kmol.K
Description	Universal ideal gas constant
Source of data	Methodological Tool "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" Version 03.0
Value(s) applied	8,314
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

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

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

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

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

Choice of data or Measurement methods and procedures	Equipment Specification Type | Accuracy | Serial Nr. | Cal. Frequency | Dates of relevant calibrations | Cal. validity Flow meter | 2% | AAM5322F | Up to 10 years (no periodic calibration required by manufacturer) | 24.11.2010 10.05.2012 | 10.05.2022
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	Document in the CDM-PDD the flare specifications set by the manufacturer for the correct operation of the flare for the following parameters: (a) Minimum and maximum inlet flow rate, if necessary converted to flow rate at reference conditions or heat flux; (b) Minimum and maximum operating temperature; and (c)Maximum duration in days between maintenance events

The project would lead to reduction of approx. 105,062 tCO2 per annum. The project contributes to the following indicators 13.3.2 "Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target 13.3 "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning"

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	EGgross
Unit	MWh
Description	Gross electricity production by fossil fuel power sources (2015-2017)
Source of data	TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr. The distribution of gross electricity generation by primary energy resources and the electricity utilities in Turkey (2015, 2016, 2017).
Value(s) applied	Please see calculations of emission factor (Section B.6.1.) See table 15

Choice of data or Measurement methods and procedures	TEIAS, the Turkish Electricity Transmission Company is the official source for the related data, thus providing the most up-to-date and accurate information available.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	FCi,y
Unit	tonnes (m3 for gaseous fuels)
Description	Amount of fossil fuel type i consumed in the project electricity system by generation sources in year y (2015-2017)
Source of data	TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr . Fuels consumed in thermal power plants in Turkey by the electricity utilities (2015-2017) See table 13
Value(s) applied	Please see calculations of emission factor (Section B.6.1)
Choice of data or Measurement methods and procedures	TEIAS, the Turkish Electricity Transmission Company is the official source for the related data, thus providing the most up-to-date and accurate information available.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	NCVi,y
Unit	TJ/kt (106 m3 for gaseous fuels)
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	Calculated based on TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities (2015-2017)
Value(s) applied	Please see calculations of emission factor (Section B.6.1

Choice of data or Measurement methods and procedures	TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available.
Purpose of data	Calculation of baseline emissions-to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$EFC0_2$,i,y
Unit	tCO2/TJ
Description	CO_2 emission factor of fossil fuel type i used in power unit m in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory
Value(s) applied	http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm
Choice of data or Measurement methods and procedures	Please see calculations of emission factor (Section B.6.1)
Purpose of data	Calculation of baseline emissions - to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	There is no information on the fuel specific default emission factor in Turkey, hence, IPCC values has been used as referred in the "Tool to calculate the emission factor for an electricity system "

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	ηm,y
Unit	%
Description	Average net energy conversion efficiency of power unit m in year y

Source of data	"Appendix 1, Default efficiency factors for power plants" of "Tool to calculate the emission factor for an electricity system" version 07.0.0.
Value(s) applied	See calculations of emission factor (Section B.6.4)
Choice of data or Measurement methods and procedures	The average values of thermal plants in Turkey are taken from "Tool to calculate the emission factor for an electricity system" 07.0.0.
Purpose of data	Calculation of baseline emissions - to demonstrate contribution to SDG13- 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	-

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

Calculation of the operating margin emission factor

For the calculation of the OM the consumption amount and heating values of the fuels for each sources used for the years 2015, 2016 and 2017 is taken from the TEIAS annual statistics, which holds data on annual fuel consumption by fuel types as well as electricity generation amounts by sources and electricity imports, all the data needed for the calculation, including the emission factors and net calorific values (NCVs).

The amount of fuel consumption (FCi,y) is taken from website of TEIAS for the calculation of the Simple OM.

The fuel consumption values for 2015-2017 may be seen in Table 9[38]:

	Units	2015	2016	2017	Total
Natural Gas	1000m3	20,914,868	18,954,093	22,954,854	62,823,815
Lignite	tonnes	49,940,131	60,213,772	64,412,257	174,566,160
Coal	tonnes	16,629,492	19,642,410	21,139,104	57,411,006
Fuel Oil	tonnes	516,912	526,674	317,724	1,361,310
Diesel Oil	tonnes	238,388	306,393	197,219	742,000
Lpg	tonnes	0	0	0	0
Naphta	tonnes	0	0	0	0

[38]Annual Development of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities http://www.teias.gov.tr/sites/default/files/2018-10/73.xls

Table 9 Fuel consumption of generation sources connected to the grid (2015-2017)

Annual heating values for each fuel type are directly related with the fuel consumption and are used to calculate Net Calorific Values (TJ/kt) for each year (Table.8). The annual heating values are converted to TJ and divided by the fossil fuel consumption(kt) for that year.

Turkish specific net calorific values (NCVi,y) values for fossil fuel types have been calculated, using data from the IPCC Guidelines for National Greenhouse Gas Inventory for the emission factor of the fossil fuel types (EFCO2,i,y)[39].

	NCVi(TJ/kt)			EFCO2,i (tonnes/TJ)[40]
	2015	2016	2017	
Natural Gas	37.837	38.011	36.818	54.3
Lignite	7.161	7.196	6.971	90.9
Hard Coal + Imported Coal	24.075	24,074	23.596	89.5
Fuel Oil	44.216	42.418	44.927	75.5
Diesel Oil	43.784	44.203	44.632	72.6
Lpg	0	0	0	61.6
Naphta	0	0	0	69.3

Table 10 NCV and emission factor of fossil fuel type

Total CO_2 emissions for each year for each fuel source is calculated by = (FCi,y) x NCVi,y) x EFCO2,I where "i" is fuel type

$$Total\ Emission\ for\ \ Fuel\ i\ for\ year\ y = \ FC_{i,y} \times NCV_{i,y} \times EF_{CO2i}$$

Total CO2 emission due to electricity generation in Turkey for the years of 2015, 2016 and 2017 are given in following table

tCO2 (tonnes)	2015	2016	2017	Total
Hard Coal+Imported Coal+Asphaltite	35,832,091	42,322,566	44,641,881	122,796,538
Lignite	32,508,012	39,388,444	40,816,020	112,712,476

[39] http://www.teias.gov.tr/sites/default/files/2018-10/75.xls

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

[40] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Fuel Oil	1,725,608	1,686,704	1,077,711	4,490,024
Diesel Oil	757,776	983,254	639,039	2,380,070
Natural Gas	42,970,146	39,120,876	45,892,079	127,938,102
Total CO2-Emissions	**113,793,634**	**123,501,844**	**133,066,731**	**370,362,209**

Table 11 CO2 emission from electricity production (2015-2017)(tCO2)

Total emission calculation is also calculated by the following equation:

$$\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}$$

where y: (2015-2017) and i:(Hard Coal+Imported Coal+Asphaltite, Lignite, Fuel Oil, Diesel Oil, Natural Gas)

The electricity delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units (EGgross,y) is obtained from TEIAS (Turkish Electricity Transmission Company).

Table 12 shows the gross electricity production for 2015-2017 produced by fossil fuel power sources[41]:

	EGgross,y (MWh)			
	2015	2016	2017	Total
Natural Gas	99,218,742	89,227,100	110,498,980	298,935,820
Lignite	31,335,735	38,569,900	40,694,410	110,600,040
Hard Coal + Import Coal	44,829,872	53,703,200	56,781,890	155,314,96 0
Fuel Oil	980,378	969,100	520,620	2,470,100
Diesel Oil	1,243,561	957,200	679,260	2,265,750
Lpg	0	0	0	0
Naphta	0	0	0	0

Table 12 Gross electricity generation by fossil fuel power sources 2015-2017

To calculate the net electricity fed into the grid by specific fuel sources, relation between overall gross/net electricity generation data is calculated. The electricity consumption of

[41] http://www.teias.gov.tr/sites/default/files/2019-03/56%2893-2017%29.xls

the power plants is included in the gross electricity production. This relation is derived in in Table 13[42]:

	2015	2016	2017
Gross generation (MWh)	261,783,300	274,407,700	(i) 297,277,500
Net generation (MWh)	249,899,500	261,950,900	(ii) 284,257,500
Relation	95,5%	95.5%	(iii) 95.6 %

Table 13 Relation between net and gross electricity generation 2015-2017

The net electricity delivered to the grid by the fossil fuel plants (EGnet,y) is calculated in Table 14[43]:

	2015	2016	2017	Total
Gross electricity generation (GWh)	177,608	183,426.50	209,166.20	570,200.7
Net electricity generation EGnet,y (GWh)	169,546	175,099.800	200,005.20	544,651
Electricity imports (GWh)	7,135.5	6,330	2,728	7,144,558
Electricity supplied to grid EGy (GWh)	176,681	181,429,800	202,733.20	560,844

Table 14 Net electricity generation fossil fuel power plants and electricity imports 2015-2017

The calculation of EFgrid,OM,y requires the inclusion of electricity imports with an emission factor of 0 tCO2/MWh. Therefore, the imports in the electricity production has been added.

The last step is to calculate EFgrid,OMsimple,y:

	2015	2016	2017
CO2-Emmissions (tCO_2)	113,793,634	123,501,844	200,005,000

[42] http://www.teias.gov.tr/sites/default/files/2019-03/56%2893-2017%29.xls

[43] http://www.teias.gov.tr/sites/default/files/2019-03/56%2893-2017%29.xls

Net Electricity Supplied to Grid by relevant sources (GWh)	176,681	181,430	202,734,000
EFgrid,OMsimple,y (tCO_2/MWh)	0.6441	0.6807	0.6564
3-year Generation Weighted Average EFgrid,OMsimple,y (tCO_2/MWh)	0.6604		

Table 15 Operating Margin

The formula for calculation of operating margin is

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad \text{Equation (16)}$$

Based on the above values, the simple operating margin CO_2 grid emission factor (EFgrid,OMsimple,y) calculated through equation is **0.6604 tCO_2/MWh.**

Calculation of the build margin emission factor

The Build Margin have been calculated for the year 2017.

There are two main information sources for the Turkish electricity system: TEİAŞ (www.teias.com.tr) and Ministry of Energy and Natural Resources (www.etkb.gov.tr).

Step 5.1 Select the option regarding the vintage:

In terms of vintage of data, project participants can choose between one of the following two options:
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.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project

activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Project Proponent chooses Option 1 in terms of vintage of data for the proposed project activity:

Step 5.2 The Identification of Power Units to Be Used in Calculation of BM

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

The recent added power units (SET5 Units) list can be obtained from the Ministry of Energy and Natural Resources web site[44]

Company Name	Plant Name	Place	Fuel Type	Power Capacity MWe	Temporary Acceptance Date
MAREN MARAŞ ELEKTRİK ÜRETİM SANAYİ VE TİCARET A.Ş.	MELİH JES	Aydın	Geothermal	26.00	30/12/17
MAVİBAYRAK ENERJİ ÜRETİM A.Ş.	MAVİBAYRAK-1 BİYOKÜTLE ENERJİ SANTRALİ	Aydın	Biomass	9.50	28/12/17
CENAL ELEKTRİK ÜRETİM A.Ş.	CENAL TERMİK ENERJİ SANTRALİ	Çanakkale	Coal	660.00	27/12/17
GÖKÇEKÖY ELEKTRİK ÜRETİM LTD. ŞTİ.	ZİYARET HES	Erzincan	Hydro	3.40	26/12/17
ELEKTRİK ÜRETİM ANONİM ŞİRKETİ	KİĞI BARAJI VE HES	Bingol	Hydro	138.00	21/12/17

Table 16 The 5 most recent power plants (accordingly year 2017)(excluding VERs)

Important Note: (The Rationale for Usage of Power Capacities instead of Annual Electricity Production Data)

[44]http://www.etkb.gov.tr/tr-TR/AramaSonuclari?k=2017+enerji+yat%u0131r%u0131mlar%u0131&page=2

There is no data available for annual electricity production of each power plant belonging to years 2015, 2016 and 2017. The data available for the annual energy production for specific power station belongs to year 2012. To update the BM to the year 2017, the only data that we can use to estimate the annual production is the power capacity. We can make calculations as if every power plant had operated with full capacity all around the year.

The usage of capacity is a CDM Executive Board approved deviation from the methodology AM005 for a similar situation[45]. According to the board-approved deviation, as the annual production data
is absent, we will "use of weights estimated using installed capacity in place of annual electricity generation" (cited from the link given in footnote21).

The CDM registered projects are excluded from the five power plants given in Table 14. The sum of power capacities of these plants is 836.9MW. AEGSET 5 Units: 836.9 MW * year.

b) Determine the annual electricity generation of the project electricity system, excluding power units registered as VER project activities

Total capacity at the end of the year 2017 is 85200 [46] (which is AEGTotal). The 20 percent of total capacity is 17040 MW so AEGSET≥20 per cent > AEGSET 5 Units.

(c) Selection of The SETsample

AEGSET≥20 per cent > AEGSET 5 Units so the set AEGSET≥20 per cent is selected. None of them has started to produce electricity more than 10 years ago, so the steps (d), (e) and (f) are ignored.
SETsample (AEGSET≥20 per cent)

The 20 percent of total power is 17,040 MW.

Period	Capacity Addition (MW)	Addition (Excluding CMD Projects) (MW)	Thermal (MW)
09/05/2014 – 31/12/2014	4,403.40	4,053.16	2,835.154
2015	4,287.57	3,035.27	930.836

[45]http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

[46] http://www.teias.gov.tr/sites/default/files/2018-10/1ing.docx

2016	5,919.10	4,610.71	2,821.439
2017	5,840.46	5,348.584	3,994.196
Total	20,450.53	17,047.73	10,581.625

Table 17 SET-Sample Periods

The sum of 2017, 2016 and 2015 projects (excluding VER registered) is 12,294.56 MW. We need to include more projects from 2014 to exceed 17,040 MW (we need 4,045.437 MW more). As we include the projects between dates 09.05.2014 and 31.12.2014, we sum up to 17,047.73 MW. Here we get the SETSample.

SETSample List

You can find the list of SETSample below in (In Appendix 3), yellow rows indicate that the project is VER registered and they are excluded from the SET.

SET-Sample List (In Appendix 3),

Step 5.3 The Calculation of Build Margin Emission Factor

The TOOL Formula for BM Calcuation

TOOL07 Methodological tool: (Tool to calculate the emission factor for an electricity system Version 07.0)[47] gives the following formula for BM emission factor calculation.

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:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \text{Equation (17)}$$

Where:
EFgrid,BM,y = Build margin CO2 emission factor in year y (t CO2/MWh)
EGm,y = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
EFEL,m,y = CO2 emission factor of power unit m in year y (t CO2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which electricity generation data is available

[47] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

According to, "Tool to calculate the emission factor for an electricity system" (version 07.0.0)[48], the CO2 emission factor of each power unit m (EF_{EL},m,y) should be determined as per the guidance from the tool in step 4 for simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, where m is the power units included in the build margin.

As plant specific fuel consumption data is not available for Turkey, option A2 has been selected for the calculation (since only fuel type and electricity generation are known) of the CO2 emission factor of each power unit m (EFEL,m,y) as follows:

$$\mathrm{EF}_{EL,m,y} = \frac{EF_{CO_{2,m,i,y}} \times 3.6}{\boldsymbol{\eta}_{m,y}} \qquad \text{Equation (18)}$$

Where:

EFELm,y	= CO2 emission factor of the power unit m in year y (tCO2/MWh)
EFCO2,m,i,y	= Average CO2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
ηm,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 relevant year as per the data vintage chosen in Step 3

Where several fuel types are used in the power unit, the lowest CO_2 emission factor for $EFCO_2$,m,i,y has been used.

(a) Identification of Average CO_2 Emission Factor of Fuel Type i in Power Unit m in Year y (EFCO2,m,i,y)

The fuel types used in Set Sample are

- Natural Gas
- Import Coal
- Lignit

Fuels Used in SET Sample	$EFCO_2$ Values (t CO_2/GJ)
Natural Gas	0.0543
Import Coal	0.0895
Lignite	0.0909

Table 18 EF-$C0_2$ Values of Fuels Used in Set Sample

[48] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

$EFCO_2$ values are taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Table 9[49]. It is noted that $EFCO_2$ values for hydro, geothermal, wind, biogas and renew. + wastes are given as zero so they are taken into calculation.

(b) Average net energy conversion efficiency of power unit m in year y (ηm,y)

There is no available data for the plant and year specific efficiency data. So we take efficiency level of best technology available complying the board approved deviation given in footnote 2. Quotation from the board-approved deviation is given below:

> "(ii) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM). For the estimation of the operating margin (OM) the average emission factor for the grid for each fuel type can be used."

Fuels Used in SET Sample	η Values (Ratio)
Natural Gas	0.62
Import Coal	0.50
Lignite	0.50

Table 19 Efficiency Ratios for Fuels and Used in Set Sample

Efficiency values are taken from Tool to calculate the emission factors for an electricity system , Annex 1: Default efficiency factors for power plants[50].

(c) Calculation of CO2 emission factor of power unit m in year y (t CO_2/MWh)

Using the above formula we obtain EFEL values for the different fuel types.

Fuels Used in SET Sample	EFEL (t CO_2 MWh)
Natural Gas	0.3153
Import Coal	0.8262
Lignite	0.8391

[49] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
[50] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v2.0.pdf

Table 20: EF_{EL} Values for Fuel Types in Set Sample

(d) Calculation of CO_2 Build Margin emission factor (t CO_2/MWh)

	Total NG Capacity Addition (MWe)	Emission Addition of NG (MW * tCO2/MWh)	Total Import Coal Capacity Addition (MWe)	Emission Addition of Coal (MW * tCO2/MWh)	Total Lignite Capacity Addition (MWe)	Emission Addition of Lignite (MW * tCO2/MWh)	Total Emission Coefficient (MW * tCO2/MWh)
2017	2,621.54	854.10	1370,000	882.83	2.66	1.74	1,738.67
2016	1,691.44	551.07	700,000	451.08	430.00	281.43	1,283.58
2015	203.24	66.21	292,600	188.55	435.00	284.70	539.46
2014	1,028.01	334.93	1800,000	1,159.92	7.14	4.67	1,499.52
Total	5,544.23	1,806.31	4162,60	2,682.38	874.80	572.54	5061.23

Table 21 Total Capacities and Emission Contributions by Fuel Type

	2017
Gross Electricity Production (GWh)	297,277.5
Net Electricity Production (GWh)	284,257.5
Net/Gross	0.956

Table 22 Net - Gross Electricity Production Ratios

By using the below formula

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \text{Equation (19)}$$

We don't have the exact annual electricity production values for each power plant. Thus we assume production of each power plant is proportional to its capacity. Each production value will be then capacity multiplied by 365 days * 24 hours. Since 365 days * 24 hours will be at both the Numerator and Denominator of the formula, we just don't add up to the formula.

We also do correction to reflect Gross/Net Electricity Generation difference so we multiply the total capacity by 0.956. Calculation becomes

$$EF_{BM,2017} = \frac{5544.23\ MW \times 0.3153\ {}^{tCO_2}/_{MWh} + 2682.38\ MW \times 0.8262\ {}^{tCO_2}/_{MWh} + 572.54\ MW \times 0.8391\ {}^{tCO_2}/_{MWh}}{17047.73\ \text{MW} * 0.956}$$

$EF_{BM,2017}$ =0.3070 t CO_2/MWh

The build margin emission factor EFgrid,BM,y calculated through equation is **0.3070 tCO_2/MWh.**

Calculating the combined margin emission factor

The combined margin emission is calculated using following formula:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Equation (20)

Where w_{OM} is 0.25 and w_{BM} is 0.75.

The combined margin emission factor EFgrid,CM,y calculated through equation is

EFgrid, CM, y = 0.25 * 0.6604 + 0.75 * 0.3070= **0.3953 tCO_2/MWh**

Baseline emissions

According to ACM0001 Version 19.0

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

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

$$BEy = BECH4,y + BEEC,y + BEHG,y + BENG,y$$

Where:

BEy = Baseline emissions in year y (t CO2e/yr)
$BECH4,y$ = Baseline emissions of methane from the SWDS in year y (t CO2e/yr)
$BEEC,y$ = Baseline emissions associated with electricity generation in year y (t CO2/yr)
$BEHG,y$ = Baseline emissions associated with heat generation in year y (t CO2/yr)
$BENG,y$ = Baseline emissions associated with natural gas use in year y (t CO2/yr)

According the methodological tool "Emissions from solid waste disposal sites" version 08.0 , ex-ante calculation of $BE_{CH4,SWDS,y}$ based on the formulation below:

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

Where, for the yearly model:

$BECH4,SWDS,y$
$PECH4,SWDS,y$
$LECH4,SWDS,y$
Baseline, project or leakage methane emissions occurring in year y generated from waste disposal at a SWDS

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)
$DOCf,y$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
Wj,x = Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)

Where, for the monthly model:

$BECH4,SWDS,m$
$PECH4,SWDS,m$
$LECH4,SWDS,\mathrm{m}$
Baseline, project or leakage methane emissions occurring in month m generated from waste disposal at a SWDS

m = Month of the crediting period for which methane emissions are calculated
i = Months in the time period in which waste is disposed at the SWDS, extending from the first month in the time period (i = 1) to month m (i = m)
$DOCf,m$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for month m (weight fraction)
Wj,i = Amount of organic waste type j disposed/prevented from disposal in the SWDS in the month i (t)

Where, for both the yearly and monthly model:
φy = Model correction factor to account for model uncertainties for year y
fy = Fraction of methane captured at the SWDS and flared, combusted for used in another manner that prevents the emissions of methane to the atmosphere in year y
$GWPCH4$ = 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)
F = Fraction of methane in the SWDS gas (volume fraction)
$MCFy$ = Methane correction factor for year y
$DOCj$ = 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

As per ACM0002 , the baseline emissions are calculated as the net electricity generated by the project activity, multiplied with the baseline emission factor for the project grid. Baseline emissions calculated as explained in section B.6.1 above are summarized as below.

BEy = EGy * EFy
Where,
EGy = the net electricity exported to the grid system during the year y (54,600 MWh/annum)
EFy = the emission factor of the grid to which the project exports electricity (0.3953 tCO_2 tCO2/MWh)
Hence,

BEy = 54,600 MWh/annum * 0.3953 tCO_2/MWh
BEy = 21,585 tCO_2 per annum

Project emissions

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

$$PEy = PE_{EC,y} + PE_{FC,y} + PE_{DT,y} + PE_{SP,y}$$

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

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

$$PE_y = PE_{EC,y} + PE_{FC,y} \quad (20)$$

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

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

The project emissions from consumption of electricity by the project activity ($PE_{EC,y}$) is calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". When applying the tool:

- Electricity sources *j* in the tool corresponds to the sources of electricity consumed due to the project activity. This includes, where applicable, electricity consumed for the operation of the LFG capture system,

$$PE_{EC,y} = \sum_{k} EC_{PJ,j,y} x EF_{EL,j,y} x \left(1 + TDL_{j,y}\right) \quad (21)$$

Where:

$PE_{EC,y}$ Project emissions for electricity consumption in year y (tCO2/yr)

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

$FE_{EL,j,,y}$ Emission factor for electricity generation for source j in year y (tCO2/MWh)

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

j Sources of electricity consumption in the project

For the simplicity of emission reduction calculation, project emission from electricity consumption is assumed to be "0". For ex-post calculation, this emission sources will be taken into account.

The project emissions from fossil fuel combustion ($PE_{FC,j,y}$) will be calculated following the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". For this purpose, the processes j in the tool corresponds to all fossil fuel combustion in the landfill, as well as any other on-site fuel combustion needed for the project activity.

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y} \quad (22)$$

Where

$FC_{i,j,y}$ quantity of fuel type i combusted in process j during the year y

$COEF_{i,y}$ CO_2 emission coefficient of fuel type i in year y

The CO_2 emission coefficient is calculated following Option B as fuel combust chemical composition of the fuel.

The CO_2 emission coefficient is calculated following Option B based on net calorific value and CO_2 emission factor of the fuel type I as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (23)$$

where

$COEF_{i,y}$	CO_2 emission coefficient of fuel type i in year y
$NCV_{i,y}$	the weighted average net calorific value of the fuel type I in year y
$EF_{CO2,y}$	the weighted average CO_2 emission factor of fuel type I in year y
i	are the fuel types combusted in process j during the year y

For the simplicity of emission reduction calculation, project emission from fossil fuel combustion is assumed to be "0". For ex-post calculation, this emission sources will be taken into account.

Calculation of project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions for each minute m in year y, based on the methane mass flow in the residual gas (FCH4,RG,m) and the flare efficiency (ηflare,m), as follows:

$$PEflare,y = GWPCH4 \times \sum_{m=1}^{525600} FCH4,RG,m \times (1 - \eta flare,m) \times 10^{-3}$$

Where:

$PEflare,y$ = Project emissions from flaring of the residual gas in year y (tCO2e)
$GWPCH4$ = Global warming potential of methane valid for the commitment period (tCO2e/tCH4)
$FCH4,RG,m$ = Mass flow of methane in the residual gas in the minute m (kg)
$\eta flare,m$ = Flare efficiency in minute m

The estimated Project emissions from flaring is 0 tCOe.

PEy = 0 tCO_2/year

Leakage

No leakage effects need to be accounted under the approved consolidated methodology ACM0001, version 19.0.

LEy = 0 tCO_2/year

Emission reductions

ERy = BEy – Pey-ERy = 105,062– 0
ERy = 105,062 tCO_2 (ERy = BEy)

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

SDG 7 : Affordable and Clean Energy

The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel. The clean energy generated by the project is calculated based on the amount of electricity generated by the project per annum. The project is expected to generate 54,600 MWh of clean energy per annum.

Year	Baseline estimate	Project estimate	Net benefit (MWh)
09/02/2018-31/12/2018	48,766	0	48,766
2019*	54,600	0	54,600
2020	54,600	0	54,600
2021	54,600	0	54,600
2022	54,600	0	54,600
2023	54,600	0	54,600
2024	54,600	0	54,600
01/01/2025-08/02/2025	5,834	0	5,834
Total	382,200	0	382,200
Total number of crediting years	7 years		
Annual average over the crediting period	54,600	0	54,600

*The PP cannot claim the ERs during delay period,9 Feb 2018 – 4 Sep 2019 of CP2. Thus, PP has lost the electricity generation between 09/02/2018 and 04/09/2019; the project is expected to generate only 17,801 MWh in 2019 as below:

05/09/2019-31/12/2019	17,801	0	17,801

SDG 8 : Decent Work and Economic Growth

The project leads to employment opportunities which would not have been possible in the baseline scenario. The project have been provided employment to between 20 and 25 people.

This will help to achieve SDG 8 with indicators 8.5.2 "Unemployment rate, by sex, age and persons with disabilities" and following target: 8.5 "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value" There is no opportunity to employ woman. So "equal pay for work of equal value" does not apply.

This will also help to achieve "the project labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment." Training records or certificates will be provided during each monitoring period.

SDG 13 Climate Action

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

Waste amount estimated to be 304,466 tonnes, corresponding to an average of 800 t/day during the second crediting period.

Year	Baseline Estimate	Project estimate Waste Dumped (t/y)	Net Waste (t)
09/02/2018-31/12/2018	0	258,985	258,985
2019*	0	304,466	304,466
2020	0	319,690	319,690
2021	0	335,674	335,674
2022	0	352,458	352,458
2023	0	370,081	370,081
2024	0	388,585	388,585

01/01/2025-08/02/2025	0	43,596	43,596

* The PP cannot claim the ERs during delay period,9 Feb 2018 –4 Sep 2019 of CP2. Thus, PP has lost the electricity generation between 09/02/2018 and 04/09/2019; the project estimate waste dumped only 99,264 t in 2019 as below.

055/09/2019-31/12/2019	0	99,264	99,264

Year	Baseline (LFG Generation)	Total LFG generation on site, as m3 LFG
09/02/2018-31/12/2018	0	20,080,877
2019*	0	23,607,351
2020	0	24,787,718
2021	0	26,027,104
2022	0	27,328,459
2023	0	28,694,882
2024	0	30,129,626
01/01/2025-08/02/2025	0	3,380,296

*The PP cannot claim the ERs during delay period,9 Feb 2018 – 4 Sep 2019 of CP2. Thus, PP has lost the electricity generation between 09/02/2018 and 04/09/2019; the project is expected total LFG generation on site 7,696,643 m3 in 2019 as below

05/09/2019-31/12/2019	0	7,696,643

The project leads to mitigation of 115,062tCO_2 per annum.

Year	Baseline estimate A= b + c	MDproject,y (b)	BEelectricity (c)	Project estimate (d)	Net benefit (tCO_2) E= b + c - d
09/02/2018-31/12/2018	63,572	44,294	19,278	0	63,572
2019	86,159	64,574	21,585	0	86,159
2020	100,482	78,897	21,585	0	100,482
2021	114,312	92,727	21,585	0	114,312
2022	127,794	106,209	21,585	0	127,794
2023	141,050	119,465	21,585	0	141,050
2024	154,190	132,605	21,585	0	154,190

01/01/2025-08/02/2025	17,876	15,570	2,306	0	17,876
Total	805,435	654,341	151,094	0	805,435
Total number of crediting years	7				
Annual average over the crediting period	115,062	93,477	21,585	0	115,062

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Relevant SDG Indicator	7.2.1 "Renewable energy share in the total final energy consumption"
Data / Parameter	EGpj,y
Unit	MWh/yr
Description	Quantity of net electricity supplied to the grid in year y
Source of data	Meter reading protocols (OSOS records)
Value(s) applied	54,600 MWh[51]
Measurement methods and procedures	The net electricity generation supplied to the grid will be measured continuously by YEDAŞ meters (both main and spare) and recorded monthly. Please see B.7.3. for more detailed description of the monitoring plan.

[51] Samsun Landfill Gas to Energy Project Feasibility Report – 2018

<table>
<tr><td>Monitoring frequency</td><td>Continuous measurement and at least monthly recording. (Remote automatic meter reading system-OSOS)

Information of the meters are listed as followed:

<table>
<tr><td></td><td>Main Meter</td></tr>
<tr><td>Manufacturer</td><td>ELSTER</td></tr>
<tr><td>Model</td><td>A1500</td></tr>
<tr><td>Serial number</td><td>65001340</td></tr>
</table>

<table>
<tr><td></td><td>Backup Meter</td></tr>
<tr><td>Manufacturer</td><td>ELSTER</td></tr>
<tr><td>Model</td><td>A1500</td></tr>
<tr><td>Serial number</td><td>00436730</td></tr>
</table>

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

Relevant SDG Indicator	7.2.1 "Renewable energy share in the total final energy consumption"
Data / Parameter	$PE_{FC,j,y}$

Unit	$tCO2_e$
Description	Project emissions from fossil fuel combustion in process j during the year y
Source of data	Fuel invoices
Value(s) applied	-
Measurement methods and procedures	"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", Version 03. Project emissions involve direct emissions (such as fossil fuel consumption of construction equipment, co-firing for power generation or vehicles for on-going operations and maintenance) by the Project activity.
Monitoring frequency	Continuously
QA/QC procedures	The consumption of fossil fuel will be monitored based on the fuel invoices and is therefore of high quality.
Purpose of data	Calculation of project emissions
Additional comment	n.a

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

Measurement methods and procedures	The flow rate of the residual landfill gas is automatically converted to dry basis and normal conditions by the PLC system without any intervention by the Project owner. This parameter is calculated by multiplying LFGflare, density of methane and wCH4 (percentage of methane measured by the gas analyzer). This is in compliance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", v.03.0.0. For conversion, volumetric flow rate data will collected from the flow meter Nr.2 (FM 2). Equipment Specification;

Type	Accuracy	Serial Nr.	Cal. Frequency	Dates of relevant calibrations	Cal. validity
Flow meter	2%	AAM5322F	Up to 10 years (no periodic calibration required by manufacturer)	24.11.2010 10.05.2012	10.05.2022

Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	A separate flow meter is installed for the flare unit. Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour.
Purpose of data	This parameter will be used to check with the SPECflare parameter. This parameter will be used to calculate PEflare,y.
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	Tn
Unit	K
Description	Temperature of the gaseous stream
Source of data	Temperature Gauge

Value(s) applied	
Measurement methods and procedures	Equipment Specifications <table><tr><td>Type</td><td>Accuracy</td><td>Serial Nr.</td><td>Cal. Frequency</td><td>Dates of relevant calibrations</td><td>Cal. Validity</td></tr><tr><td>Gentek temperature gauge</td><td></td><td>12-1900</td><td>No periodic calibration required by manufacturer</td><td>30.06.2014</td><td>N/A</td></tr></table> Calibration results: Uncertainty 1.05°C, standard deviation < 1°C.
Monitoring frequency	Manual reading and recording, continously
QA/QC procedures	The data is manually read and recorded. The temperature measurement device is calibrated, indicating a small error margin and small fluctuations.
Purpose of data	FCH4,RG,m, mass flow of methane in the residual gas in the minute m, is calculated based on the dry basis assumption, which requires the temperature of the landfill gas to be below 60 °C. This data is used to verify that this requirement is fulfilled. It should also be noted that the landfill gas is dehumidified before the booster intake.
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	$LFG_{electricity,y}$
Unit	Nm^3
Description	Total amount of landfill gas and biogas (under normal conditions of 0° and 1 Atm) combusted in the generator unit in year y
Source of data	Flow Meter Nr.3
Value(s) applied	

Measurement methods and procedures	Equipment Specifications <table><tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr><tr><td>Flow Meter</td><td>2%</td><td>AAE9255F</td><td>Up to 10 years (no periodic calibration required by manufacturer)</td><td>24.11.2010 10.05.2012</td><td>10.05.2022</td></tr></table> Measurement Range: 0-2200 Nm3/h. Flowmeter consistency is checked on 11.04.2013 to confirm that no calibration is necessary.
Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour. One flow meter is installed for all of the gen-sets.
Purpose of data	Calculation of baseline emissions
Additional comment	n.a

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

<table>
<tr><td>Measurement methods and procedures</td><td>Equipment Specifications

<table>
<tr><th>Type</th><th>Accuracy</th><th>Serial Nr.</th><th>Cal. Frequency</th><th>Dates of relevant calibrations</th><th>Cal. validity</th></tr>
<tr><td>Flow Meter</td><td>2%</td><td>AAE9255F</td><td>Up to 10 years (no periodic calibration required by manufacturer)</td><td>24.11.2010
10.05.2012</td><td>10.05.2022</td></tr>
</table>

Measurement Range: 0-2200 Nm3/h.</td></tr>
<tr><td>Monitoring frequency</td><td>Measured continuously in real-time.</td></tr>
<tr><td>QA/QC procedures</td><td>Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour. One flow meter is installed for all of the gen-sets.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>n.a</td></tr>
</table>

**

$$E_{LFG} = E_G \times \frac{\sum_i [FL_i \times ML_i]}{\sum_i [FL_i \times ML_i] + \sum_i [FB_i \times MB_i]}$$

Where

- E_G = Total Electricity Generated
- E_{LFG} = Electricity Generated from burning Land Fill Gas
- FL_i = Flow from Land Fill Pipe at hour i
- FB_i = Flow from Biogas at hour i
- ML_i = Methane ratio in Land Fill pipe at hour i
- MB_i = Methane ratio in biogas pipe at hour i
- $\sum_i$ *denotes the sum over all hours*

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

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	$LFG_{total,y}$
Unit	Nm^3
Description	Total amount of landfill gas and biogas (under normal pressure and temperature) captured in year y
Source of data	Flow meter Nr.1
Value(s) applied	
Measurement methods and procedures	Equipment Specifications Type | Accuracy | Serial Nr. | Cal. Frequency | Dates of relevant calibrations | Cal. validity Flow Meter | 2% | AAE9253F | Up to 10 years (no periodic calibration required by manufacturer) | 24.11.2010 10.05.2012 | 10.05.2022 Measurement Range: 0-2200 Nm3/h
Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.

QA/QC procedures	Data is measured continuously with a flow meter by the Project owner. Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy. This will ensure that the accuracy of the measurement instrument is maintained. The measurement frequency is equal to or more than one sampling each hour.
Purpose of data	This parameter is used for double checking purposes for comparing it with the sum of LFGelectricity,y and LFGflare,y.
Additional comment	n.a

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

Type	Accuracy	Serial Nr.	Cal. Frequency	Dates of relevant calibrations	Cal. Validity
Pronova SSM-6000-LT	%2	80020000-1435	Annually	11.04.2013 10.09.2013	10.09.2014

Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	Methane content is measured directly and continuously with a gas analyzer. The gas analyzer will be maintained and calibrated regularly according to the manufacturer's requirements in order to ensure that required level of accuracy is maintained. The gas analyzer is subject to a regular maintenance and testing regime to ensure accuracy, therefore the analyzer will be calibrated according to the manufacturer's recommendations. The measurement interval is equal to or more than one sampling each hour.

Purpose of data	The percentage of methane in the landfill gas is used to calculated the amount of methane destroyed in the gas engine and flare units. It is also used to check whether it satisfies the minimum methane content threshold for the flare unit to ensure the gas is flared efficiently.
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	$PE_{flare,y}$
Unit	t_{CO2-eq}
Description	Project emissions from flaring of the residual gas in year y
Source of data	N/A
Value(s) applied	N/A
Measurement methods and procedures	$PE_{flare,y} = \sum_{m=1} F_{CH4,RG,m}*(1-\eta_{flare,m})*GWP_{CH4}*10^{-3}$ $F_{CH4,RG,m}$ and $\eta_{flare,m}$ parameters are read continuously but recorded at regular intervals. Therefore, the formula above has been applied to 10- minutes and 30-minutes data, instead of 1-minute data. GWP_{CH4} is a fixed ex ante parameter.
Monitoring frequency	N/A
QA/QC procedures	Calculations are carried out with a spreadsheet to minimize the risk errors.
Purpose of data	Calculation of baseline emissions
Additional comment	n.a

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

Measurement methods and procedures	Equipment Specifications

Type	Accuracy	Serial Nr.	Cal. Frequency	Dates of relevant calibrations	Cal. Validity
Genset Control EASYGEN- 3200-5	N/A	17856564	N/A	02.11.2011	N/A
Genset Control EASYGEN- 3200-5	N/A	17609634	N/A	11.07.2011	N/A
Genset Control EASYGEN- 3200-5	N/A	18336534	N/A	27.09.2013	N/A

Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	The PLC provides data on engines' supplied amount of power (kW). Operational hours are calculated based on engine operation (i.e. at least of one of the engines generates power).
Purpose of data	Calculation of baseline emissions
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	TEG,m
Unit	°C
Description	Temperature in the exhaust gas of the enclosed flare in minute m
Source of data	Thermocouple
Value(s) applied	
Measurement methods and procedures	Equipment Specifications

Type	Accuracy	Serial Nr.	Cal. Frequency	Dates of relevant calibrations	Cal. Validity
K-Type Thermocouple-Isocontrolli	N/A	N/A	Annual replacement	February 2012	N/A

Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.

QA/QC procedures	If more than one temperature port is fitted to the flare, the flare manufacturer must provide written instructions detailing the conditions under which each location shall be used and the port most suitable for monitoring the operation of the flare according to manufacturer's specifications for temperature. Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule. Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events should be noted in the site records along with any corrective action that was implemented to correct the issue.
Purpose of data	-
Additional comment	n.a

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	ηflare,m
Unit	%
Description	Flare efficiency in minute m
Source of data	TEG,m, FCH4,RG,m, and SPECflare
Value(s) applied	
Measurement methods and procedures	A calculation spreadsheet is used to check the requirements defined above, which minimizes the risk of manual errors. The flare efficiency for the minute m (ηflare,m) is 90% when the following conditions are met to demonstrate that the flare is operating: The temperature of the flare (TEG.m), minimum methane content and the flow rate of the residual gas to the flare (FRG,m) is within the manufacturer's specification for the flare (SPECflare) in minute m; and Otherwise ηflare,m is 0%.
Monitoring frequency	Measured continuously in real-time and recorded every 30 minutes.
QA/QC procedures	-
Purpose of data	-
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data / Parameter	Flamem
Unit	N/A
Description	Flame detection of flare in the minute m
Source of data	Flame detector unit
Value(s) applied	
Measurement methods and procedures	Equipment Specifications Type: Optical Flame Detector; Accuracy: N/A; Serial Nr.: N/A; Cal. Frequency: N/A; Dates of relevant calibrations: N/A; Cal. Validity: N/A
Monitoring frequency	Continuously
QA/QC procedures	The flare unit installed for the project activity includes the flame detector as an integral safety component. This detector coupled with the electronic module installed in the control panel continuously detect flame presence by UV sensor. If the detector cannot see the flame (and cogeneration engine are in OFF), the main valve automatically closes and a flame is tried to be created with only pilot line. If this operation fails, the system automatically shuts down and an alarm appears on the system. Therefore, the data availability also implies flame detection.
Purpose of data	This parameter is added to comply with the methodological tool "Project emissions from flaring", v.03.0.0 and there is no direct use for these data in calculations.
Additional comment	-

Relevant SDG Indicator	8.5.2. Unemployment rate, by sex, age and persons with disabilities
Data / Parameter	Number of employment generation
Unit	Number
Description	Number of people employed directly due to the project activity
Source of data	SGK Records
Value(s) applied	The project provides between 20 and 25 employment

Measurement methods and procedures	The total number of persons working in the plant would be calculated based on the SGK Records
Monitoring frequency	Once for each monitoring period
QA/QC procedures	Social insurance registries of employees will be provided annually. After first verification, only changes in employees will be reported.
Purpose of data	-
Additional comment	-

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

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following
Data / Parameter	ERy
Unit	tCO_2/y
Description	Emission Reductions in year y (t CO_2/yr) As per ACM0002 Version 19 and ACM0001 Version 19.0, the baseline emissions (emission reductions) are calculated as the net electricity generated by the project activity and Methane destroye. For electricity, generation multiplied with the baseline emission factor for the project grid.
Source of data	Measured and Calculated. (The emission reduction value the emission factor of the grid to which the project exports electricity (0.3953 tCO_2 tCO2/MWh)
Value(s) applied	115,062 tCO_2[52]
Measurement methods and procedures	Please see B.6.2-B.6.4 and B.7.3 for more detailed description of the monitoring plan.
Monitoring frequency	Once for each monitoring period
QA/QC procedures	Please see B.7.3. for more detailed description of the monitoring plan.
Purpose of data	Calculation of baseline emissions (Baseline emissions calculated as explained in section B.6.2-B.6.4)
Additional comment	-

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following
Data / Parameter:	CAPEX and OPEX
Data unit:	Euro

[52] This value will be changed accordig to net electicity generation value and methane production.

Description:	Total investment to implement the project and total cost to operate the project
Source of data:	Engineering, procurement and maintenance contracts and financial analysis excel sheet
Measurement procedures (if any):	NA
Monitoring frequency:	At the first verification period
QA/QC procedures:	Audited by professional, independent financial auditors.
Purpose of data	n.a.
Any comment:	n.a

B.7.2. Sampling plan

Not Applicable

B.7.3. Other elements of monitoring plan

The monitoring instruments to be installed include LFG flow meters, methane meters, pressure and temperature gauges and electricity measurement devices. All the monitoring instruments will meet the relevant accuracy requirements and data substitution for methane content or LFG flow as provided in Appendix of TOOL08.(Methodological tool: Tool to determine the mass flow of a greenhouse gas in a gaseous stream Version 03.0)
Methane content is measured continuously through Gas Anaylser, Flow Meter Nr.1 and Flow Meter Nr. 2.

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

The monitoring plan mainly involves proper preparation of a spreadsheet and reporting of it. Monitoring will be carried out with the help of a spreadsheet and supporting documentation. All data used for the monitoring plan will be archived electronically and backed up regularly. These data will be kept for the full crediting period and a further two years after the end of the crediting period or the last issuance of carbon credits, whichever occurs later.

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

Monitoring data is collected in accordance with the agreement done between the project owner and Turkish Electricity Distribution Company (YEDAS) which provides the infrastructure for the connection to the national grid. Connection Agreement has signed on 05/04/2017 with YEDAŞ Electricity Authorised Distribution Company. The metering system is defined in the agreement as two groups: main meter and spare meter. The design of the metering system is checked and approved by YEDAS before commissioning of the plant. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA) requires all meters to be in line with either Turkish Standards Institution or International Electrotechnical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of the both parties. This prevents any intervention and assures the accuracy and quality of the measurements. All requirements and specifications of the meters will be done according to Communique on the counter to be used in the Electricity Market by Energy Market Regulatory Authority on 22.04.2011.
Each project activity has a certain amount of self electricity consumption. Similar to energy generation, energy consumption is also recorded and accounted for the invoicing. The electricity consumption of the project mostly be covered by the Project's own electricity generation and the remaining power is the one which is measured and fed to the transmission line. In cases when the Project's own power generation is not high enough to cover its own consumption, electricity from the grid is used. This usage is measured also by the two measurement devices.

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

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

The amount of LFG combusted in the gas engines is monitored by effectively and conservatively monitoring the methane amount supplied into each of the engine units. The

actual emission reductions from the destruction of methane in the combustion units will be calculated such that the risk of overestimation is minimized. The readings are taken and recorded internally by compatible and proper measurement devices automatically with high data quality.

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

The main and spare meter readings are recorded monthly and cross-checked whether calibration is required. The capacity of the transmission line connected is 31.5 kVA, the accuracy class for power meters have been defined in the Communiqué for Power Meters as 0.5S class. The calibration will be implemented in accordance with the related standard procedures. The periodical maintenance is under the responsibility of YEDAŞ and has been fixed as once in 10 years.

The Project aims to create local employment opportunities in the project region in a sustainable way. The Project proponent prefers to prioritize personnel from the project region, which is defined as a Gold Standard indicator to be verified each year. The proposed project provides local employment both during the construction and operational phases. It is 20 to 25 employees' permanent during the operation of the plant.

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

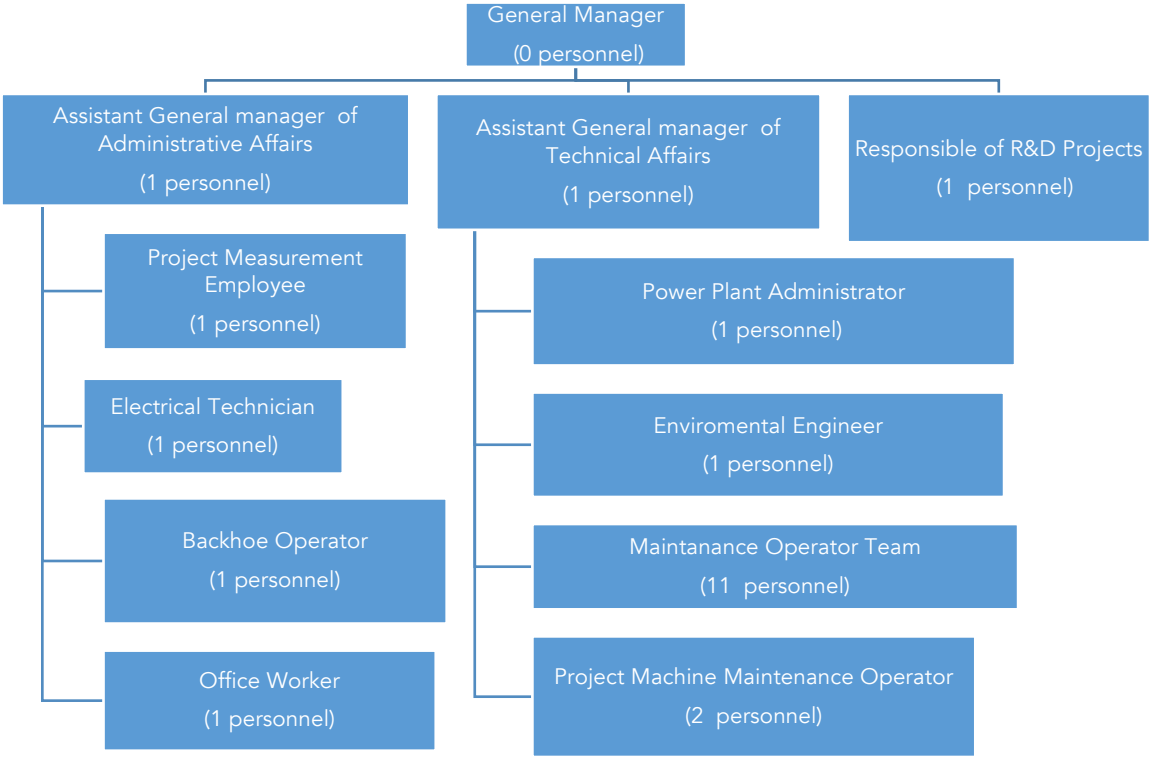
The general manager of the Project owner is responsible for overseeing the implementation of the monitoring procedure. Competency requirements for these tasks are applied to ensure that the general manager is able to implement and/or supervise this procedure. The general manager is responsible of the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

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

The all staff receives health and safety trainings to minimise exposure to workplace hazards. At every shift, at least one trained technical personnel is present. All relevant information

such as data files, maintenance and defect records and other monitoring related records is kept at a designated location in a transparent and organised manner.

Roles and responsibilities have been summarized in the following chart:



SECTION C. Duration and crediting period

C.1. Duration of project

C.1.1. Start date of project

The starting date of a project activity is the earliest date at which either the implementation or construction or real action of a project activity begins. The construction start date of the Project is 13/09/2010.

13/09/2010[53]

C.1.2. Expected operational lifetime of project

28 years and 0 months

C.2. Crediting period of project

Renewable crediting period will be used.

[53] Construction start date of the project according to registered PDD.

C.2.1. Start date of crediting period

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

Starting date of the second crediting period: 09/02/2018- 08/02/2025[54]

The PP cannot claim the ERs during delay period,9 Feb 2018 – 4 Sep 2019 of CP2. Thus, PP has lost the electricity generation between 09/02/2018 and 04/09/2019. The project can produce ERs between 05/09/2019 to 08/02/2025 for CP2[55]

Starting date of design change: 06/12/2017[56]

C.2.2. Total length of crediting period

7 years and 0 months, which is planned to be renewed twice. (14 years)

SECTION D. principles assessment

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

https://globalgoals.goldstandard.org/101-4-gold-standard-for-the-global-goals-safeguarding-principles-requirements/

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
SOCIAL &ECONOMIC SAFEGUARDING PRINCIPLES				
Principle 1- Human Rights	1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence	No	1. The Samsun Landfill Gas to Energy Project is not in conflict with the economic	Not Required

[54] This is rule of GS4GG and GS has confirmed these dates.

[55] This is rule of GS4GG and GS has confirmed these dates

[56] Equipment Agreement which has already submitted to the GS

	or human rights abuses of any kind as defined in the Universal Declaration of Human Rights. 2. The Project shall not discriminate with regards to participation and inclusion.		livelihood or other issue of the local community. Thus, the Project does not cause any human rights abuse and respects internationally proclaimed human rights issue. 2. The Project does not discriminate with regards to participation and inclusion. As a member of United Nations and part of UN Agreement on Human Rights, it is ensured by law in Turkey that no action can be taken against human rights.[57]	
Principle 2- Gender Equality and Women's Rights	The Project shall complete the following gender assessment questions in order to inform Requirements, below:	No	1. The project does not decrease women´s access to or control of resources.	Not Required

[57] http://www.resmigazete.gov.tr/main.aspx?home=http://www.resmigazete.gov.tr/arsiv/7217.pdf&main=http://www.resmigazete.gov.tr/arsiv/7217.pdf

	1. Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits? 2. Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)? 3. 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)? 4. 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		2. No, there is no possibility of adverse effect. 3. No, the Project does not disconsider gender roles and in fact actively engages both women and men. Community meetings are scheduled considering participation by both Men and Women. But there is no need to make another LSC meeting for capacity decision because they known the capacity very well and support this project everytime. 4. The project does not discriminate on basis of gender, caste or religion. 5. No the Project was not designed to increase women´s	

	minority groups or landless peoples)? 5. 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? 6. 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? 7. 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? 8. Is there a likelihood that the proposed		workload nor add care responsibilities. 6. There is no place for discrimination against women in this Project. The project does nto discriminate on basis of gender, caste or religion.[58] 7. The Project will not limit women´s ability regarding natural resources. The project landfill gas project thus does not have any major impact on natural resources of the region.[59] 8. No the Project will not expose women and girls to further risks or hazards. 1. The project proponent has a grievance cell which would look into compalints.	

[58] The DOE has already interviewed with the women during the site visit of Samsun Avdan LFG's renewal crediting period(revalidation) on 19th of March.

[59] Project Introduction File page 19 and Samsun Avdan_Environmental and Tecnical Report

	Project would expose women and girls to further risks or hazards? The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women. 1. Sexual harassment and/or any forms of violence against women - address the multiple risks of gender-based violence, including sexual exploitation or human trafficking. 2. Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls. 3. Restriction of women's rights or access to resources (natural or economic). 4. Recognise women's ownership rights regardless of marital status - adopt project measures where possible to support to women's access to inherit and own land, homes, and other assets or natural resources. Projects shall apply the principles of		2. There is no such risk for the project. Participation in the project is 100% voluntary. The project proponent has a grievance cell which would look into compalints. 3. The Project will not restrict women´s rights or access regarding natural resources. The project proponent does not discriminate on gender, caste, religion etc. 4. Marital status is completely irrelevant to the Project. The project proponent does not discriminate on gender, caste, religion etc 1. Yes, the Project has equal opportunity for women and men to contribute both in volunteer and working positions.	

	nondiscrimination, equal treatment, and equal pay for equal work, specifically: 1. Where appropriate for the implementation of a Project, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities. 2. Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. 3. Ensure that these conditions do not limit the access of women or men, as the case may be, to Project participation and benefits. The Project shall refer to the country's national gender strategy or equivalent national		2. The project proponent has a stipulated HR policy that takes into account participation by both men and women. 3. There is no limit on the access to Project participation and benefits from either of these conditions. Samsun Landfill Gas project does not involve in any form discrimination in any kind of form. Turkey ratified ILO 100 Equal Remuneration Convention and 111 Discrimination (Employment and Occupation) Convention[60]	

[60] http://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO::P11200_COUNTRY_ID:102893

	commitment to aid in assessing gender risks.			
Principle 3-Community Health, Safety and Working Conditions	The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments.	Potentially	The project owner is committed to the safe and healthy working conditions during all phases of the project. All employees attend trainings health & safety. This issue is protected by Labor Law and regulations[61] and UN Agreement on Human Rights.[62]	All the employees will be trained about health and safety issues during operation phase of the project but this is not required.
Principle 4-Cultural Heritage, Indigenous Peoples, Displacement and Resettlement	Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, or practices)? Does the Project require or cause the physical or economic relocation of peoples	No	During the construction and operation of the Samsun Landfill Gas to Energy Project is not any damage, alteration or removal to the critical cultural heritage.[63] Furthemore, cultural and environmental heritage is protected against	Not Required

[61] http://www.mevzuat.adalet.gov.tr/html/1243.html

[62] https://www.unicef.org/turkey/udhr/_gi17.html

[63] Project Introduction File page 49

	(temporary or permanent, full or partial)? Does the Project require any change to land tenure arrangements and/or other rights? For Projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership? Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?		alteration, damage or removal by the law[64]. The project does not involve any settlement areas. Thus, this project does not cause the physical or economic relocation of peoples. The project's area municipilaty land.[65] The project does not require any changes to land tenure arrangements or other rights. And this Samsun Landfill Gas to Energy Project is not involving land-use tenure. Furthermpre there is not any uncertainties with regards land tenure, access rights, usage	

[64] Reference: "Law on Protection of Cultural and Environmental Assets"

http://mevzuat.basbakanlik.gov.tr/Metin.Aspx?MevzuatKod=1.5.2863&MevzuatIliski=0&sourceXmlSearch=

[65]Agrement with Samsun Municipality

			rights or land ownership. The Land for the project has been approved by the Municipality of Samsun. No cultural heritage/ indigenous people are displaced due to the project.	
Principle 5- Corruption	The project does not involve and is not complicit in corruption.	No	Samun Landfill Gas to Energy project does not involve and is not complicit in any kind of corruption. Turkey has ratified UN Convention against Corruption and the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions.[66]	Not Required

[66] http://treaties.un.org/Pages/ViewDetails.aspx?mtdsg_no=XVIII-14&chapter=18&lang=en

Principle 6- Economic Impacts	1. The project does not employ and is not complicit in any form of child labor. 2. The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments. 3. The project does not involve and is not complicit in any form of forced or compulsory labor.	Potentially	1. Samsun Avdan Enerji Üretim ve Tic. A.Ş. and their subcontractors complying with all relevant national laws. Samsun Avdan Enerji Üretim ve Tic. A.Ş. does not employ children in any shape or form for their works. Turkey has ratified ILO 138 Minumum Age Conventions and 182 Worst Forms of Child Labour Convention[67] 2. The project owner is committed to the safe and healthy working conditions all phases of the project. All employees attend trainings health & safety. This issue is protected by Labor Law and	Not Required

[67] http://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO::P11200_COUNTRY_ID:102893

			regulations[68] and UN Agreement onHuman Rights[69] 3. Samsun Avdan Enerji Üretim ve Tic. A.Ş. and appointed subcontractors does not involve in any form forced or compulsory labour Turkey has ratified ILO 29 Forced Labour Convention[70]	
ENVIRONMENTAL & ECOLOGICAL SAFEGUARDING PRINCIPLES				
Principle 1-Climate and Energy	Will the Project increase greenhouse gas emissions over the Baseline Scenario? Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project reduces greenhouse gas emissions and fossil fuel use compared to the baseline scenario. On the contrary the project generates renewable energy and supplies to the grid.	Not Required
Principle 2-Water	Will the Project affect the natural or pre-existing pattern of	No	The project being a landfill project thus there is no	Not Required

[68] Project Introduction File page 37 and http://www.mevzuat.adalet.gov.tr/html/1243.html

[69] https://www.unicef.org/turkey/udhr/_gi17.html

[70] http://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO::P11200_COUNTRY_ID:102893

	watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?		impact of water resources due to the project[71]. In project site there is no area defined in the water pollution control regulation.[72] The project is in scope of Exempt EIA.[73] The leachate water is managed by the municipality as the agreement between PP and municipality states that leachate water management is within the responsibility of the municipality.	
Principle 3- Environment, ecology and land use	1. Does the Project involve the use of land and soil for production of crops or other products? 2. Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides,	No	1.The solid waste was being dumped to the landfill site without a soil capping layer before this project. Now, with soil capping layers, the landfill site is more robust, with a reduced risk of	Not Required

[71] Project Introduction File page 50 and Samsun Avdan_Environmental and Tecnical Report

[72] Project Introduction File page 59 and Avdan_Environmental and Tecnical Report

[73] EIA Exempt Documents– 03/12/013 and 28/08/2015

	erosion, flooding, drought or other extreme climatic conditions? 3. Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development)? 4. Could the Project potentially result in the release of pollutants to the environment? 5. Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials? 6. Will the Project involve the application of pesticides and/or fertilisers?		erosion and landslide.[74] 2. The project is susceptible to decreased vulnerability to wind, earthquakes, subsidence, land slides, erosion, flooding, drought or other extreme conditions. 3. The Project is not function as a hazardous waste disposal or processing facility (i.e. as a hazardous waste gasification or incineration facility).[75] Furthermore, there is not effect negatively organism, flora, fauna or GMOs.[76] 4. The project takes a precautionary approach in regard to environmental challenges and is not complicit in practices contrary to the	

[74] Project Introduction File page 41 and Samsun Avdan_Environmental and Tecnical Report

[75] Project Introduction File page 22, 54 and 57 and Samsun Avdan_Environmental and Tecnical Report

[76] Project Introduction File page 46, 49 and Samsun Avdan_Environmental and Tecnical Report

			precautionary principle. The environment is protected by several Laws and Regulations in Turkey.[77] The purpose of the "Law on Environmental Protection" is to protect the environment with principles of sustainable development and environment. The project owner also follows necessary procedures for environmental safety at the project site at international standard (such as Bern Convention).[78] 5. The all wastes will be disposed of according to related regulations.[79] 6.Not applicable for SWDS.	

[77] Project Introduction File pages between 51 to 70 and Samsun Avdan_Environmental and Tecnical Report

[78] Project Introduction File page 49-50 Samsun Avdan_Environmental and Tecnical Report

[79] Project Introduction File pages between 51 to 63 and Samsun Avdan_Environmental and Tecnical Report

Assessments regarding Safeguarding Principles and Requirements paragraph 4.3.7 to 4.3.11 are briefly given below. PID also addresses the following items as mandated by Turkish law and regulations.[80]

4.3.7 Harvesting of Forests

Question: Will the Project involve the harvesting of forests?

This is landfill gas project so the project does not involve the harvesting of forests.

4.3.8 Food

Question: Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?

The project area does not involve agricultural land so the project activity does not have any negatively impact to access and availability of food for people.

4.3.9 Animal husbandry

Question: Will the Project involve animal husbandry?

This landfill gas to energy project does not involve any animal husbandry.

4.3.10 High Conservation Value Areas and Critical Habitats

Question: Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites[81] identified?

The project does not affect or alter High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or cultural sites.

4.3.11 Endangered Species

Questions: 1. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)?

2. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?

[80] Enviromental Assestment Report has already provided to the GS

[81] Charter of the United Nations, Article 1, para 3. http://www.un.org/en/sections/un-charter/chapter-i/index.html

There are no endangered species identified as potentially being present within the Project boundary (including those that may route through the area). The project is not within the vicinity of area that contains endangered species.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from stakeholders

The stakeholders to the project activity was defined jointly by the project owner and Rüzgar Danışmanlık (Cagla Balci Eris) , who is the consultant to the GS project cycle, taking into account the characteristics and possible impacts of the project activity.

Complementary Stakeholder Consultation for Design Change and Renewal Crediting Period:

The general outcome of the stakeholder consultation interview was positive verbally. That's why there is no need to make physical another local stakeholder consultation meeting. Furthermore, everything is similar related with the sustainable development indicators (SD assestment) of Samsun Landfill Gas to Energy Plant as first crediting period.

The stakeholders stated that they are in favour of the project and underlined the significant contribution of the project to regions sustainable image and stressed the importance of renewable and clean energy everytime.

The documents including the non-technical project summary for renewal crediting period and the Environmental and Social Impact questionnaire related with the Sustainable Development Indicators (SD Assessment) (according to GS4GG requirements) have been delivered to the stakeholders who have been selected as stakeholders to the project activity. The main communication method has been through e-mails and delivery of hard copies of the mentioned documents for those who don't have an email address (specifically the locals) to the mukhtar of Aşağıavdan village.

The feedback request for renewal crediting period has started on 13/03/2019 with sending out the documents to the stakeholders officially, and verbally on the 13/02/2019 and 13/03/2019 the mukhtar of Aşağıavdan village and no feedback has been received until now. The beginning of Complemantary Stakeholder Feedback Round has be announced from the muckhtar's offices, and coffe houses of the Alaçam and Özlü villages. This public leaflet announcement, emails and documents contain information such as location of available these documents, the procedure to commit comments, timing (until 13/04/2019) and the contact's details.

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During the Complementary Stakeholder Consultation process for Renewal Crediting Period no negative comments have been received regarding Samsun Landfill Gas to Energy Plant.

List of stakeholders invited to the Complementary stakeholder consultation for the renewal of crediting period:

Category code	Organisation (if relevant)	Name of invitee	Way of invitation	Date of invitation	Confirmation received ? Y/N
C	Ministry of Environment and Urbanization	Mehrali Ecer	Via E-mail and phone mecer@cob.gov.tr 0 312 5863052	13/03/2019	Y
C	Ministry of Environment and Urbanization	Tuba Seyyah	Via E-mail and phone tuba.seyyah@csb.gov.tr 0 312 5863167	13/03/2019	Y
B	Samsun Regional Directorates of Forestry	General	Via E-mail samsunisl@ogm.gov.tr	13/03/2019	Y
B	Samsun District Governor	General	Via E-mail lkadim@icisleri.gov.tr	13/03/2019	Y
A	Mayor of Samsun (Head of Environmental Protection and Control Department)	Figen Akın	Via E-mail figen_akin@mynet.com	13/03/2019	Y
C	Mayor of Samsun (Waste Management Branch Manager)	Fatih Kutbay	Via E-mail fatihkutbay@hotmail.com	13/03/2019	Y
D	REC Regional Environmental Centre	Rıfat Unal Sayman	Via E-mail info@rec.org.tr/ unal.sayman@rec.org.tr	13/03/2019	Y
B	Samsun Province Environment and Urban Director	Haluk Kartal	Via E-mail haluk.kartal@csb.gov.tr	13/03/2019	Y
A	Headman of Aşağıavdan Village	Kamuran Genç	Via face to face and phone	13/03/2019	Y
D	Samsun TEMA	General	Via E-mail samsuntema55@hotmail.com	13/03/2019	Y
F	Greenpeace	Hilal Atıcı	Via E-mail hatici@greenpeace.org	13/03/2019	Y

F	WWF	Güniz Bursali	Via E-mail gbursali@wwf.org.tr info@wwf.org.tr	13/03/2019	Y
E	Gold Standard Foundation	Neha Rao	Via E-mail neha.rao@goldstandard.org	13/03/2019	N
F	REEP	Info	Via E-mail info@reeep.org	13/03/2019	N
F	MERCY CORPS	Dorothy Mcintosh	Via E-Mail dmcintosh@uk.mercycorps.org	13/03/2019	Y

E.2. Summary of comments received

For simplification, all comments received during the complimentary stakeholder consultation are summarized here:

The general outcome of the complemantary stakeholder consultation interview was positive verbally with the mukhtar of the Aşağıavdan village and they have given their comment with a letter. (These letter has been provided to the GS and VVB.) That's why there is no need to make physical local stakeholder consultation meeting. The stakeholders stated that they are in favour of the project and underlined the significant contribution of the project to regions sustainable image and stressed the importance of renewable and clean energy. On the other hand, the impact on local stakeholders was considered negligible, because the new 4 gas motor turbines are located next the existing turbines and the project boundaries has not changed. Thus, no negative impacts on local stakeholders.

During the Complementary Stakeholder Consultation process for Renewal Crediting Period no negative comments have been received regarding the Samsun Avdan Landfill Gas to Energy Power Plant and no indicator in the sustainability matrix was scored negative, and no significant environmental impacts were identified.

Furthermore, the GS continuous input mechanism was explained and discussed that whenever they have a complaint or a request, they can be able to fill in the grievance book which can be located at mukhtar of Aşağıavdan. The project owner has also explained that would be regularly checked by the project manager. The local stakeholders agreed on this mechanism and the book was given to the mukhtar of Aşağıavdan with a protocol.(This protocol has been provided to the GS and VVB)

E.3. Report on consideration of comments received

Until the GS registration of the project activity on 2011, no comments from the invited stakeholders apart from the meeting have been received, neither by phone calls, by e-mail, by post nor by fax during the seven operational years.

In addition, all these documents has been made available under the GS registry webpage (www.markit.com) as required by GS4GG.

Appendix 1. Contact information of project participants

Organization name	Samsun Avdan Enerji Üretim ve Tic. A.Ş.
Registration number with relevant authority	
Street/P.O. Box	Süleyman Seba Cad.
Building	BJK Plaza, A Blok, No:77 Beşiktaş
City	Istanbul
State/Region	n.a.
Postcode	
Country	Turkey
Telephone	+90 212 2581820
Fax	+90 212 2581240
E-mail	n.a.
Website	
Contact person	
Title	General Manager
Salutation	Mr.
Last name	İren
Middle name	
First name	Erol
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	erol@arier.com.tr
Organization name	Rüzgar Danışmanlık
Registration number with relevant authority	
Street/P.O. Box	Göztepe Mah. Avcı Sok.
Building	Nursaray Apt.No:1 D:22
City	Kadıköy Istanbul
State/Region	n.a.
Postcode	34720
Country	Turkey
Telephone	+90 216 3550968
Fax	+90 216 3327679
E-mail	cagla@ruzgardanismanlik.net
Website	www.ruzgardanismanlik.net

Contact person	
Title	Managing Consultant
Salutation	Mrs.
Last name	Balcı Eriş
Middle name	-
First name	Çağla
Department	Management
Mobile	-
Direct fax	+90 216 33327679
Direct tel.	+90 216 32176 77
Personal e-mail	cagla@ruzgardanismanlik.net

Appendix 2. Summary of post registration design changes

The registration date of PDD is 24/06/2011 and version was 4 with the dated 13/04/2012 for first crediting period. The project owner has applied to GS for design change on 15/03/2019. As compared to the initial design (4 gas motor turbine with a rated power of 4.8 MW), the SWDS is extended by further 4 turbines with a rated capacity of 1.2 MW each, summing up a to total installed capacity of 8.4 MW from 4.8 MW.

The initial estimation of annual electricity generation has been modified to be in line with the extended installed capacity. The value assumed for annual net electricity exports to the grid has been revised to 54,600 MWh and the resulting annual emission reductions is 69,957 CO_2 with the 8.4 MW install capacity. [82]

Information on the request	
Date of Submission:	04/04/2019
Date of GS feedback:	02/05/2019
Date of PP response-I round:	15/05/2019
Date of GS feedback-II round:	29/05/2019
Date of PP response-II round:	17/06/2019
Date of GS feedback-III round:	01/08/2019

[82] For detailed information, see section A.1 of GS4GG PDD (version 0.1, date 01/03/2019)

Appendix 3 : Set Sample List

SANTRAL ADI	YAKIT CİNSİ	İLAVE KURULU GÜÇ MWe	GEÇİCİ KABUL TARİHİ
MELİH JES		2	30/12/17
MAVİBAYRAK-1 BİYOK			28/12/17
CENAL TERMİK ENERJİ		6	27/12/17
ZİYARET HES			26/12/17
ÇAMLICA HES		2	23/12/17
ASLANCIK BARAJI VE H			22/12/17
SARPINCIK RES			22/12/17
KİĞI BARAJI VE HES		1	21/12/17
DATÇA RES			21/12/17
MERSİN RES			20/12/17
SANKO JES		1	20/12/17
HAMİTABAT DGKÇS		6	20/12/17
DEREBAŞI HES		5	15/12/17
DURUCASU HES			15/12/17
KÜREKDAĞI RES			08/12/17
MERSİN RES		1	08/12/17
RENOE ACIPAYAM GES		4	08/12/17
KUYUCAK JES			07/12/17
HATAY GÖKÇEGÖZ ÇÖI BİY		2	02/12/17
KOZBEYLİ RES			01/12/17
DARICA II HES		3	01/12/17
KARTALDAĞI RES		1	24/11/17
ÇUMRA ŞEKER FABRİKA SANTRALİ LİN			24/11/17
GÖKDAĞ RES		6	24/11/17
MANASTIR-ESENKÖY R			24/11/17

KÜREKDAĞI RES			24/11/17	
TÜPRAŞ KIRIKKALE RA		2	23/11/17	
KANGAL RES			23/11/17	
DATÇA RES			17/11/17	
SOĞUKSU HES			10/11/17	
DARICA II HES		3	09/11/17	
ELMALI RES			09/11/17	
CENAL TERMİK ENERJİ		6	04/11/17	
KÜREKDAĞI RES			04/11/17	
MANASTIR-ESENKÖY R		1	03/11/17	
SİNCAN ÇADIRTEPE BİY BİY		8	03/11/17	
KAROVA RES		1	02/11/17	
İÇ ANADOLU DGKÇS		1	02/11/17	
GEBZE KOJENERASYON			01/11/17	
VESMEC KIRK-KAB 1 ÇÖ BİY			31/10/17	
TİRE BİYOGAZ ELEKTRİ BİYOK			31/10/17	
KALECİK HES		2	31/10/17	
GÖKDAĞ RES		1	31/10/17	
MALATYA ÇÖP GAZLAŞ		4	31/10/17	
DOĞAL ENERJİ BİYOKÜ BİYOK		(	31/10/17	
KARATAŞ 1 HES			31/10/17	
PİR ENERJİ ÜRETİM TES BİYOKÜTI		4	31/10/17	
DELİCE-1 HES			29/10/17	
KARTEPE BİYOKÜTLE-F ENERJİ SANTRALİ BİYOF			29/10/17	
YAPILCANLAR-2 BİYOG BİYOKÜT		1	28/10/17	
HAMZABEYLİ RES			28/10/17	
AFYON-I BİYOGAZ SAN BİYOKÜ			28/10/17	
SANKO JES			27/10/17	
ŞAVŞAT HES			27/10/17	
GERİŞ RES		1	27/10/17	

KANGAL RES		1	27/10/17	
KUYUCAK JES		1	27/10/17	
EGE II-III-IV HES		3	26/10/17	
MAS 1 YENİLENEBİLİR I BİY		1	25/10/17	
KAYADİBİ HES		1	23/10/17	
MAVİBAYRAK-1 BİYOK			21/10/17	
DEREKÖY HES			20/10/17	
KAZAN DOĞAL GAZ KO		1	19/10/17	
KİPAŞ KAĞIT BİYOKÜTI			19/10/17	
ÇORUM-MECİTÖZÜ BES BİYOKÜ			17/10/17	
KÜREKDAĞI RES			14/10/17	
MANASTIR-ESENKÖY R		1	13/10/17	
KORUMA KLOR ALKALİ SANTRALİ		3	13/10/17	
KAROVA RES		1	13/10/17	
KARTALDAĞI RES		1	13/10/17	
GREENECO JES-3		1	13/10/17	
RENOE ACIPAYAM GES			13/10/17	
PINARBAŞI KOJENERAS			13/10/17	
ITC ANTALYA BİYOKÜT BİY			13/10/17	
NİSA BİYOKÜTLE ELEK BİYO		5	09/10/17	
ÇAY REGÜLATÖRÜ VE I		1	06/10/17	
KANGAL RES		1	06/10/17	
KUMRULAR BİYOGAZ T BİYOK		4	05/10/17	
HAMİTABAT DGKÇS		2	28/09/17	
KONAKPINAR RES			28/09/17	
KARAÇAYIR RES			27/09/17	
KANGAL RES		2	22/09/17	
KAYADÜZÜ RES			21/09/17	
SOĞUKSU HES			17/09/17	
KARTALDAĞI RES		1	15/09/17	
KOS ENERJİ SANTRALİ			15/09/17	

ITC ANTALYA BİYOKÜT BİY		1	11/09/17	
MARATON HES			09/09/17	
KAYADÜZÜ RES		2	09/09/17	
KİLLİK RES		1	08/09/17	
YAKINCA REGÜLATÖRÜ		7	08/09/17	
KUYUCAK RES			25/08/17	
ARSLANBEY-OSB İZMİT		4	25/08/17	
DEVECİKONAĞI BARAJI		5	24/08/17	
ACWA POWER KIRIKKA		3	24/08/17	
EFE-6 JES		2	20/08/17	
KARAMENDERES HES			18/08/17	
KIZILDERE-3 JES		9	18/08/17	
KAZAN DOĞAL GAZ KO		2	18/08/17	
AFJES			17/08/17	
HAMİTABAT DGKÇS		3	16/08/17	
ABATEKS TEKSTİL DOĞ TESİSİ			14/08/17	
SULTANHİSAR JES			11/08/17	
EBRU REG. VE HES		1	11/08/17	
BİNATOM GEDİZ ELEKT			04/08/17	
KİLLİK RES		1	04/08/17	
PETKİM RES		4	27/07/17	
KUYUCAK RES			27/07/17	
TRABZON RİZE ÇÖP GAZ BİY		1	26/07/17	
KİLLİK RES		2	21/07/17	
ALBE-I BİYOGAZ SANTI BİYOK		1	17/07/17	
İSKENDERUN DEMİR VE ÇELİK TERMİK KUVVET SANTRALİ	FO/KG/YFG	23,646	15/07/17	
FATMA RES		1	14/07/17	
DİLOVASI ÇÖP BİYOGAZ BİY		1	13/07/17	
ÇAĞLAYAN REGÜLATÖ		1	07/07/17	
BARBAROS RES			31/07/17	
SARPINCIK RES			22/06/17	
HAMİTABAT DGKÇS		2	16/06/17	
KARGI BARAJI VE HES		4	15/06/17	

ÇARDAKLI REGÜLATÖF		1	15/06/17	
GENERJİ HES		4	06/06/17	
MASPO JEOTERMAL EN		1	03/06/17	
ÇALIKOBASI HES			02/06/17	
DİZAYN TEKNİK ÇORLU SANTRALİ		2	01/06/17	
SUSURLUK RES		1	30/05/17	
BERGRES RES		4	26/05/17	
KARGI BARAJI VE HES			18/05/17	
AİRRES-4 RES			18/05/17	
ACWA POWER KIRIKKA		2	17/05/17	
YALOVA RES		1	12/05/17	
TİRE RES		2	12/05/17	
SEYDİOĞLU REGÜLATÖ			09/05/17	
HAMİTABAT DGKÇS		3	05/05/17	
AİRRES-4 RES		1	05/05/17	
ÖDEMİŞ RES			04/05/17	
ÇAYIRHAN SODYUM SÜ KOJENERASYON PROJE			28/04/17	
ACWA POWER KIRIKKA		2	28/04/17	
BERGRES RES		2	20/04/17	
KARGI BARAJI VE HES		4	20/04/17	
ÇAYHAN 2 HES		6	14/04/17	
AREL ENERJİ MANAVGA BİY			14/04/17	
ÖDEMİŞ RES		1	13/04/17	
MUŞ-DOĞAN REGÜLAT			31/03/17	
UMURLAR RES			31/03/17	
FATMA RES		1	31/03/17	
DEMİR REGÜLATÖRÜ V			31/03/17	
ALAPLI KOJENERASYO			31/03/17	
SAMURLU RES			31/03/17	
DOĞANÇAY REGÜLATÖ		6	31/03/17	
ETİ KROM PROSES ISISI			31/03/17	
GÜNDOĞDU RES			29/03/17	
SULTANHİSAR JES			29/03/17	
PETKİM RES		2	25/03/17	
KARTALDAĞI RES		9	24/03/17	

GEMCİLER KOJENERAS			24/03/17	
GÜLLE ENTEGRE TEKST DAN. SAN. VE TİC. A.Ş. Ü			24/03/17	
ÖZMEN-1 JES			24/03/17	
AYBİGE REGÜLATÖRÜ			23/03/17	
ABS ALÇI YENİCE OTOP			17/03/17	
KARACABEY RES			16/03/17	
TOPÇAM HES		4	15/03/17	
DEREBAŞI HES		5	10/03/17	
UMURLAR RES		1	05/03/17	
KARTALDAĞI RES		6	03/03/17	
FATMA RES		1	03/03/17	
ÇAYALTI REGÜLATÖRÜ			03/03/17	
İSKENDERUN ÇÖP GAZ BİY		1	24/02/17	
ÖZMEN-1 JES		1	24/02/17	
KIRKAĞAÇ RES		1	24/02/17	
DELTA TERMİK KOMBİN			24/02/17	
YAHYALI RES			23/02/17	
KARACABEY-2 BİYOGA		2	23/02/17	
GÜNEŞ HES		4	21/02/17	
KARGI REGÜLATÖRÜ V			20/02/17	
TEPE RES			17/02/17	
AİRRES-4 RES		4	17/02/17	
DİNAR RES			16/02/17	
KMK PAPER KÜTAHYA KOJENERASYON SANTR		8	11/02/17	
KASIMLAR BARAJI VE H		7	11/02/17	
BALABANLI RES			10/02/17	
MARAŞ BİYOKÜTLE TES BİY			03/02/17	
BARBAROS RES			03/02/17	
ÇEŞME RES			03/02/17	
ANKAMALL AVM TRİJE		6	02/02/17	
ALES DOĞAL GAZ KOM			27/01/17	
AYYILDIZ RES		1	27/01/17	

DİNAR RES			27/01/17	
KIRKAĞAÇ RES		1	27/01/17	
ÇAYALTI REGÜLATÖRÜ			20/01/17	
BUPİLİÇ SANTRALİ			20/01/17	
UZUNDERE II REGÜLAT III HES)		5	13/01/17	
KARDEMİR TERMİK-KO		5	06/01/17	
YUMRUTEPE REGÜLAT(		5	06/01/17	
KARADERE RES			06/01/17	
SARPINCIK RES	RES	6.90	31/12/16	
KUBİLAY JES	JEOTERMAL	23.00	31/12/16	
DİNAR RES	RES	7.432	30/12/16	
ALİAĞA RES	RES	9.60	30/12/16	
ÇATALCA RES	RES	16.50	29/12/16	
GÖKTAŞ HES (GÖKTAŞ-1 HES)	HES	122.20	29/12/16	
ÇİĞDEM REG. VE HES (ÇİĞDEM 3 HES)	HES	4.80	29/12/16	
OVARES RES	RES	0.00	28/12/16	
SAMATLAR REGÜLATÖRÜ VE HES	HES	5.783	27/12/16	
YAHYALI RES	RES	23.10	24/12/16	
KIRKAĞAÇ RES	RES	17.100	23/12/16	
FATMA RES	RES	11.200	23/12/16	
MELİKOM REGÜLATÖRÜ VE HES	HES	6.750	23/12/16	
MEHMETHAN JES	JEOTERMAL	22.80	22/12/16	
TOPÇAM HES	HES	20.450	21/12/16	

KEBAN DERESİ HES	HES	0.325	18/12/16
KELTEPE RES	RES	9.20	18/12/16
AKNİŞASTA TERMİK KOJENERASYON SANTRALİ	DG	2.30	17/12/16
KURTEKS ÜRETİM TESİSİ	DG	2.00	16/12/16
SOMA RES	RES	9.00	16/12/16
OMMER OTEL TRİJENERASYON TESİSİ	DG	1.286	16/12/16
ÇATALCA RES	RES	16.50	16/12/16
YALOVA RES	RES	10.50	15/12/16
SAYALAR RES	RES	3.00	15/12/16
ERAK GİYİM KOJENERASYON SANTRALİ	DG	-0.165	15/12/16
SARPINCIK RES	RES	11.50	09/12/16
BANDIRMA-3 RES	RES	7.20	09/12/16
KOCAELİ ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1.415	09/12/16
SEYİTALİ RES	RES	4.00	08/12/16
URLA RES	RES	7.50	08/12/16
FATMA RES	RES	16.80	08/12/16
BALIKLI I-II-III HES	HES	3.237	07/12/16
YAHYALI RES	RES	23.10	07/12/16
KARACABEY RES	RES	10.00	07/12/16
KARADAĞ RES	RES	13.542	07/12/16
SENKRON EFELER BİYOGAZ SANTRALİ	BİYOKÜTLE	1.20	07/12/16
ZELİHA RES	RES	9.00	07/12/16

SUSURLUK RES	RES	0.000	06/12/16
DİNAR RES	RES	31.586	06/12/16
İNCESU RES	RES	14.00	06/12/16
SEFERİHİSAR RES	RES	9.00	06/12/16
KINIK RES	RES	48.00	05/12/16
MAZI I RES	RES	17.00	05/12/16
MEŞELİ HES	HES	3.10	08/11/16
EDİNCİK RES	RES	21.00	06/11/16
FUATRES RES	RES	10.20	05/11/16
SOMA RES	RES	21.00	05/11/16
KOZBÜKÜ HES	HES	60.810	05/11/16
ELMALI RES	RES	18.00	05/11/16
KONAKPINAR RES	RES	5.70	04/11/16
YAHYALI RES	RES	19.80	04/11/16
ERİK REGÜLATÖRÜ VE HES	HES	9.012	04/11/16
URLA RES	RES	5.00	04/11/16
KUBİLAY JES	JEOTERMAL	1.00	31/10/16
MEHMETHAN JES	JEOTERMAL	2.00	31/10/16
AHMETLİ HES	HES	11.640	31/10/16
ATLAS İNŞAAT OSMANİYE ÇÖP GAZI ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	3.120	31/10/16
KEN 3 JES	JEOTERMAL	9.8	31/10/16
SULTANHİSAR JES	JEOTERMAL	1.10	31/10/16

YUMRUTEPE REGÜLATÖRÜ VE HES	HES	9.958	31/10/16
DEREİÇİ HES	HES	6.770	30/10/16
SARPINCIK RES	RES	4.60	30/10/16
HALK ENERJİ ERZURUM GES	GES	4.90	30/10/16
MELİKOM REGÜLATÖRÜ VE HES	HES	0.85	29/10/16
UMURLU-2 JES	JEOTERMAL	12.00	28/10/16
KARGI REGÜLATÖRÜ VE HES	HES	0.97	28/10/16
KIRKAĞAÇ RES	RES	5.70	28/10/16
KASIMLAR BARAJI VE HES	HES	25.00	28/10/16
MUTLULAR BES	BİYOKÜTLE (ORMAN ATIĞI)	30.00	28/10/16
MALATYA-1 ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.20	28/10/16
HATAY GÖKÇEGÖZ ÇÖP SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	4.239	28/10/16
MEŞELİ HES	HES	3.10	25/10/16
KILCAN HES	HES	2.39	22/10/16
MAS 1 YENİLENEBİLİR ENERJİ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	0.835	22/10/16
ZEUS BİYOKÜTLE ENERJİSİNE DAYALI ELK. ÜRT. TESİSİ	BİYOKÜTLE	12.00	22/10/16
SEFERİHİSAR RES	RES	3.00	22/10/16
MARAŞ BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.20	21/10/16
FATMA RES	RES	5.60	21/10/16
GÜVERCİN REG. VE HES	HES	16.372	21/10/16
AFYONKARAHİSAR SANDIKLI BİYOKÜTLE ÜRETİM TESİSİ	BİYOKÜTLE	1.40	21/10/16
ERİK REGÜLATÖRÜ VE HES	HES	6.010	21/10/16

KARACABEY RES	RES	15.00	21/10/16
URLA RES	RES	2.50	20/10/16
NAZAR ÜRETİM TESİSİ	DG	4.50	15/10/16
BURSA ÇİMENTO KOJENERASYON TESİSİ	ATIK ISI	9.00	14/10/16
TİRE BİYOGAZ TESİSİ	BİYOKÜTLE	4.268	14/10/16
SOLENTEGRE GES	GES	8.00	14/10/16
OKKAYASI REG. VE ŞEHİTLİK HES	HES	22.708	13/10/16
İZMİT RAFİNERİ TERMİK-KOJENERASYON	DG/FO	35.00	08/10/16
NAMNAM HES	HES	3.720	07/10/16
BANDIRMA-3 RES	RES	9.60	07/10/16
KARABEL RES	RES	3.00	06/10/16
KUZEY I-II REG. VE HES	HES	5.55	06/10/16
TÜFEKÇİKONAĞI HES	HES	5.18	04/10/16
AKYURT RES	RES	4.40	02/10/16
AREL YENİLENEBİLİR ENERJİ ISPARTA BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2.826	01/10/16
BOZYAKA RES	RES	2.40	01/10/16
KARAÇAYIR RES	RES	1.60	01/10/16
ALAŞEHİR JES 2	JEOTERMAL	24.000	01/10/16
GREENECO JES	JEOTERMAL	12.800	30/09/16
OVARES RES	RES	3.00	29/09/16
KONAKPINAR RES	RES	6.30	29/09/16
YAHYALI RES	RES	13.20	24/09/16

KANDİL REG. VE HES	HES	6.192	23/09/16
ELMALI RES	RES	9.00	23/09/16
SİVAS ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.41	22/09/16
BALKODU II HES	HES	6.492	10/09/16
DEMİRCİLİ RES	RES	10.00	09/09/16
AKYURT RES	RES	8.40	09/09/16
ÜNDOĞDU RES	RES	6.750	08/09/16
OVARES RES	RES	8.00	08/09/16
ITC-KA ÇARŞAMBA ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.415	08/0G9/16
ATİLLA REGÜLATÖRÜ VE HES	HES	10.43	08/09/16
KARAÇAYIR RES	RES	8.40	08/09/16
BALIKLI I-II-III HES	HES	6.55	02/09/16
KOZBÜKÜ HES	HES	20.27	02/09/16
ALİAĞA RES	RES	6.00	02/09/16
ÇARIKLI HES	HES	8.96	02/09/16
DEMİRCİLİ RES	RES	10.00	26/08/16
DEMİRCİLER RES	RES	14.75	26/08/16
OVARES RES	RES	4.00	26/08/16
SARITEPE RES	RES	5.000	25/08/16
TERMİK-KOJENERASYON SANTRALİ	DG	2.022	19/08/16
ALİAĞA RES	RES	18.00	12/08/16
YALOVA RES	RES	12.00	12/08/16

ZONGULDAK EREN ENERJİ ELEKTRİK ÜR. A.Ş. ÜRETİM TESİSİ (ZETES III)	YERLİ/İTHAL TAŞKÖMÜRÜ VEYA LİNYİT	700.00	11/08/16
GEYCEK RES	RES	18.00	05/08/16
BOREAS I ENEZ RES	RES	2.50	31/07/16
KARADAĞ RES	RES	2.70833	30/07/16
BEREKETLİ RES	RES	30.00	29/07/16
DEMİR REGÜLATÖRÜ VE HES	HES	0.705	29/07/16
DEMİRCİLİ RES	RES	10.00	29/07/16
AFYON-I BİYOGAZ SANTRALİ	BİYOKÜTLE (HAYVANSAL ATIK)	1.20	29/07/16
ZİNCİRLİ RES	RES	2.40	24/07/16
DEMİRCİLER RES	RES	8.55	22/07/16
ULUBORLU RES	RES	19.992	22/07/16
SARITEPE RES	RES	10.00	22/07/16
EBRU REG. VE HES	HES	15.310	22/07/16
İNTEPE RES	RES	2.30	21/07/16
İÇ ANADOLU DGKÇS	DG	280.000	21/07/16
AMASYA RES	RES	15.000	15/07/16
GEP KARAMAN OSB KOJENERASYON SANTRALİ	DG	4.200	15/07/16
ZELİHA RES	RES	6.00	04/07/16
ALİAĞA RES	RES	6.00	01/08/16
DEMİRCİLİ RES	RES	10.00	01/08/16
DORA-4 JES	JEOTERMAL	17.00	31/07/16
GEBZE KOJENERASYON TESİSİ	DG	11.85	31/07/16

ZONGULDAK EREN ENERJİ ELEKTRİK ÜR. A.Ş. ÜRETİM TESİSİ (ZETES III)	YERLİ/İTHAL TAŞKÖMÜRÜ VEYA LİNYİT	700.00	31/07/16
YANIKKÖPRÜ HES	HES	9.20	31/07/16
İÇ ANADOLU DGKÇS	DG	280.00	29/06/16
ÇERÇİKAYA RES	RES	4.00	24/06/16
ABALIOĞLU KOJENERASYON TESİSİ	DG	6.066	24/06/16
ZİNCİRLİ RES	RES	9.60	24/06/16
SEFERİHİSAR RES	RES	2.00	24/06/16
ÇAYALTI REGÜLATÖRÜ VE HES (2. SANTRAL)	HES	2.16	24/06/16
POYRAZ RES	RES	21.00	24/06/16
MORDOĞAN RES	RES	13.80	24/06/16
İÇ ANADOLU DGKÇS	DG	280.00	23/06/16
DEMİR REGÜLATÖRÜ VE HES	HES	1.895	18/06/16
AMASYA RES	RES	12.00	17/06/16
BOZYAKA RES	RES	0.50	17/06/16
POYRAZ RES	RES	12.00	17/06/16
ODAYERİ BİYOGAZ	BİYOKÜTLE (ÇÖP GAZI)	5.660	17/06/16
SARITEPE RES	RES	35.00	17/06/16
TAHA DGKÇS	DG	68.00	10/06/16
ULUBORLU RES	RES	16.67	10/06/16
ÇATALTEPE RES	RES	2.50	10/06/16
TERMİK (KOJENERASYON) SANTRALİ	İTHAL KÖMÜR	9.70	09/06/16
BOZYAKA RES	RES	4.80	09/06/16

GARZAN BARAJI VE HES	HES	1.34	03/06/16
ALAÇATI RES	RES	16.00	03/06/16
SEFERİHİSAR RES	RES	12.00	03/06/16
YALOVA RES	RES	13.50	03/06/16
AMASYA RES	RES	15.00	30/05/16
POYRAZ RES	RES	9.00	27/05/16
İNTEPE RES	RES	13.80	27/05/16
TEKAS ELEKTRİK ÜRETİM SANTRALİ	DG	0.80	27/05/16
URLA RES	RES	13.00	27/05/16
GERES RES	RES	2.500	27/05/16
PAMUKÖREN JES 3	JEOTERMAL	22.51	20/05/16
ENERJEO KEMALİYE SANTRALİ	JEOTERMAL	24.90	20/05/16
ÇATALTEPE RES	RES	7.50	20/05/16
TAHA DGKÇS	DG	68.00	20/05/16
AKPINAR HES	HES	9.010	19/05/16
MARTEKS ÜRETİM TESİSİ	DG	4.300	14/05/16
KURTKAYASI RES	RES	9.000	13/05/16
KANİJE RES	RES	0.000	13/05/16
İNEGÖL-CERRAH HES	HES	1.181	13/05/16
İKİLER HES	HES	6.120	13/05/16
DOĞANŞAR REG. VE HES	HES	6.770	13/05/16
BANDIRMA II DGKÇS	DG	205.600	13/05/16

İNTEPE RES	RES	9.200	06/05/16
GERMİYAN RES	RES	10.800	06/05/16
ULUBORLU RES	RES	15.003	06/05/16
VANAZİT HES	HES	3.089	06/05/16
ŞENBÜK RES	RES	9.160	06/05/16
HAYMEANA I-II HES (HAYMEANA I HES)	HES	3.200	05/05/16
ÇAYALTI REGÜLATÖRÜ VE HES (2. SANTRAL)	HES	3.120	29/04/16
UMUTLU HES	HES	6.780	29/04/16
KANİJE RES	RES	12.800	22/04/16
PAŞALI REGÜLATÖRÜ VE HES	HES	3.500	22/04/16
TAV EGE ADNAN MENDERES HAVALİMANI OTOPRODÜKTÖR TESİSİ	DG	9.780	18/04/16
ÇAY REGÜLATÖRÜ VE HES	HES	4.143	15/04/16
KARACABEY-2 BİYOGAZ TESİSİ	BİYOKÜTLE	1.067	15/04/16
KURTKAYASI RES	RES	14.400	15/04/16
KOJENERASYON TESİSİ	DG	4.300	14/04/16
ARISU REGÜLATÖRÜ VE HES	HES	0.863	14/04/16
BANDIRMA II DGKÇS	DG	401.600	14/04/16
UMUTLU HES	HES	13.560	08/04/16
ÇANDIR-1 REG. VE HES	HES	1.710	08/04/16
TOROS TARIM SAMSUN SANTRALİ	ATIK ISI	30.600	08/04/16
YAMANLI II HES (1. KADEME ÜNİTE 3)	HES	11.781	07/04/16
KANİJE RES	RES	19.200	01/04/16

ULUBORLU RES	RES	8.335	01/04/16
ARIKAN ÜRETİM TESİSİ	DG	9.000	01/04/16
GREENECO JES	JEOTERMAL	12.800	31/03/16
YAYLAKÖY RES	RES	15.000	25/03/16
BAYRA HES	HES	9.046	25/03/16
GÖKBÖĞET HES	HES	3.176	25/03/16
TUFANBEYLİ ÜRETİM TESİSİ	LİNYİT	150.000	25/03/16
AKSARAY OSB BİYOGAZ SANTRALİ	BİYOKÜTLE	3.201	18/03/16
ANI BİSKÜVİ KOJENERASYON SANTRALİ	DG	1.200	11/03/16
KURTKAYASI RES	RES	12.000	11/03/16
KANİJE RES	RES	12.800	04/03/16
SUSUZ REGÜLATÖRÜ VE HES	HES	7.100	03/03/16
ITC-KA BİYOKÜTLE GAZLAŞTIRMA TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	5.425	03/03/16
YUNUS EMRE TERMİK SANTRALİ	LİNYİT	145.000	25/02/16
ÇİLEHANE HES	HES	5.664	19/02/16
AKBÜK II RES	RES	20.000	12/02/16
YAMANLI II HES (1. KADEME ÜNİTE 1 VE 2)	HES	47.628	11/02/16
TERMİK-KOJENERASYON SANTRALİ	DG	4.300	06/02/16
ARTVİN BARAJI VE HES	HES	166.090	03/02/16
KURTKAYASI RES	RES	9.600	29/01/16
BOLU-GÖYNÜK ENERJİ SANTRALİ	LİNYİT	135.000	29/01/16
YAHYALI RES	RES	16.800	29/01/16

KÖROĞLU BARAJI VE KOTANLI HES	HES	50.000	29/01/2016
İÇDAŞ BİGA RES	RES	8.800	22/01/16
BEYPİ A.Ş. BOLU YEM FABRİKASI KOJEN. SAN.	DG	4.300	22/01/16
ALAŞEHİR JES	JEOTERMAL	11.270	15/01/2016
TARABYA OTELİ KOJENERASYON	DG	1.200	01/01/2016
İÇDAŞ BİGA RES	RES	12.800	31/12/15
UMURLU JES	JEOTERMAL	9.720	30/12/15
ITC-KA ELAZIĞ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2.830	30/12/15
HANAK HES	HES	5.139	29/12/15
ALPERTEKS SANTRALİ	DG	4.290	25/12/15
KALEKÖY HES	HES	2.740	25/12/15
BANDIRMA RES	RES	15.000	25/12/15
FUATRES RES	RES	16.500	25/12/15
TUĞRA REG. VE HES	HES	2.120	25/12/15
YAHYALI RES	RES	18.900	25/12/15
SİLOPİ TERMİK SANTRALİ	YERLİ ASFALTİT	135.000	22/12/15
BAĞBAŞI REG. VE HES	HES	13.600	19/12/15
İSKENDERUN ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2.830	18/12/15
ATAKÖY HES	HES	5.000	17/12/15
ŞANLIURFA BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3.120	17/12/15
SÖKE RES	RES	45.000	14/12/15
TÜPRAŞ İZMİT RAFİNERİSİ TERMİK KOJENERASYON SANTRALİ	DG	41.280	11/12/15

ARTVİN BARAJI VE HES	HES	166.090	10/12/15
HASANLAR HES	HES	0.000	09/12/15
SARES RES	RES	2.750	04/12/15
TUFANBEYLİ ÜRETİM TESİSİ	LİNYİT	300.000	02/12/15
İÇDAŞ BİGA RES	RES	22.400	02/12/15
FLORANCE NIGHTINGALE HASTANESİ KOJENERASYON SANTRALİ	DG	0.800	02/12/15
İNCESU RES	RES	3.200	26/11/15
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	4.240	26/11/15
KANGAL RES	RES	14.000	26/11/15
YAHYALI RES	RES	7.200	20/11/15
ŞANLIURFA OSB ENERJİ SANTRALİ	DG	18.310	18/11/15
KOÇAK REG. VE HES	HES	1.344	17/11/15
KANDİL REG. VE HES	HES	6.192	16/11/15
OSB ÜRETİM SANTRALİ	DG	21.750	13/11/15
SÜLOĞLU RES	RES	24.000	13/11/15
KANİJE RES	RES	3.200	13/11/15
AKBÜK RES	RES	4.800	12/11/15
KIYIKÖY RES	RES	11.000	12/11/15
ASLAN ÇİMENTO ATIK ISIDAN ENERJİ ÜRETİM TESİSİ	ATIK ISI	7.500	06/11/15
DÜZOVA RES	RES	1.500	06/11/15
TEPEKIŞLA BARAJI VE HES	HES	32.993	05/11/15
ÇİLEHANE HES	HES	1.536	02/11/15

ŞANLIURFA BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3.120	31/10/15
UMURLU JES	JEOTERMAL	2.280	31/10/15
KANGAL RES	RES	20.000	30/10/15
PAMUKÖREN JES 2	JEOTERMAL	22.510	29/10/15
HIZIR REGÜLATÖRÜ VE HES	HES	1.955	29/10/15
KANDİL REG. VE HES	HES	2.616	29/10/15
BAĞARASI RES	RES	24.400	29/10/15
HAYMEANA I-II HES (HAYMEANA I HES)	HES	3.200	29/10/15
KARAMAN BİYOGAZ TESİSİ	BİYOKÜTLE	1.414	29/10/15
ÇAY REGÜLATÖRÜ VE HES	HES	4.143	28/10/15
OVACIK BİYOGAZ ENERJİ SANTRALİ	BİYOKÜTLE	4.800	28/10/15
FUATRES RES	RES	3.300	28/10/15
KANİJE RES	RES	3.200	28/10/15
PAKMİL BİYOKÜTLE SANTRALİ	BİYOKÜTLE	1.763	27/10/15
AKBÜK RES	RES	2.400	27/10/15
KARAKAYA REG. VE HES	HES	9.010	26/10/15
KARADUVAR ATIKSU ARITMA TESİSİ BİYOGAZ SANTRALİ	BİYOKÜTLE	1.900	26/10/15
TRABZON RİZE ÇÖP GAZI SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	2.826	25/10/15
PAŞALI REGÜLATÖRÜ VE HES	HES	3.500	25/10/15
BABADERE JES	JEOTERMAL	8.000	24/10/15
DİLOVASI ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1.063	24/10/15
SERHAT REGÜLATÖRÜ VE HES	HES	8.840	24/10/15

SİVAS BİYOKÜTLEDEN (ÇÖP GAZI) ELEKTRİK ENERJİSİ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.410	24/10/15
SEBİL REG. VE HES	HES	22.636	24/10/15
POYRAZGÖLÜ RES	RES	14.000	24/10/15
HİLAL-2 RES	RES	7.000	23/10/15
KIYIKÖY RES	RES	12.000	23/10/15
YAHYALI RES	RES	9.600	23/10/15
ATAKÖY HES	HES	2.500	22/10/15
ADA 2 RES	RES	3.200	21/10/15
GÜNAYŞE REG. VE HES	HES	0.800	19/10/15
ANGUTLU HES	HES	14.400	19/10/15
DEMİRCİ REG. VE HES	HES	12.600	17/10/15
AKBÜK RES	RES	2.400	16/10/15
İÇDAŞ BİGA RES	RES	16.000	16/10/15
EGE RES	RES	7.000	16/10/15
ARPACIK REGÜLATÖRÜ VE HES	HES	3.770	15/10/15
ÇİLEKLİTEPE HES	HES	23.625	15/10/15
SÜLOĞLU RES	RES	18.000	11/10/15
TERMİK-KOJENERASYON SANTRALİ	DG	4.000	10/10/15
ADARES RES	RES	10.000	10/10/15
GERES RES	RES	0.000	03/10/15
KÖPRÜBAŞI HES	HES	7.949	02/10/15
GÖKTAŞ HES (GÖKTAŞ-2 HES)	HES	153.400	02/10/15

BAĞARASI RES	RES	21.600	29/09/15
POYRAZGÖLÜ RES	RES	16.000	18/09/15
KARACABEY-2 BİYOGAZ TESİSİ	BİYOKÜTLE	1.067	18/09/15
SÜLOĞLU RES	RES	18.000	18/09/15
HANAK HES	HES	3.690	17/09/15
KEN KİPAŞ JES	JEOTERMAL	24.000	17/09/15
KIYIKÖY RES	RES	9.000	17/09/15
İZNİK DEREKÖY HES	HES	0.715	15/09/15
DİLEK RES	RES	9.600	15/09/15
KUYUCAK RES	RES	15.100	12/09/15
ALAŞEHİR JES	JEOTERMAL	33.730	12/09/15
ORİON ÜRETİM SANTRALİ	DG	1.200	11/09/15
TERMİK-KOJENERASYON SANTRALİ	DG	2.000	10/09/15
TERMİK-KOJENERASYON SANTRALİ	DG	1.200	09/09/15
TEPEKIŞLA BARAJI VE HES	HES	32.993	04/09/15
EĞERCİ REGÜLATÖRÜ VE HES	HES	1.3436	03/09/15
AYVALI (ÇORUH) BARAJI VE HES	HES	121.654	03/09/15
TERMİK-KOJENERASYON SANTRALİ	DG	4.044	02/09/15
KOCADAĞ 2 RES	RES	2.500	02/09/15
DİLEK RES	RES	7.200	27/08/15
SEKİYAKA II HES	HES	1.090	27/08/15
EFELER JES	JEOTERMAL	47.400	26/08/15

SUÇATI-I HES	HES	8.316	20/08/15
TEPEKIŞLA BARAJI VE HES	HES	3.641	13/08/15
KIYIKÖY RES	RES	12.000	13/08/15
PAMUKÖREN JES	JEOTERMAL	16.006	07/08/15
AKÇAKOYUN HES	HES	6.790	06/08/15
ZİYARET RES	RES	1.000	04/08/15
MUT RES	RES	0.500	31/07/15
AKINCI (KAYABEYİ) HES	HES	10.175	30/07/15
GÖKSU HES	HES	17.177	25/07/15
DİLEK RES	RES	7.200	24/07/15
PAMUKÖREN JES	JEOTERMAL	6.504	21/07/15
BOLU-GÖYNÜK ENERJİ SANTRALİ	LİNYİT	135.000	15/07/15
DOĞU HES	HES	5.985	08/07/15
KARAKUZ BARAJI VE HES	HES	76.000	08/07/15
MANAHOZ HES	HES	1.120	05/07/15
TELLİ 1-2 HES	HES	0.000	03/07/15
EFELER JES	JEOTERMAL	22.500	03/07/15
AVANOS REGÜLATÖRÜ VE CEMEL HES	HES	6.000	03/07/15
ALÇE HES	HES	5.140	02/07/15
SOMA RES	RES	8.000	26/06/15
SÖĞÜTLÜ HES	HES	9.160	26/06/15
MANAHOZ HES	HES	5.960	25/06/15

ÖDEMİŞ RES	RES	8.000	25/06/15
ÇEŞME RES	RES	7.000	20/06/15
MUT RES	RES	13.200	19/06/15
TOSUNLAR-1 JES	JEOTERMAL	3.807	12/06/15
ÇAYKARA HES	HES	10.560	11/06/15
BOLU ÇİMENTO ATIK ISIDAN ENERJİ ÜRETME TESİSİ	ATIK ISI	6.000	05/06/15
MUT RES	RES	16.500	05/06/15
HAVVA HES	HES	4.780	04/06/15
ÖDEMİŞ RES	RES	12.000	29/05/15
EKOTEN TEKSTİL SAN. VE TİC. A.Ş. KOJEN. SANTRALİ	DG	0.008	29/05/15
SEBENOBA RES	RES	9.000	28/05/15
BEYHAN I BARAJI VE HES	HES	31.600	26/05/15
ANGUTLU 2 HES	HES	8.898	25/05/15
EDİNCİK RES	RES	26.400	23/05/15
KORU RES	RES	10.400	22/05/15
MUT RES	RES	19.800	22/05/15
POLATLI BES	BİYOKÜTLE	0.637	22/05/15
ÇEŞME RES	RES	9.000	22/05/15
GÜNEYYAKA HES	HES	6.630	21/05/15
SEMA REGÜLATÖRÜ VE HES	HES	17.000	21/05/15
KARGI (KIZILIRMAK) HES	HES	101.720	20/05/15
AKSARAY OSB BİYOGAZ SANTRALİ	BİYOKÜTLE	1.067	15/05/15

YALNIZARDIÇ HES	HES	0.530	08/05/15
KORU RES	RES	19.800	08/05/15
ORTAMANDIRA RES	RES	10.000	08/05/15
SİLOPİ TERMİK SANTRALİ	YERLİ ASFALTİT	135.000	08/05/15
ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	3.978	07/05/15
HARMANLIK RES	RES	10.400	06/05/15
KIZILÇAM REGÜLATÖRÜ VE HES	HES	1.320	05/05/15
AKINCI (KAYABEYİ) HES	HES	74.506	03/05/15
KİPAŞ KAĞIT SANAYİ İŞLETMELERİ A.Ş. TERMİK-KOJENERASYON SANTRALİ	KÖMÜR	7.600	01/05/15
YANBOLU HES	HES	6.21	30/04/15
DURKAR 1 TERMİK-KOJENERASYON SANTRALİ	DG	2.433	30/04/15
STS-1 HES	HES	11.243	30/04/15
YUNUSLAR HES	HES	7.960	28/04/15
HARMANLIK RES	RES	13.200	24/04/15
KORU RES	RES	19.800	22/04/15
BARAN REGÜLATÖRÜ VE HES (BARAN-I)	HES	8.865	17/04/15
BOREAS I ENEZ RES	RES	2.500	17/04/15
BEYHAN I BARAJI VE HES	HES	183.500	17/04/15
YANBOLU HES	HES	2.870	16/04/15
GARZAN BARAJI VE HES	HES	3.210	15/04/15
HARMANLIK RES	RES	26.400	11/04/15
İNCEBEL HES	HES	6.930	09/04/15

SOMA RES	RES	12.000	09/04/15
YALNIZARDIÇ HES	HES	15.930	08/04/15
SEYİTALİ RES	RES	2.000	07/04/15
BAĞIŞTAŞ I BARAJI VE HES	HES	89.540	03/04/15
ÇAKMAK REGÜLATÖRÜ VE HES	HES	8.630	03/04/15
ONUR REGÜLATÖRÜ VE HES	HES	19.568	02/04/15
BEYHAN I BARAJI VE HES	HES	183.500	29/03/15
ÇERÇİKAYA RES	RES	11.15795	20/03/15
SOMA RES	RES	18.000	20/03/15
SÜTLÜCE HES VE REGÜLATÖRÜ	HES	5.640	19/03/15
YALNIZARDIÇ HES	HES	15.930	19/03/15
ALAKÖPRÜ BARAJI VE HES	HES	28.890	18/03/15
PEMBELİK BARAJI VE HES	HES	63.670	13/03/15
KIYIKÖY RES	RES	3.000	13/03/15
MODERN ENERJİ TERMİK SANTRALİ	DG+ORMAN ÜRÜN.	27.600	12/03/15
BEYHAN I BARAJI VE HES	HES	183.500	12/03/15
SÖĞÜTLÜ HES	HES	9.160	12/03/15
ÇAKMAK REGÜLATÖRÜ VE HES	HES	18.750	10/03/15
EFELER JES	JEOTERMAL	22.500	06/03/15
BÜYÜKBAHÇE REGÜLATÖRÜ VE HES	HES	11.700	06/03/15
BANDIRMA RES	RES	0.600	27/02/15
TÜPRAŞ İZMİT RAFİNERİSİ TERMİK KOJENERASYON SANTRALI	DG	79.080	27/02/15

BAĞIŞTAŞ I BARAJI VE HES	HES	51.090	27/02/15
ÇERÇİKAYA RES	RES	13.94735	19/02/15
YAMANLI II HES	HES	11.222	19/02/15
PEMBELİK BARAJI VE HES	HES	63.670	18/02/15
SEBENOBA RES	RES	8.000	13/02/15
SİNCAN ÇADIRTEPE BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	5.664	13/02/15
MEREK REGÜLATÖRÜ VE HES	HES	9.180	12/02/15
DEMİRER KOJENERASYON TESİSİ	DG	2.476	11/02/15
PİTANE RES	RES	4.800	09/02/15
KADAHOR REGÜLATÖRÜ VE HES	HES	9.362	07/02/2015
SOMA RES	RES	6.000	07/02/2015
KOCADAĞ 2 RES	RES	7.500	06/02/2015
KÖPRÜYANI REGÜLATÖRÜ VE HES	HES	11.900	04/02/2015
YAMANLI II HES	HES	11.222	31/01/2015
ADIGÜZEL II HES	HES	30.09	24/01/2015
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	1.125	23/01/2015
MMK METALURJİ SAN. TİC. VE LİMAN İŞLETMECİLİĞİ A.Ş KOJENERASYON TESİSİ	DG	15.000	17/01/2015
HAYAT BİYOKÜTLE PROJESİ	BİYOKÜTLE	0.955	16/01/2015
ÇAYKARA HES	HES	15.360	16/01/2015
KARDEMİR KARABÜK DEMİR ÇELİK SAN. VE TİC. A.Ş. TERMİK-KOJENERASYON SANTRALI	KÖMÜR+DİĞER	15.000	10/01/2015
ÇERÇİKAYA RES	RES	27.8947	10/01/2015
BUCAKKIŞLA HES	HES	41.000	08/01/2015

PET CİPS RESİN VE KOJ. TESİSİ	DG	8.600	31/12/2014
M.KEMALPAŞA-SUUÇTU HES	HES	2.304	31/12/2014
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	13.075	31/12/2014
HAMZABEY HES	HES	8.820	31/12/2014
TERMİK KOJENERASYON SANTRALİ	LİNYİT	1.640	31/12/2014
TEKSMAK TERMİK KOJENERASYON SANTRALİ	DG	2.677	30/12/2014
YEŞİLKÖY REG. VE HES	HES	3.720	30/12/2014
GÜNAYDIN RES	RES	2.500	26/12/2014
YAZILI I-II-III HES	HES	6.620	25/12/2014
SOMA RES	RES	24.000	25/12/2014
SEBENOBA RES	RES	13.000	20/12/2014
GÜNAYDIN RES	RES	5.000	20/12/2014
ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	7.956	19/12/2014
ATLAS TERMİK SANTRALİ	İTHAL KÖMÜR	600.000	19/12/2014
BANDIRMA RES	RES	26.400	14/12/2014
ARAKLI 3 HES	HES	0.631	12/12/2014
ŞADILLI RES	RES	11.000	06/12/2014
CENGİZ 240MW DGKÇS	DG	208.670	05/12/2014
EREN HES	HES	35.186	04/12/2014
MURAT HES	HES	11.089	01/12/2014
BİLECİK DOĞALGAZ ÇEVRİM SANTRALİ	DG	13.050	28/11/2014
MENTAŞ HES	HES	9.600	28/11/2014

SOMA RES	RES	32.000	26/11/2014
KELTEPE RES	RES	0.000	21/11/2014
EKİNCİK HES	HES	7.520	20/11/2014
YAKINCA REGÜLATÖRÜ VE HES	HES	11.700	14/11/2014
YÜCE HES	HES	5.283	14/11/2014
PİRİNÇLİK HES	HES	21.315	14/11/2014
GÖNEN BİYOGAZ TESİSİ PROJESİ	BİYOKÜTLE	1.487	14/11/2014
ŞADILLI RES	RES	13.750	14/11/2014
ÜÇGEN HES	HES	3.388	07/11/2014
MERNİOS HALI KOJENERASYON SANTRALİ	DG	9.730	01/11/2014
BEYPAZARI BİYOGAZ TESİSİ BİYOKÜTLE PROJESİ	BİYOKÜTLE	0.7936	31/10/2014
CANAN TEKSTİL KOJENERASYON SANTRALI	DG	2.000	31/10/2014
GÖKBOYUN REGÜLATÖRÜ VE HES	HES	5.000	29/10/2014
AMASYA ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.200	29/10/2014
TUĞRA REGÜLATÖRÜ VE HES	HES	11.480	28/10/2014
ŞADILLI RES	RES	8.250	26/10/2014
TERMİK-KOJENERASYON SANTRALI	DG	15.000	25/10/2014
KOCABEY-2 BİYOGAZ SANTRALİ	BİYOKÜTLE	2.134	25/10/2014
AFYON BİYOGAZ ENERJİ SANTRALİ BİYOKÜTLE PROJESİ	BİYOKÜTLE	4.017	24/10/2014
TURKOL OTEL SANTRALİ (TERMİK KOJENERASYON)	DG	1.000	24/10/2014
ADANA DOĞU ATIKSU SANTRALİ	BİYOKÜTLE	0.800	24/10/2014
TUANA HES	HES	3.695	24/10/2014

ALBE-I BİYOGAZ SANTRALİ	BİYOKÜTLE	1.813	24/10/2014
POLATLI BES	BİYOKÜTLE	0.834	24/10/2014
CENGİZ 240MW DGKÇS	DG	401.330	22/10/2014
İNCESU RES	RES	10.000	22/10/2014
SİGMA SULUOVA BİYOGAZ TESİSİ	BİYOKÜTLE	1.000	20/10/2014
ZEKERE HES	HES	3.978	17/10/2014
BURDUR ŞEKER FABRİKASI ÜRETİM TESİSİ (TERMİK KOJENERASYON)	DG/FO/LİNYİ T	4.750	17/10/2014
KEREM JES	JEOTERMAL	24.000	16/10/2014
GÜRGEN REGÜLATÖRÜ VE HES	HES	2.360	15/10/2014
ALİAĞA RES	RES	2.400	10/10/2014
EFELER JES	JEOTERMAL	22.500	01/10/2014
PİRO REGÜLATÖRÜ VE HES	HES	4.060	01/10/2014
MODERN BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE	6.000	30/09/2014
UMURLAR RES	RES	10.000	30/09/2014
SAMSUN AVDAN BİYOGAZ TESİSİ BİYOKÜTLE PROJESİ	BİYOKÜTLE (ÇÖP GAZI)	2.400	27/09/2014
KOJEN	DG	1.189	26/09/2014
ALAŞEHİR JES	JEOTERMAL	24.000	25/09/2014
KAVAKLI RES	RES	13.700	25/09/2014
ASLANCIK HES	HES	46.500	19/09/2014
GARZAN HES	HES	5.420	19/09/2014
SİLİVRİ RES	RES	7.500	19/09/2014
DORUK HES	HES	28.278	19/09/2014

AYVASIL REGÜLATÖRÜ VE HES	HES	2.976	19/09/2014
KANGAL RES	RES	2.000	19/09/2014
SERAP HES	HES	28.960	19/09/2014
ALİAĞA RES	RES	7.200	12/09/2014
DOĞANÇAY HES	HES	20.160	12/09/2014
HAYAT KİMYA KOJENERASYON SANTRALİ	DG	15.040	12/09/2014
KAYSERİ KATI ATIK DEPONİ SAHASI ELEKTRİK ÜRETİM SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1.560	11/09/2014
ATİK RES	RES	2.000	09/09/2014
KANGAL RES	RES	42.000	05/09/2014
KORKMAZ RES	RES	14.000	04/09/2014
SİLİVRİ RES	RES	12.500	03/09/2014
DOĞANÇAY HES	HES	10.080	29/08/2014
KÖRFEZ ENERJİ SAN. VE TİC. A.Ş. TERMİK KOJENERASYON SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	2.830	29/08/2014
AK NİŞASTA SAN. VE TİC. A.Ş. KOJENERASYON SANTRALİ	DG	2.000	22/08/2014
DİNAR RES	RES	36.800	22/08/2014
KAVAKLI RES	RES	36.300	21/08/2014
SİLİVRİ RES	RES	25.000	20/08/2014
ALADEREÇAM HES	HES	7.350	19/08/2014
SAMURLU RES	RES	4.500	16/08/2014
KORKMAZ RES	RES	10.000	15/08/2014
GÖKRES-2 RES	RES	24.000	15/08/2014
TERMİK-AKIŞKAN YATAKLI KOJENERASYON SANTRALİ	LİNYİT	5.500	15/08/2014

KIYIKÖY RES	RES	24.000	15/08/2014
ŞENKÖY RES	RES	9.000	15/08/2014
GENERAL REGÜLATÖRÜ VE HES	HES	5.950	08/08/2014
ATLAS TERMİK SANTRALİ	İTHAL KÖMÜR	600.000	08/08/2014
ÇANTA RES	RES	12.500	24/07/2014
ÜÇGEN 2 REGÜLATÖRÜ VE HES	HES	10.319	17/07/2014
SARAY REGÜLATÖRÜ VE HES	HES	13.500	16/07/2014
PANER KOJENERASYON SANTRALİ	DG	2.800	16/07/2014
AKDERE HES	HES	7.480	12/07/2014
HASANBEYLİ RES	RES	7.500	11/07/2014
BALABANLI RES	RES	16.100	11/07/2014
AŞKALE ÇİMENTO TERMİK KOJENERASYON SANTRALİ	ATIK ISI	5.500	10/07/2014
KOÇLU HES	HES	36.260	10/07/2014
BEKİRLİ TERMİK SANTRALİ	İTHAL KÖMÜR	600.000	10/07/2014
KARADERE RES	RES	4.800	04/07/2014
UŞAK RES	RES	28.500	04/07/2014
ÇANTA RES	RES	20.000	28/06/2014
SUSURLUK RES	RES	15.000	28/06/2014
ALTINSU TEKSTİL KOJENERASYON TESİSİ	DG	1.189	27/06/2014
GÜNAYDIN RES	RES	2.500	27/06/2014
HASANBEYLİ RES	RES	7.500	26/06/2014
KARADERE RES	RES	11.200	21/06/2014

GÖKRES 2 RES	RES	11.000	20/06/2014
KÖROĞLU HES	HES	9.060	20/06/2014
BERKE REGÜLATÖRÜ VE HES	HES	3.127	20/06/2014
ITC AKSARAY ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1.415	17/06/2014
KAVŞAK BENDİ HES	HES	5.430	17/06/2014
BÜKOR II HES	HES	12.597	13/06/2014
SENTETİK-2 KOJENERASYON TESİSİ	DG	3.349	13/06/2014
GÖKBEL I-II HES	HES	4.282	13/06/2014
EDİNCİK BES	BİYOGAZ	2.126	12/06/2014
ARKUN BARAJI VE HES	HES	88.819	12/06/2014
TOKMADİN HES	HES	3.430	12/06/2014
SALMAN RES	RES	2.000	06/06/2014
ÇİNE HES	HES	46.600	06/06/2014
ERZİN DGKÇS	DG	319.820	05/06/2014
DORA 3 JES	JEOTERMAL	17.000	03/06/2014
ZİYARET RES	RES	10.000	31/05/2014
DERHAN TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	1.189	31/05/2014
ÇANTA RES	RES	15.000	31/05/2014
ARKUN BARAJI VE HES	HES	156.010	30/05/2014
SALMAN RES	RES	6.000	30/05/2014
HASANBEYLİ RES	RES	7.500	29/05/2014
GÜLLE TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	4.300	27/05/2014

ŞENBÜK RES	RES	13.940	25/05/2014
BALABANLI RES	RES	23.000	17/05/2014
UŞAK RES	RES	25.500	17/05/2014
ZALA REGÜLATÖRÜ VE HES	HES	5.422	16/05/2014
KİRAZLIK REGÜLATÖRÜ VE HES	HES	2.500	16/05/2014
SALMAN RES	RES	12.000	14/05/2014
TUANA HES	HES	3.695	13/05/2014
PROKOM PİROLİTİK YAĞ VE GAZ TAKITLI ELEKTRİK ÜRETİM TESİSİ	PİROLİTİK YAĞ	7.040	11/05/2014
GÜVEN GIDA TETMİK KOJENERASYON SANTRALİ	DG	2.006	10/05/2014
TONYA I-II HES	HES	2.500	09/05/2014
ASLANCIK HES	HES	12.800	09/05/2014

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