Gold Standard for the Global Goals

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

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

This document contains the following Sections

KEY PROJECT INFORMATION

Key Project Information

GS ID (s) of Project (s)	GS764[1]
Title of the project (s) covered by monitoring report	Bolu Landfill Gas to Energy Project, Turkey
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	12
Version number of the monitoring report	10
Completion date of the monitoring report	04/11/2024
Date of project design certification	12/08/2011
Date of Last Annual Report	15/10/2024
Monitoring period number	03
Duration of this monitoring period	03/11/2021 to 31/07/2023 (inclusive of both dates)
Project Representative	CEV Marmara Enerji Üretim San. ve Tic. Ltd. Şti.
Host Country	Turkey
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	AMS-I.D. "Grid Connected Renewable Electricity Generation" (Version 18.0) AMS III.G "Landfill Methane Recovery" (Version 9.0)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

[1] https://registry.goldstandard.org/projects/details/1179

Table 1: Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
SDG 13- Take urgent action to combat climate change and its impacts	Emission reductions	37,177	tCO_2e GSVER's
SDG 7– Ensure access to affordable, reliable, sustainable and modern energy for all	MWh of renewable energy generated	14,402.98	MWh
SDG 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Number of trainings and employment throughout the MP	8 employment 5 trainings provided	Number

Table 2: Product Vintages

		Amount Achieved		
Start Dates	End Dates	SDG 7	SDG 8	SDG 13
03/11/2021	31/12/2021	1,160.45 MWh	10 workers employed	3,448 tCO2e
01/01/2022	31/12/2022	7,945.22 MWh	9 workers employed	21,337 tCO2e
01/01/2023	31/07/2023	5,297.31 MWh	8 workers employed and 5 trainings conducted	12,392 tCO2e

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

The Bolu Landfill Gas to Energy Project, developed and operated by CEV Marmara Enerji Üretim San. ve Tic. Ltd. Şti. (hereinafter referred to as "project developer"), which is the regional office of the Korea-based company; CEV Clean Energy & Vehicle. The proposed activity involves the collection and utilization of the LFG with an electricity component with a maximum installed capacity reaching 1.131 MWe. On 23/09/2022, the proposed activity commissioned another unit with installed capacity of 1.413MWe to deal with potential operational pauses resulted by the existing engine in future. With

the new commissioning, there has been no increase in project installed capacity and power generation. Due to the fact that there has been no change in the total capacity of the project, there will not be any adverse impact on the additionality of the project or there will be no additional environmental impact. Please refer to the clarification request form obtained by Gold Standard. The project is located in the Bolu landfill site, Turkey which is the main landfill area of the Bolu province, which has more than 300,000 inhabitants. The project started operations in 1992 and its official operation date is in 1994. The landfill currently holds more than 2 million tons of waste. In 2022, the disposed waste amount reached 66,042 tones, corresponding to 180-190 t/day on average. In the baseline scenario, the landfill has 8 venting pipes with the release of the LFG to the atmosphere without any flaring or utilization activity. The Project activity does not only aim at utilizing the already existing waste, but it also makes use of the new waste. The Project has started with construction on 11/11/2010 and the operation has started as of 12/08/2011.

Table 3-Project Milestones

Date	Milestone
20/01/2009	Bolu Municipality organizes a tender for managing the waste on its landfill.
09/02/2009	The Project owner wins the tender and concludes a contract with the Municipality. Carbon consideration is included in the contract.
17/02/2009	The Municipality issues site access permit to the Project owner.
22/08/2009	Technical experts from Korea make a site visit to carry out various gas tests and measurements.
06/03/2009	An informative meeting is organized in Bolu to inform stakeholders about the Project.
15/04/2009	Bolu Provincial Directorate of Environment and Forestry issues the "EIA is not required" document to the Project
07/2009	Feasibility study contract is signed
17/06/2010	Electricity generation license obtained.
25/11/2010	Equipment order is signed.
12/08/2011	Start date of electricity generation
12/08/2011	Start of first crediting period
11/08/2018	End date of first crediting period
12/08/2018	Start date of second crediting period
11/08/2025	End date of second crediting period

Project activity is not registered with any other compliance or voluntary market-based mechanism. Project Developer has not or will not issue emission reductions (ER) for the same vintage from this project under any other carbon market mechanism other than Gold Standard. In addition, there is no double counting with national climate policies or programs for the project. GHG emissions reductions from the project activity are not

accounted for within the relevant system of the host country/ regulator or any voluntary mechanism.

Purpose of the Project activity
The main purpose of the project activity is to generate electrical energy through sustainable means using landfill gas, to delivers the generated output to the Turkish national grid to contribute to climate change mitigation efforts.

The details of the project are mentioned in Table 4.

Table 4: Project Details

Name of PP	Capacity in MW	Connection with Grid	State	Usage of Electricity
CEV Marmara Enerji Üretim San. ve Tic. Ltd. Şti.	1.131 MWe[2]	Turkish National Grid	Bolu	Sale to grid

The project activity is promoted by CEV Marmara Enerji Üretim San. ve Tic. Ltd. Şti. Thus, CEV Marmara Enerji Üretim San. ve Tic. Ltd. Şti. is acting as PP for the project activity.

Sectoral Scope 01: Energy industries – (renewable - / non-renewable sources)
Sectoral Scope 13: Waste Handling and Disposal
Methodology:

- AMS-I.D. "Grid Connected Renewable Electricity Generation" (Version 18.0[3])
- AMS III.G "Landfill Methane Recovery" (Version 9.0)

Project Type: I. Renewable energy projects

Tools referred with above methodology are:

AMS-III.G version 09.0 also refers to the following methodology and tools where applicable:

- "Emissions from solid waste disposal sites" version 08

[2] The Project Proponent added another generation unit with a capacity of 1.413 MWe.However, this unit is only added to the project as a backup unit to deal with potential operational pauses resulting from the existing engine in the future and does not contribute to the electricity generation activity. Therefore, the plant's total capacity is the same as the registered capacity.
[3] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

- "Tool to calculate baseline, project or leakage CO_2 emissions from electricity consumption" version 02

AMS-I.D version 18.0 also refers to the following methodology and tools where applicable:

- "Tool to calculate the emission factor for an electricity system" version 5.0

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, is generation of grid-connected power, which would have otherwise been generated by the operation of already existing grid-connected power plants and by the addition of new generation sources and maintaining the status quo, where LFG is emitted into the atmosphere without conducting any management, collection or utilization on the landfill site.

Baseline Scenario:

The establishment and description of the baseline scenario is discussed the guidance of the document "Gold Standard Procedures for the renewal of a crediting Period". According to the referred document the Project participants shall provide an assessment on the validity of the original baseline or update through, and assessment carried out as per the "Tool to assess the validity of the original / current baseline and to update the baseline at the renewal of a crediting period".

The "Tool to assess the validity of the original / current baseline and to update the baseline at the renewal of a crediting period" provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism.

The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period. In line with the requirements of "Tool to assess the validity of the original / current baseline and to update the baseline at the renewal of a crediting period", the current baseline scenario has remained valid at the time of renewal. The identified baseline for the second crediting period is "Disposal of the waste at a landfill without the capture of landfill gas and electricity is generated by existing grid connected power plants."

Contribution to sustainable development

- **Environmental:** The project activities replace the grid electricity, which is constituted of different fuel sources causing greenhouse gas emissions. By replacing in the consumption of these fuels, it contributes to conservation of water, soil, flora and fauna and transfers these natural resources and additional supply of these primary energy sources to the future generations. In the absence of the project activity, an equivalent amount of electricity would have been generated from the power plants connected to the grid, the majority of which are

based on fossil fuels. Thus, the project is replacing the greenhouse gas emissions (CO_2, CH_4) and other pollutants (CO, NMVOC, particulate matters) occurring from extraction, processing, transportation and burning of fossil-fuels for power generation connected to the national grid.

- **Social:** Local employment is enhanced by all project activities during construction and operation phases of the project. As a result, local poverty and unemployment is partially eliminated by increased job opportunities and project business activities. Construction materials for the foundations, cables and other auxiliary equipment are preferentially sourced locally. Moreover, as contribution of the project to welfare of the region, the quality of the electricity consumed in the region is increased by local electricity production, which also contributes decreasing of distribution losses.
- **Technological:** Implementation of the proposed project contributes to wider deployment of LFG technology at the local and national level. It supports improved energy security, alternative sustainable energy, and renewable energy industry development. This also strengthen pillars of Turkish electricity supply based on ecologically sound technology.
- **Economical:** Firstly, the project helps to accelerate the growth of the LFG industry and stimulate the designation and production of renewable energy technologies in Turkey. Then, other entrepreneurs irrespective of sector are encouraged to invest in LFG power generation. It also assists to reduce Turkey's increasing energy deficit and diversify the electricity generation mix while reducing import dependency, especially on natural gas. Importantly, rural development is maintained in the areas around the project site by providing infrastructural investments to these remote villages.

A.2. Location of project

The project is located in approximately 3 km northeast of Bolu City Centre (flight distance) and 1.5 km south of the main Anatolian highway. The location of project activity is in Marmara Region, Bolu Province, Yukarısoku Village as seen in Figure 1. Host party is Turkey.

Name of the PP	Village	District	Latitude	Longitude
CEV Marmara Enerji Üretim San. Ve Tic. Ltd. Şti.	Yukarısoku	Center	40° 45' 8" N	31° 38' 28" E

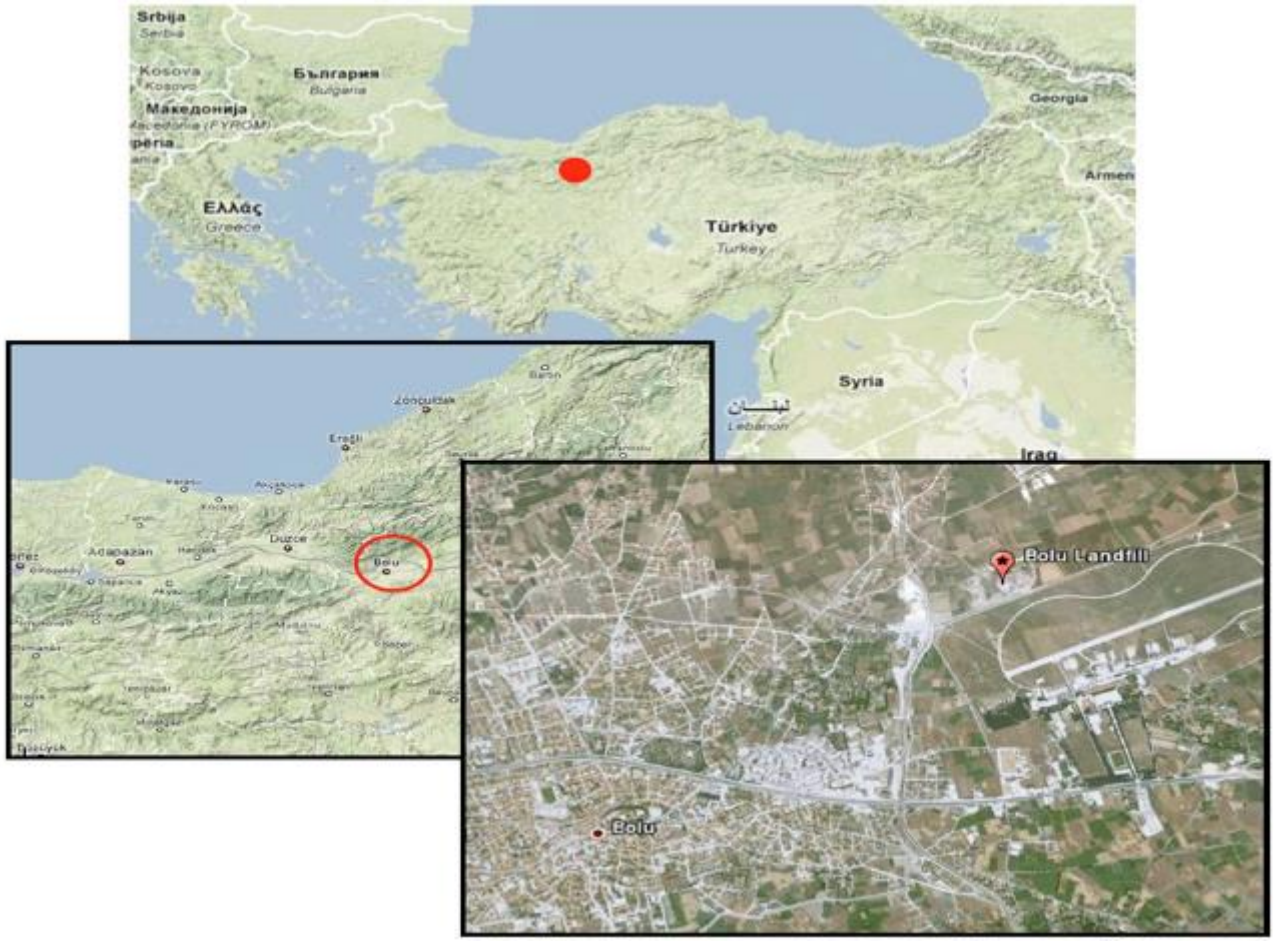

Figure 1: *Location of the Project Activity*

A.3. Reference of applied methodology

Title: Grid-connected electricity generation from renewable sources
Reference: The project activity meets the eligibility criteria of small-scale project as it is less than 15 MW

Methodology:

- AMS-III.G. "Landfill Methane Recovery" version 09.0[4]
- AMS-I.D. "Grid connected renewable electricity generation" version 18.0[5]

Type: I. Energy industries (renewable / non-renewable sources)

[4] https://cdm.unfccc.int/methodologies/DB/QPVDNPHDG8302KQ5EPGD3OC57KVA3Q
[5] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

AMS-III.G version 09.0 also refers to the following methodology and tools where applicable:

- "Emissions from solid waste disposal sites" version 08.0[6]
- "Tool to calculate baseline, project or leakage emissions from electricity consumption and monitoring of electricity generation" version 02.0[7]

AMS-I.D version 18.0 also refers to the following methodology and tools where applicable:

- "Tool to calculate the emission factor for an electricity system" version 5.0[8]

A.4. Crediting period of project

The project activity is a GS Registered project with the ID of GS764[9]. The first crediting period start date of the project was 12/08/2011 with choice of renewable crediting period. The PDD submitted for renewal indicates the second renewable crediting period start date as 12/08/2018:

1st crediting period: 12/08/2011 to 11/08/2018
2nd crediting period: 12/08/2018 to 11/08/2025

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

The project activity involves the collection and utilization of the LFG with an electricity component (i.e., gas engine) with total installed capacity of 1.131 MWe. The proposed activity involves the collection and utilization of the LFG with an electricity component. The whole installation has 25 years design life.

On 23/09/2022, the proposed activity commissioned another unit with installed capacity of 1.413MWe to deal with potential operational pauses resulted by the existing engine in future. With the new commissioning, there has been no increase in project installed capacity and power generation. Due to the fact that there has been no change in the total capacity of the project, there will not be any adverse impact on the additionality of the project or there will be no additional environmental impact. Please refer to the clarification request form obtained by Gold Standard.

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[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.0.pdf
[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v2.0.pdf
[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf
[9] https://registry.goldstandard.org/projects/details/1179

The details of equipment installed at CEV Marmara Enerji Üretim San. Ve Tic. Ltd. Şti. are as follows:

Equipment	Specification
Gas Engine	**Manufacturer:** GE Jenbacher A-6200 **Type:** JGS416GS-L.L **Rated Power:** 1131 kWe **Serial Number:** 1021522 **Date of Manufacture:** 2011 **Operational Lifetime:** 15 Years*
Gas Engine (for use in emergencies)	**Manufacturer:** GE Jenbacher A-6200 **Type:** JGS 420 GS-L.L **Rated Power:** 1414 kWe **Serial Number:** 1146063 **Date of Manufacture:** 2015 **Operational Lifetime:** 15 Years*
Gas Analyzer	**Manufacturer:** EMERSON / X-Stream **Type:** EPMK-P11024-E001 **Serial Number:** XMC02102854726
Flowmeter	**Manufacturer:** SIERRA Instruments **Model:** 640S-NAA-L13-M0-E2-P2-V4-DD-5-CRWS **Serial Number:** 141381
Meter Protection Device	**Manufacturer:** SIEMENS **Model:** 7SR1205-2GA12-1CA0/BB ARGUS **Serial Number:** BF1103116877

*In order to justify the operational lifetime of the gas engines "TOOL10: Tool to determine the remaining lifetime of equipment (Version 01)[10] is used. Operational lifetime is determined by using the "Tool to determine the remaining lifetime of equipment" (v. 1). In the tool it is stated that; project participants may use one of the following options to determine the remaining lifetime of the equipment:

a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;
b) Obtain an expert evaluation;
c) Use default values.

[10] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

For the project option (c) is used. According to the tool, gas turbines up to 50 MW, has a default 150,000 hours of technical lifetime. When 8760 working hours is taken: 150,000 hours / 8,760 hours = 17.12 years. To be conservative, operational lifetime is taken as 15 years.

B.1.1 Forward Action Requests
There are 2 FARs raised on previous verification activities.
FAR#1: Verifying VVB shall check if the odor problem due to the replacement of pipe system still exist and spraying for insects is implemented.
FAR#2: Transparent, annual update reports need to be provided for Projects that have achieved the Project Design Certification stage or have successfully transitioned to Gold Standard for the Global Goals. An annual report shall be submitted for each monitoring year by end of next calendar year for which verification is not completed.

The answers to these requests are found below:
FAR#1: The odor problem does not exist and insect spraying is being implemented. The documentation showing spraying is implemented is submitted to VVB.
FAR#2:Annual report for 2023 is prepared and shared with VVB.

B.2. Post-Design Certification changes
Not Applicable

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline
Not Applicable.
B.2.2. Corrections
Not Applicable.

B.2.3. Changes to start date of crediting period
Not Applicable.

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline
The proposed activity involves the collection and utilization of the LFG with an electricity component with a maximum installed capacity reaching 1.131 MWe. On 23/09/2022, the proposed activity commissioned another unit with installed capacity of 1.413MWe

to deal with potential operational pauses resulted by the existing engine in future. With the new commissioning, there has been no increase in project installed capacity and power generation. Due to the fact that there has been no change in the total capacity of the project, there will not be any adverse impact on the additionality of the project or there will be no additional environmental impact. Please refer to the clarification request form obtained by Gold Standard.

Furthermore, kj values in MR and registered PDD(V.12) is different because it is realized that MAP/PET>1 and kj values are corrected throughout MR accordingly. In registered PDD, all the kj values are for MAP/PET<1. However even if the kj values are for MAP/PET<1, one of the tables in the registered PDD, there is a typo says kj values are for MAP/PET>1. For more information kindly refer 2006 Guidelines for National Greenhouse Gas Inventories (Volume 5, Table 3.3)

B.2.5. Changes to project design of approved project

Not Applicable

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

Monitoring is being carried out following the procedures set by the applicable methodology AMS-III.G and all applicable tools. The monitoring consists of:

- Amount of landfill gas combusted in power generation units
- Temperature of the landfill gas sent to power generation to ensure compliance regarding dry basis for measurement
- Amount of landfill gas flared
- Concentration of methane of the landfill gas
- Total amount of electricity exported to the grid
- Operating hours of power generation units
- Total amount of the electricity imported from the grid

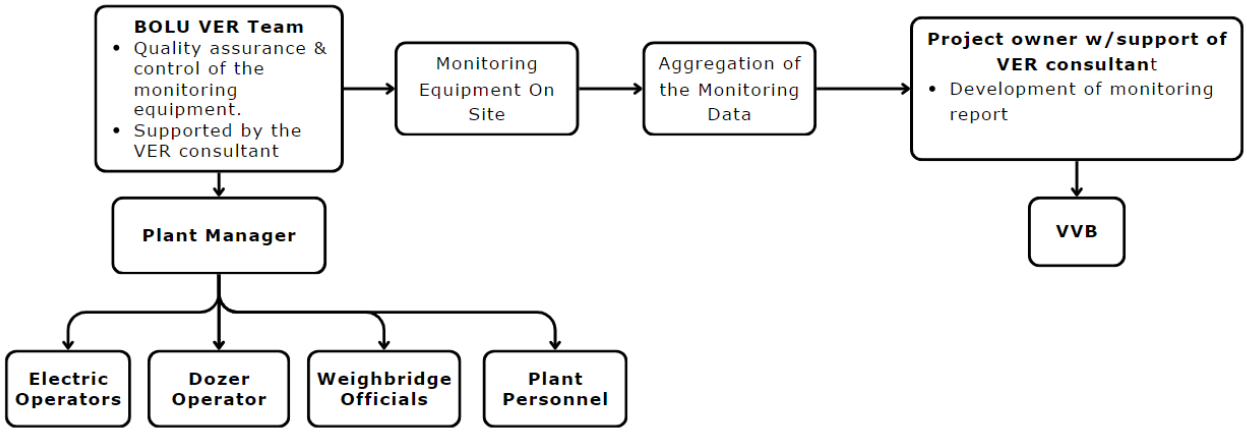
Responsibilities for monitoring

The project owner is responsible for the operation and maintenance of the landfill and the installed equipment[11]. The project owner is also responsible for the administration

[11] Except for the electricity meter that monitors both electricity imports and exports since the monitoring device is sealed by TEİAŞ (Turkish Electricity Transmission Company), and the Project Participant cannot interfere with the device.

of the data, setting up a VER team who are responsible for monitoring all data required to calculate emission reductions. Plant Manager is responsible for data accuracy and and manages plant personnel, electricity operators, dozer operator, weighbridge operators. Project Owner and VER consultant is gathering data necessary for monitoring from Bolu VER Team and develops monitoring report, emission reduction calculation. In addition, project owner and VER consultant is responsible for communication with VVB, and provides supporting documents to VVB when requested.

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



Registration of the monitored data

The Bolu GSVER-Team is responsible for quality assurance and quality control of the monitoring equipment. The data measured by the monitoring equipment is being stored and processed into a monitoring report, which is being submitted by the project owner. All the monitored data is stored during the crediting period and for at least two years after the end of the crediting period, whichever occurs later.

Corrective actions and emergency preparedness

The VER-Team regularly check the monitoring system on errors. In the case of errors, corrective actions are being undertaken by the VER-Team, or if required, by the supplier of the monitoring equipment.

QA/QC procedure

Strong quality assurance and quality control procedures are being taken to monitor the equipment and data collection. Equipment and facilities are subject to a regular maintenance and testing regime to ensure accuracy following supplier's manual. In case of data deficiency or incorrect data reading, the data is being crosschecked with other parameters and data leading to the most conservative emission reductions will be considered for the calculation of the emission reductions.

Measuring of exported and imported electricity

The main meter for the monitoring of the electricity import and export is at grid connection. Monthly protocols based on the readings, that are confirmed by both TEIAŞ, and the project participant are prepared by the end of each month and stored. These protocols are also the basis of invoicing for the electricity sales from the proposed project activity. The electricity meters are bidirectional and measure both the imported and exported electricity from and to the grid.

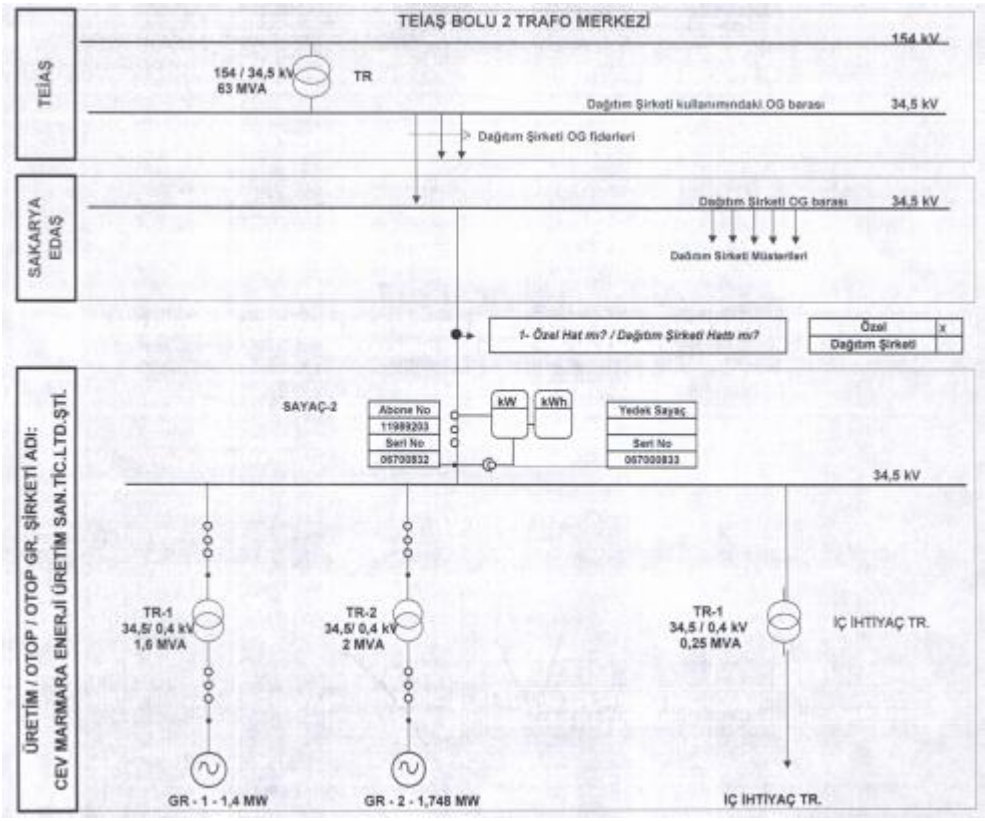


Figure 2-Single Line Diagram

Loss of Data

If there will be any loss of data, the lost data will be counted as "0" unless methodology or tools or validation verification manuals of UNFCCC request otherwise.

Trainings

Health and safety Trainings: Trainings on occupational health and safety, which is provided by Health and Safety Expert and Workplace Physician. This training complies with national Occupational Health and Safety Law dated 30/06/2012 and numbered 6331. In addition, in accordance with the Regulation on Environmental Management Services published in the Official Gazette dated 30/07/2019 and numbered 30847, a compulsory training program on environmental laws and secondary regulations and environmental issues has been implemented. Besides, within the scope of the Regulation on First Aid published in 29.07.2015 numbered 29429, First Aid training has been provided. Additionally, training has been organized within the scope of

disseminating the zero-waste management system in accordance with the zero waste regulation published in the official gazette numbered 30829 dated 12/07/2019.

SECTION D. DATA AND PARAMETERS

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

SDG13 (Indicators 13.3.2)

Data/parameter	**OX**
Unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	AMS-III.G
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	As referred under AMS-III.G
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**GWP_{CH4}**
Unit	tCO_2e/tCH_4
Description	Global Warming Potential of CH_4
Source of data	IPCC
Value(s) applied	28 according to the IPCC Fifth Assessment Report, 2014 (AR5)[12]
Choice of data or Measurement methods and procedures	As referred under AMS-III.G

[12] https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

Purpose of data	Calculation of baseline emission
Additional comment	-

Data/parameter	n_{PJ}
Unit	%
Description	Efficiency of the LFG capture system that will be installed in the project activity
Source of data	AMS-III.G
Value(s) applied	50%
Choice of data or Measurement methods and procedures	Default value under AMS-III.G
Purpose of data	Calculation of baseline emissions
Additional comment	Only applicable to ex-ante estimations of the baseline emissions. The efficiency factor is based on the observations on actual performance of the power plant.

Data/parameter	D_{CH4}
Unit	kg/m3
Description	Density of methane under normal conditions
Source of data	IPCC Volume 2 Energy
Value(s) applied	0.67 kg/m^3 [13]
Choice of data or Measurement methods and procedures	As referred under AMS-III.G
Purpose of data	Calculation of baseline emissions

[13] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf page 4.12 page 4.12

Additional comment	-

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

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

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

Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	The proposed project activity falls under Application A

Data/parameter	**$MCF_{default}$**
Unit	-
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.8
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	The baseline falls under the definition "unmanaged solid waste disposal site-deep"

Data/parameter	**DOC_j**
Unit	-
Description	Fraction of degradable organic carbon in waste type j (weight fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 2.4 and Table 2.5)
Value(s) applied	The following values for the different waste types have been applied:

Waste type j	DOC_j (% wet waste)
Wood and wood products	43
Pulp, paper and cardboard	40
Food, food waste, beverages and tobacco	15
Textiles	24
Garden, yard and park waste	20

	Glass, plastic, metal, other inert: 0
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	k_j
Unit	1/yr.
Description	Decay rate for the waste type j
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (Volume 5, Table 3.3)
Value(s) applied	The following values for the different waste types have been applied:

Waste type j		Boreal and Temperate (MAT < 20°C)
		WET (MAP/PET >1)
Slowly degrading	Pulp, paper, cardboard	0.06
	Wood, wood products and straw	0.03
Moderately degrading	Other (non-food) organic putrescible garden and park waste	0.01
Rapidly degrading	Food, food waste, sewage sludge, beverages, and tobacco	0.185

	MAT (Mean Annual Temperature)[14]: 10.9 °C MAP (Mean Annual Precipitation)[15]: 573.6 mm PET (Potential Evapotranspiration)[16]: 560 mm MAP/PET=1,02>1
Choice of data or Measurement methods and procedures	Emissions from solid disposal sites
Purpose of data	Calculation of baseline emissions
Additional comment	kj values in MR and registered PDD(V.12) is different because it is realized that MAP/PET>1 and kj values are corrected throughout MR accordingly. In registered PDD, all the kj values are for MAP/PET<1. However even if the kj values are for MAP/PET<1, one of the tables in the registered PDD, there is a typo says kj values are for MAP/PET>1. For more information kindly refer 2006 Guidelines for National Greenhouse Gas Inventories (Volume 5, Table 3.3)

Data/parameter	**$EG_{m,y}$**
Unit	MWh
Description	Net electricity generated by power plant/unit m
Source of data	TEIAS (Turkish Electricity Transmission Company) https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value(s) applied	

Fuel Type	Year	Electricity Generated and Delivered to the Grid (MWh)
Natural Gas	2013	100,224,085
	2014	114,587,465
	2015	94,714,611
Lignite	2013	28,853,577
	2014	34,796,857
	2015	29,913,198
Coal	2013	31,963,761

[14] https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=H&m=BOLU
[15] https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=H&m=BOLU
[16] http://tucaum.ankara.edu.tr/wp-content/uploads/sites/280/2015/08/tucaum4_4.pdf

	<table><tr><td></td><td>2014</td><td>37,678,175</td></tr><tr><td></td><td>2015</td><td>42,794,821</td></tr><tr><td>Fuel Oil</td><td>2013</td><td>1,657,875</td></tr><tr><td></td><td>2014</td><td>2,038,751</td></tr><tr><td></td><td>2015</td><td>2,122,945</td></tr></table> Please refer to Section B.6.3 table 9 in registered PDD (version 12) (page 39 and 40)
Choice of data or Measurement methods and procedures	According to "Turkish Statistics Law and Official Statistics Program" TEIAS, the Turkish Electricity Transmission Corporation is the official source for the related data, hence providing the most up-to-date and accurate information available.
Purpose of data	Used to calculate the combined margin emission factor
Additional comment	Since TEİAŞ provides gross amounts, a conversion factor has been applied derived from the total gross / net amount for the same year.

Data/parameter	$FC_{i,y}$
Unit	Tons (m^3 for gaseous fuels)
Description	Amount of fossil fuel type i consumed in the project electricity system by generation sources in year y (2009-2011)
Source of data	TEIAS (Turkish Electricity Transmission Company) https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value(s) applied	<table><tr><th>Fuel Type</th><th>Year</th><th>Amount of Fossil Fuel (FCi,y)(tons)</th></tr><tr><td>Natural Gas</td><td>2013</td><td>22,909,746</td></tr><tr><td></td><td>2014</td><td>25,426,014</td></tr><tr><td></td><td>2015</td><td>20,914,868</td></tr><tr><td>Lignite</td><td>2013</td><td>47,120,306</td></tr><tr><td></td><td>2014</td><td>57,696,139</td></tr><tr><td></td><td>2015</td><td>49,940,131</td></tr><tr><td>Coal</td><td>2013</td><td>12,105,930</td></tr><tr><td></td><td>2014</td><td>14,501,934</td></tr><tr><td></td><td>2015</td><td>16,629,492</td></tr><tr><td>Fuel Oil</td><td>2013</td><td>702,893</td></tr><tr><td></td><td>2014</td><td>874,271</td></tr><tr><td></td><td>2015</td><td>755,299</td></tr></table> Please refer to Section B.6.3 table 9 in registered PDD (version 12) (page 39 and 40)

Choice of data or Measurement methods and procedures	According to "Turkish Statistics Law and Official Statistics Program" TEIAS, the Turkish Electricity Transmission Corporation is the official source for the related data, hence providing the most up-to-date and accurate information available.
Purpose of data	Used to calculate the combined margin emission factor
Additional comment	-

Data/parameter	**$NCV_{i,y}$**
Unit	GJ/tons (m^3 for gaseous fuels)
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	TEIAS (Turkish Electricity Transmission Company) https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value(s) applied	See table below
Choice of data or Measurement methods and procedures	According to "Turkish Statistics Law and Official Statistics Program" TEIAS, the Turkish Electricity Transmission Corporation is the official source for the related data, hence providing the most up-to-date and accurate information available.
Purpose of data	Used to calculate the combined margin emission factor
Additional comment	-

Fuel Type	Year	Net Calorific Value ($NCV_{i,y}$) GJ/tons
Natural Gas	2013	37,145
	2014	37,488
	2015	37,838
Lignite	2013	7,258
	2014	7,106
	2015	7,161
Coal	2013	23,790
	2014	23,927
	2015	24,076
Fuel Oil	2013	42,889
	2014	41,613
	2015	44,082

Please refer to Section B.6.3 table 9 in registered PDD (version 12) (page 39 and 40)

Data/parameter	**$EF_{CO2,i,y}$**

<table>
<tr><td>Unit</td><td>tCO_2/GJ</td></tr>
<tr><td>Description</td><td>CO_2 emission factor of fossil fuel type i used in power unit min year y</td></tr>
<tr><td>Source of data</td><td>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
http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm</td></tr>
<tr><td>Value(s) applied</td><td>Please refer to Section B.6.3 table 9 in registered PDD (version 12) (page 39 and 40)
<table><tr><td>Fuel Type</td><td>CO_2 Emission Factor of Fossil Fuel (EF_{CO2}, i,y) (tCO_2/GJ)</td></tr><tr><td>Natural Gas</td><td>0.0540</td></tr><tr><td>Lignite</td><td>0.0909</td></tr><tr><td>Coal</td><td>0.0928</td></tr><tr><td>Fuel Oil</td><td>0.0565</td></tr></table></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>There is no information on the fuel specific default emission factor in Turkey, hence, IPCC values has been used.</td></tr>
<tr><td>Purpose of data</td><td>Used to calculate the combined margin emission factor</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/parameter</td><td>$n_{m,y}$</td></tr>
<tr><td>Unit</td><td>%</td></tr>
<tr><td>Description</td><td>Average net energy conversion efficiency of power unit m in year y</td></tr>
<tr><td>Source of data</td><td>“Tool to calculate the emission factor for an electricity system”,</td></tr>
<tr><td>Value(s) applied</td><td><table><tr><td></td><td>Average conversion efficiency $\eta_{m,y}$</td></tr><tr><td>Natural Gas</td><td>IPCC default value of 60% for combined cycle</td></tr><tr><td>Lignite</td><td>IPCC default value of 41.4% for PFBS</td></tr><tr><td>Coal</td><td>IPCC default value of 41.4% for PFBS</td></tr><tr><td>Fuel Oil</td><td>IPCC default value of 46% for combined cycle</td></tr></table></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>Default values have been used.</td></tr>
<tr><td>Purpose of data</td><td>Used to calculate the combined margin emission factor</td></tr>
<tr><td>Additional comment</td><td>Where available plant specific efficiencies are used instead of default values where available. Please refer to emission reduction calculation sheet for more details.</td></tr>
</table>

Data/parameter	$F_{CH4,BL,y}$
Unit	tCH_4
Description	Methane emissions that would be captured and destroyed to comply with national or local safety requirements or legal regulations in the year y
Source of data	National laws and regulations (http://mevzuat.basbakanlik.gov.tr)
Value(s) applied	0
Choice of data or Measurement methods and procedures	Fixed value has been applied
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	EE_y
Unit	%
Description	Energy Conversion Efficiency of the project equipment
Source of data	Applicable methodology
Value(s) applied	40%
Choice of data or Measurement methods and procedures	Determined as 40% default
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	EF grid,y
Unit	tCO2e/MWh
Description	CO2 emission factor of the grid electricity in year y
Source of data	As per the registered PDD

Value(s) applied	0.484
Choice of data or Measurement methods and procedures	As per the requirements in "Tool to calculate the emission factor for an electricity system" version 5.0
Purpose of data	Calculation of baseline emissions
Additional comment	Please refer to page 39 of the registered PDD for the combined margin emission factor.

D.2 Data and parameters monitored

SDG13 (Indicators 13.3.2)

Data/parameter	$F_{CH4,PJ,Y}$
Unit	Nm^3
Description	Quantity of methane captured by project activity
Source of data	Calculated using quantity of landfill gas used by generation of electricity
Value(s) applied	**Period** / **Value** 03/11/2021-31/12/2021 / 194.92 2022 / 1,334.53 01/01/2023-31/07/2023 / 889.77 Total / 2,419.22
Measurement methods and procedures	Thermal mass flow measuring system by Sierra Steelmass 640s. The serial number is 141381. The accuracies of the measurement are 2%.
Monitoring frequency	The monitoring system works with continuous measurement devices. It is programmed to automatically save every 10 min. values. The data are stored automatically at the server for 2 years.
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter:	w_{CH4}
Unit	m3CH4/m3LFG
Description	Average methane fraction in the landfill gas
Source of data	The methane fraction in the LFG is measured continuously by a gas analyzer.

Value(s) applied	0.49
Measurement methods and procedures	For the measurement an Emerson X-stream, Serial number XMC02102854726 is used. The monitoring system works with continuous measurement devices. It is programmed to automatically save hourly values. The data are stored automatically at the server.
Monitoring frequency	The accuracies of the measurement are 1%. (Linearity) Continuous monitoring and monthly recording.
QA/QC procedures	N/A
Purpose of data	Baseline emission calculation
Additional comments	-

Data/parameter	**BE_Y**
Unit	tCO_2e
Description	Emission reductions achieved per year
Source of data	Calculated from the power generated and methane destroyed per year
Value(s) applied	**Period** / **Actual Achieved Value** / **Actual ER-Capped by PDD and Lower Actual Values** 03/11/2021-31/12/2021 / 5,743 / 3,348 2022 / 34,474 / 21,337 01/01/2023-31/07/2023 / 24,985 / 12,392 **Total** / **67,932** / **37,177**
Measurement methods and procedures	Calculated
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter:	**Operation of the engine**
Unit	Hours
Description	Operation of the engine
Source of data	Project Developer

Value(s) applied	73,434
Measurement methods and procedures	The counting device of the engine is counting the operational hours continuously as the operational hours are also used for maintenance reasons.
Monitoring frequency	Continuous monitoring and monthly recording.
QA/QC procedures	-
Purpose of data	Baseline emission calculation
Additional comments	-

Data/parameter:	**AF**
Unit	-
Description	Regulatory requirements relating landfill gas projects
Source of data	National laws and regulations.
Value(s) applied	0
Measurement methods and procedures	-
Monitoring frequency	Yearly
QA/QC procedures	In case of a change of Article 27 of the relevant regulation "Control of Solid Waste Regulation", this change will be included to the monitoring plan.
Purpose of data	Baseline emission calculation
Additional comments	Since there is no change in the legislative structure that forces old landfill sites to utilize landfill gas and no change to article 27 of the relevant regulation "Control of Solid Waste Regulation", AF and hence MDBL has been considered 0.

Data/parameter:	**NO_x Emission**
Unit	Tons
Description	The air quality is related to pollutants such as NO_x which are being emitted in the baseline scenario. As a representative indicator of air pollution, nitrogen oxide is selected because mono-nitrogen oxides eventually form nitric acid when dissolved in atmospheric moisture, forming a component of acid rain.
Source of data	Turkish Greenhouse Gas Inventory and electricity generation values of project https://iklim.gov.tr/db/turkce/dokumanlar/turkish-greenhouse--8230-63-20220921094441.pdf https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri
Value(s) applied	Total NO_x emission related to electricity generation is about 860 kt in 2020 (the latest available data) according to National Inventory of Turkey. According to TEİAŞ data, the total generation value of Turkey's electrical energy in 2020 is 306,703.1 GWh. NO_x emission per MWh is calculated as 2.804 kg.

	Within the monitoring period a total of 14,402.98 MWh electricity has been generated and delivered to the national grid system utilizing the LFG. This corresponds to 40,386.16 tonnes of NO_x reductions.
Measurement methods and procedures	Indirectly, by measuring net electricity generation and multiplication with the baseline NO_x intensity of the Turkish grid.
Monitoring frequency	Continuously
QA/QC procedures	-
Purpose of data	-
Additional comments	-

Data/parameter:	**SO_2 Emission**
Unit	Tons
Description	The air quality is related to pollutants such as SO_x which are being emitted in the baseline scenario. As a representative indicator of air pollution, SO_2 is selected as further oxidation of sulfur dioxide may lead to acid rains and as it is a precursor to particulates in the atmosphere, both of which are environmental concerns.
Source of data	Turkish Greenhouse Gas Inventory and electricity generation values of project https://iklim.gov.tr/db/turkce/dokumanlar/turkish-greenhouse--8230-63-20220921094441.pdf https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri
Value(s) applied	Total SO2 emission related to electricity generation is about 2,165 kt in 2020 according to National Inventory of Turkey. Considering that electricity generation in 2020 is 306,703.1 GWh SO2 emission per MWh is calculated as 7.06 kg/MWh. Within the monitoring period a total of 14,402.98MWh electricity has been generated and delivered to the national grid system utilizing the LFG. This corresponds to 101,669.81tonnes of SO2 reductions.
Measurement methods and procedures	Indirectly, by measuring net electricity generation and multiplication with the baseline SO_2 intensity of the Turkish grid.
Monitoring frequency	Continuously
QA/QC procedures:	-
Purpose of data:	-
Additional comments:	-

Data/parameter	**Reduction of discharged cooling water in baseline**
Unit	m^3
Description	-
Source of data	Project participant

Value(s) applied	In 2018, 7.5 billion m^3 cooling water was discharged by thermal power plants in Turkey[17]. Net electricity generation in thermal power plants in 2018 was 213,491.5 GWh[18], corresponding to 36.5 m^3/MWh discharged cooling water intensity. Within the monitoring period a total of 14,402.98 MWh has been generated through utilization of LFG corresponding to 507,909.15 m^3 of avoided cooling water discharge to the environment.
Measurement methods and procedures	The net electricity generation of the project was recorded and multiplied with the ex-ante cooling water discharge intensity.
Monitoring frequency	Continuously
QA/QC procedures	-
Purpose of data	-
Additional comments	This is a conservative approach because most of the cooling water discharge stems from thermal and nuclear (not existing) power plants.

Data/parameter	**H_2S Emission**
Unit	ppm
Description	H_2S is emitted from the landfill site freely to the atmosphere, creating odor problem and worsens the living conditions of the nearby communities. Although there are several odorous gases in LFG, as a representative indicator of air pollution, hydrogen sulfide is selected because it is a very poisonous, flammable gas with the characteristic foul odor of rotten eggs.
Source of data	By measuring LFG destruction and multiplying with the ex-ante baseline H_2S intensity of the LFG.
Value(s) applied	The gas measurements on the Project site show that the H_2S concentration in the LFG is 1385 ppm[19] on average. Within the monitoring period a total of 3,564.20 tons of CH_4 have been destroyed corresponding to 4,936.4 kg of H_2S destroyed.
Measurement methods and procedures	By measuring LFG destruction and multiplying with the ex-ante baseline H_2S intensity of the LFG.
Monitoring frequency	Continuously

[17] TÜİK Kurumsal (tuik.gov.tr)

[18] TÜRKİYE ELEKTRİK ÜRETİM-İLETİM İSTATİSTİKLERİ (teias.gov.tr), Grafik III.I - 2018 Yılı Türkiye Elektrik Enerjisi Üretiminin Kaynaklara Göre Dağılımı.docx

[19] Source: Feasibility study of the Project

QA/QC procedures	-
Purpose of data	-
Additional comments	-

Data/parameter:	**Reduction of Volatile Organic Compounds**
Unit	m^3
Description	-
Source of data	By measuring the amount of methane destroyed through combustion or flaring.
Value(s) applied	The non-methane VOCs are typically roughly 2% of methane emissions. The methane destroyed by the Project is 5,319,704.43 m^3. Baseline VOCs emissions: 5,319,704.43 m^3 * 2% = 106,394 m^3

	The VOC destruction by combustion or flaring is greater than 98%[20]. This leads to the following baseline emission s of VOCs: VOCs Reduced = 106,394 m^3 * 98% = 104,266.21 m^3
Measurement methods and procedures	By measuring the amount of methane destroyed through combustion or flaring
Monitoring frequency	Continuously
QA/QC procedures	-
Purpose of data	-
Additional comments	-

Data/parameter	**Leachate management**
Unit	-
Description	-
Source of data	Project participant
Value(s) applied	The leachate is properly collected, stored, and transported safely to the municipal treatment facility.
Measurement methods and procedures	The leachate is sent to sewage treatment facility of Bolu Municipality where the leachate water is disposed. There is declaration of Bolu Municipality indicates that they are responsible of collecting the leakage from the project site.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	-
Additional comments	-

Data/parameter	**Hazardous waste processing**
Unit	-
Description	-
Source of data	Assessment of waste management practice
Value(s) applied	The landfill is only accepting municipal waste and not accepting hazardous waste. In accordance with the Turkish law and regulations (Environmental Law[21] and Regulation on Waste Management[22]), hazardous waste is only managed by specialized team which is in place.
Measurement methods and procedures	-
Monitoring frequency	Continuously

[20] https://www3.epa.gov/ttncatc1/dir1/fflare.pdf
[21] http://www.lawsturkey.com/law/environment-law-2872
[22] https://webdosya.csb.gov.tr/db/cygm/editordosya/Atik_Yonetimi_Yonetmeligi-2017.docx

QA/QC procedures	-
Purpose of data	To ensure that the project is not functioning as a hazardous waste disposal or processing facility (i.e., as a hazardous waste gasification – or incineration facility).
Additional comments	-

Data/parameter	**Waste Terraces**
Unit	-
Description	-
Source of data	Project participant
Value(s) applied	The waste is landfilled effectively throughout the monitoring period.
Measurement methods and procedures	Assessment of effective covering of the waste
Monitoring frequency	Continuously
QA/QC procedures	-
Purpose of data	-
Additional comments	In baseline situation, the solid waste is being dumped to the landfill site without a soil capping layer and cover material is applied after a longer period.

SDG 7 (Indicators 7.2.1)

Data/parameter	**TDL_y**
Unit	%
Description	Average technical transmission and distribution losses
Source of data	Recent, accurate and reliable data available within the host country. Values are taken from TEİAŞ website.[23]
Value(s) applied	13,23%
Measurement methods and procedures	Average of the last 3 years is taken.Grafik III.VII Türkiye Elektrik Enerjisi İletim Ve Dağitim Kaybi Oranlari (2013-2023) figure is used for calculating the average value.The values for 2023,2022 and 2021 are taken into account.

Years	TDL (%)
2021	13.8
2022	12.9
2023	13

Monitoring frequency	Annually. In the absence of the data from the relevant year, the most recent figures should be used.
QA/QC procedures	-
Purpose of data	Calculation of baseline and project emissions

[23] https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri

Additional comments	-

Data/parameter	$EG_{PJ,facility,y}$
Unit	MWh
Description	Electricity Generation in year y
Source of data	Electricity meters
Value(s) applied	The values of the monitoring period are: **Year** / **Value** 03/11/2021-31/12/2021 / 1,160.45 2022 / 7,945.22 01/01/2023-31/07/2023 / 5,297.31 **Total** / 14,402.98
Measurement methods and procedures	The quantity of net electricity generation supplied to the grid by the project plant is being monitored based on the main meter (also referred as TEİAŞ meters) readings.
Monitoring frequency	Continuous monitoring and monthly recording
QA/QC procedures	The electricity meters are used to measure the net electricity exported to the grid and used for billing purposes. Therefore, the meters are sealed by SEDAŞ (transmission company authorized by TEDAŞ) and/or through protocols where and when appropriate. The grid company is responsible for maintenance and calibration of the device. In accordance with the "Regulation on "Measurement and Measuring Tools", electricity meters must be calibrated within a frequency of once per 10 years. The accuracy class of the device is 0.5s. In the calculations, monthly screenshots from EPİAŞ are utilized to determine the net electricity generation figure for the MP, whereas OSF records are provided for the purpose of cross-checking.
Purpose of data	Calculation of the baseline emissions
Additional comments	The measurements are carried out by electricity meters of the grid company. At the project site a device of the manufacturer Baylan, Serial number BYL067000832 for main meter and BYL067000833 for spare meter. The accuracy class of the device is 0.5s The monitoring system works with continuous measurement devices. It is programmed to automatically save hourly values. The data are stored automatically at the server.

Data/parameter	$EC_{PJ,y}$
Unit	MWh
Description	Quantity of electricity consumed by the project activity
Source of data	Electricity meters
Value(s) applied	The values of the monitoring period are: **Year** / **Value** 03/11/2021-31/12/2021 / 0.228 2022 / 1.459 01/01/2023-31/07/2023 / 1.391 **Total** / **3.078**

Measurement methods and procedures	The quantity of electricity consumed by the project plant is being monitored based on the data saved through main meter readings and/or through protocols where and when appropriate.
Monitoring frequency	Continuous and monthly recording
QA/QC procedures	The electricity meters are used to measure the net electricity exported to the grid and used for billing purposes. Therefore, the meters are sealed by SEDAŞ (transmission company authorized by TEDAŞ) and/or through protocols where and when appropriate. The grid company is responsible for maintenance and calibration of the device. In accordance with the "Regulation on "Measurement and Measuring Tools", electricity meters must be calibrated within a frequency of once per 10 years. In the calculations, monthly screenshots from EPİAŞ are utilized to determine the net electricity generation figure for the MP, whereas OSF records are provided for the purpose of cross-checking.
Purpose of data	Calculation of the project emissions
Additional comments	The quantity of electricity consumed is monitored by the same equipment, which monitors the net amount of electricity generated by the project activity.

SDG 8 (Indicators 8.5.2)

Data/parameter:	**Quality of employment**
Unit	-
Description	Safe and healthy working conditions
Source of data	Assessment of working conditions by checking safety material, tasks of the personnel etc.
Value(s) applied	The project activity provides a safe working environment for its employees. The employees are also given trainings and education on occupational health and safety issues.
Measurement methods and procedures	-
Monitoring frequency	Continuously
QA/QC procedures:	-
Purpose of data:	To ensure that necessary safety equipment is available on site and properly used and the working environment does not present health risks or hazardous tasks.
Additional comments:	-

Data/parameter:	**Quantitative employment and income generation**
Unit	-
Description	Number of employees of the project
Source of data	The number of employees is tracked according to social security records.
Value(s) of applied	8 employments generated during the current monitoring period.

	<table><tr><th>Year</th><th>Job created in MR</th><th>no. of ceased employment in current MP</th><th>still employed till Year end</th></tr><tr><td>03/11/2021-31/12/2021</td><td>9</td><td>-1</td><td>10</td></tr><tr><td>2022</td><td>8</td><td>3-2</td><td>9</td></tr><tr><td>01/01/2023-31/07/2023</td><td>9</td><td>4-3</td><td>8</td></tr></table> List of employees: <table><tr><th>Name</th><th>Profession</th></tr><tr><td>Gurkan Mutlu</td><td>Electric Operator</td></tr><tr><td>Ugur Donmez</td><td>Dozer Operator</td></tr><tr><td>Davut Turk</td><td>Weighbridge Official</td></tr><tr><td>Mustafa Karatas</td><td>Electric Operator</td></tr><tr><td>Harun Kodaloglu</td><td>Plant Personnel</td></tr><tr><td>Ender Kodaloglu</td><td>Weighbridge Official</td></tr><tr><td>Ozkan Sarmaz</td><td>Plant Manager</td></tr><tr><td>Adem Sarimsakci</td><td>Electric Operator</td></tr></table>
Measurement methods and procedures	-
Monitoring frequency	Continuously
QA/QC procedures:	-
Purpose of data:	To exhibit employment performance of the plant
Additional comments:	-

SDG 8 (Indicators 8.6.1)

Data/parameter:	**Technical trainings to project personnel**
Unit	Number
Description	Technology transfer and technological self-reliance
Source of data	Number of training sessions held
Value(s) of applied	4 trainings <table><tr><th>Sr No.</th><th>Training Date</th></tr><tr><td>1</td><td>11/10/2022</td></tr><tr><td>2</td><td>11/10/2022</td></tr><tr><td>3</td><td>13/01/2023-14/01/2023</td></tr><tr><td>4</td><td>09/02/2023-10/02/2023</td></tr><tr><td>5</td><td>28.03.2023</td></tr></table>
Measurement methods and procedures	Training certificates
Monitoring frequency	Once for each monitoring period
QA/QC procedures:	Training certificates or training attendance records are provided during each monitoring period.

Purpose of data:	Monitoring the training to justify contribution to SDG 8.6.1. 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 comments:	-

SDG 8 (Indicators 8.1.1)

Data/parameter:	**Value of the imported natural gas avoided (conservative)**
Unit	-
Description	Balance of payments and investment
Source of data	The avoided natural gas amount is taken from the indicator "Access to affordable and clean energy services". The energy content of this amount is multiplied by the ex-ante natural gas price.
Value(s) of applied	Within the monitoring period a total of 13,635.01 MWh has been generated through utilization of LFG. This corresponds to a natural gas price of 494,555.91 USD.
Measurement methods and procedures	-
Monitoring frequency	Continuously
QA/QC procedures:	-
Purpose of data:	-
Additional comments:	In baseline situation, some portions of liquid and solid fossil fuels are extracted in the host country. However, most of the natural gas consumed in the host country is imported. Daily Reference Price of natural gas at the current situation is 10.63 USD/MMBtu[24]. 1 MMBTU = 0.293071 MWh, therefore 10.63 USD/MMBtu = 36.27107 USD/MWh

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

Not applicable being a non-Community Service Activities.

D.4. Implementation of sampling plan

No sampling is required.

[24] https://seffaflik.epias.com.tr/transparency/dogalgaz/stp/stp-grf.xhtml

SECTION E. CALCULATION OF SDG IMPACTS

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

67,932 tCO_2e (actual achieved value for SDG 13)
37,177 tCO_2e (Actual ER-Capped by PDD and Lower Actual Values)
14,402.98MWh (for SDG 7)
8 employments generated and 5 trainings conducted (for SDG 8)

Since the actual achieved emission reduction increased by 50.24% for the current monitoring period when compared with estimated emission reduction for the same monitoring period based on registered PDD v.12. This is mainly due to methane flow increase which are not in control of project owner. As a conservative approach, the project owner has decided to cap the emission reductions to the extent of annual estimated emission reductions as per the registered PDD and thus accordingly the MR has been revised following the rule prescribed in para 2.1.4 of Rule Clarification "Assessment Approach for Reporting Higher Ex-Post Emission Reductions". For further information, please refer to section E.6.

Actual Emission Reductions

In line with the requirements of AMS-III.G, the actual emission reduction achieved by the project activity during the crediting period will be calculated using the amount of methane recovered and destroyed/gainfully used by the project activity, calculated as:

$$ER_{y,calculated} = ((1 - OX) \times (F_{CH4,PJ,y} - F_{CH4,BL,y}) \times GWP_{CH4}) + BE_{electricity,y} - PE_y$$

Where:

$F_{CH4,PJ,y}$	Methane captured and destroyed/gainfully used by the project activity in the year y (tCH_4)

Since there are no legal requirements in Turkey to destroy methane and the LFG was not captured prior to the proposed project activity. Therefore:

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

In accordance with applicable methodology, $F_{CH4,PJ,y}$ will be calculated based on the amount of monitored electricity generation, without monitoring methane flow and concentration as follows:

$$F_{CH4,pj,Y} = \frac{EG_y \times 3600}{NCV_{CH4} \times EE_Y} \times D_{CH4} \times GWP_{CH4}$$

Where:

EG_y	Electricity generation in year y (MWh)

3600	Conversion factor (1MWh=3600MJ)
$D_{CH4,y}$	Density of methane at the temperature and pressure of the landfill gas in year y (tonnes/m^3). If $LFG_{i,y}$ is reported at normal conditions of temperature and pressure, the density of methane is also determined at normal conditions.
NCV_{CH4}	NCV of methane (MJ/Nm3). A default value : 35.9 MJ/Nm3 is used.
EE_y	Energy Conversion Efficiency of the project equipment determined as 40% default.

In accordance with AMS-I.D baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_{y,electricity} = EG_{PJ} \acute{} EF_{grid,y}$$

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)
$EF_{grid,y}$	Combined margin CO_2 emission factor of grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

In line with the requirements of AMS-I.D;

$$EG_{PJ} = EG_{PJ,facility,y}$$

Where:

$EG_{PJ,facility,y}$	Quantity of net electricity generation that is produced by the project plant to the grid in year y (MWh)

Determination of the emission factor for electricity generation ($EF_{grid,y}$)

Please refer to the latest registered PDD:
https://registry.goldstandard.org/projects/details/1179

$$EF_{grid,y} = 0.484\ tCO_2e/MWh$$

Project Emissions

In line with the requirements of AMS-III.G and AMS-I.D, project emissions are calculated as follows:

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

Where:

$PE_{power,y}$	Emission from consumption of electricity due to the project activity in year y (tCO_2e/yr)

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

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

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

Where:

$PE_{EC,y}$	Project emissions from electricity consumption in year y (tCO_2e/year)
$EC_{PJ,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/year)
$feel_{,j,y}$	Emission factor for electricity generation for source j in year y (tCO_2e/MWh)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y

The combined margin emission factor of the applicable electricity system has been determined as emission factor for the electricity system ($EF_{power,y}$), in line with Option A1 of scenario A (Electricity consumption from grid) under the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

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

SDG 7: Affordable and Clean Energy

For the current monitoring period, the clean energy generation contributed by the project activity is 14,402.98 MWh.

SDG 13 Climate Action:

For the current monitoring period, the emission reductions contributed by the project activity (ER) is calculated as follows:

$$\mathbf{ER_y = BE_y - PE_y - LE_y}$$

Where:

ER_y	=	Emission reductions (tCO_2e)
BE_y	=	Baseline emissions (tCO_2e)
PE_y	=	Project emissions due to electricity consumption from the grid (tCO_2e)
LE_y	=	Leakage emissions (tCO_2e)

Period	BE_y (tCO_2e/year)	PE_y (tCO_2e/year)	LE_y (tCO_2e/year)	ER_y (tCO_2e/year)
03/11/2021-31/12/2021	5,473.54 (561.66+4,911.88)	0.13	0	5,473.00
2022	37,475.69 (3,845.49+33,630.20)	0.85	0	37,474.00
01/01/2023-31/07/2023	24,986.13 (2,563.90+22,422.23)	0.81	0	24,985.00
Total	**(67,935.35) 6,971.04+60,964.31**	**1.79**	**0**	**67,932**

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 8 workers and 5 trainings conducted.

E.3. Calculation of leakage

In accordance with para-B.6.3 of the registered PDD, the leakage emissions have been considered zero.

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

SDG	SDG Impact	Baseline ER	Project ER	Net Actual ER-before capping	Actual ER-Capped by PDD and Lower Actual Values
13	Take urgent action to combat Climate Change and its impacts	67,935 tCO_2e	1.69 tCO_2e	67,932 tCO_2e	37,177 tCO_2e
7	Ensure access to affordable, reliable, sustainable and modern energy for all	0 MWh	14,402.98 MWh	14,402.98 MWh	14,402.98 MWh
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	-	8 employments generated and 5 trainings conducted	8 employments generated and 5 trainings conducted	8 employments generated and 5 trainings conducted

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

SDG	Values estimated in ex-ante calculation of approved PDD for this monitoring period	Actual values achieved during this monitoring period	Actual values-Capped by PDD and Lower Actual Values
13	19,399 tCO2e/year (33,802 tCO2e per monitoring period)	67,932 tCO_2e	37,177 tCO_2e
7	8,483 MWh/year (14,781.34 MWh per monitoring period)	14,402.98 MWh	14,402.98 MWh
8	10 employments and 1 training conducted	8 employments generated and 5 trainings conducted	8 employments generated and 5 trainings conducted

Actual Emission reduction increased by 50.24% (from estimation of 33,802 tCO_2/MP to 67,932 tCO_2/MP) for the current monitoring period when compared with estimated emission reduction for the same monitoring period based on registered PDD v.12. This is mainly due to methane flow increase which are not in control of project owner but because of the increase of waste amount coming to the facility. As a conservative approach, the project owner has decided to cap the emission reductions to the extent of annual estimated emission reductions as per the registered PDD and thus accordingly the MR has been revised following the rule prescribed in para 2.1.4 of Rule Clarification "Assessment Approach for Reporting Higher Ex-Post Emission Reductions". In addition to that cap, 10% increase to the capped emissions has been applied in order to prevent the unfair decrease in VER.

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

SDG 13: Climate Action

The annual estimated emission reduction for the project activity is 19,399 tCO_2e, thus considering number of days covered during present monitoring period to be 636, the emission reduction contributing towards SDG 13 will be 33,802 tCO_2e.

SDG7: Affordable and Clean Energy

The annual estimated power generation for the project activity is 8,483, thus considering number of days covered during present monitoring period to be 636, the power generation will be 14,402.98 MWh.

SDG 8: Decent Work and Economic Growth

The project is estimated to generate 10 employment and 1 training per year.

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

Actual Emission reduction increased by 50.24% (from estimation of 33,802 tCO_2/MP to 67,932 tCO_2/MP) for the current monitoring period when compared with estimated emission reduction for the same monitoring period based on registered PDD v.12. This is mainly due to methane flow increase which are not in control of project owner but because of the increase of waste amount coming to the facility. As a conservative approach, the project owner has decided to cap the emission reductions to the extent of annual estimated emission reductions as per the registered PDD and thus accordingly the MR has been revised following the rule prescribed in para 2.1.4 of Rule Clarification "Assessment Approach for Reporting Higher Ex-Post Emission Reductions". After the cap, the emission reduction is decreased from 67,932 tCO_2 to 33,799 tCO_2. In addition to that cap, 10% increase to the capped emissions has been applied in order to prevent the unfair decrease in VER, thus the capped emission reduction of 37,177 tCO_2 is applied.

SECTION F. SAFEGUARDS REPORTING

As per the safeguarding Principal Assessment presented in the Transition Annex of the project, there are no safeguarding principles which are to be included in the monitoring plan or hold any relevance to the project activity. Also, there are not any impact (positive/negative/slightly) for any mitigation measures, being applicable to any of the safeguarding principles. Hence, this section is not relevant.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

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

Stakeholder consultation for the project has been carried out at validation stage. Since the project was registered under previous version of GS hence, no specific mechanism defined for on-going stakeholder consultations post implementation.

Prior to validation, the Project was acquired by the Project owner with a tender, which was organized by the Bolu Municipality. The Project and its conditions are clearly set in an agreement and the Municipality is satisfied with the Project. Following the tender, there have been several newspaper announcements about the Project that positively commented on the Project. A meeting organized by the Project owner on 11/11/2009 hosted several stakeholders and the opinions declared during that meeting were very positive and encouraging.

Moreover, stakeholder engagement procedure was being conducted in the Mukhtar' house with the local stakeholders and heads of the Yukarısoku Villages during the verification process. The contact information of Company Executive of the company has already been given to Mukhtars (heads of the village) of Yukarısoku Villages so that the

local stakeholders can reach company executive whenever they have any complaints, suggestions, or ideas about the project. Since mukhtar is the head of the village, he is the main contact person between the project owner and the local stakeholders. Mukhtar ensures that there is continuous communication between the two parties. Moreover, logbook was delivered to the head of Yukarısoku village in order to account continuous ongoing grievance mechanism. There have been no negative comments from any stakeholder about the Project.

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

During the current monitoring period, no negative comments are received from the local stakeholders. Thus, no mitigations have been applied.

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

Not Applicable since the project did not receive any feedback or concerns during the stakeholder feedback round.

Appendix 1- Monitoring Equipment Calibration Schedule

Calibration of main and spare meter was performed on 10/06/2021.The previous meters with the serial numbers of 56753562 and 56735363 have been replaced on 13/02/2023 to the new meters with the serial numbers given in the table below. Calibration schedules and specifications of old and new meters are given in **Table 5**.

Table 5: Old Electricity Meters Calibration Schedule

Specification	Main Meter	Validity	Spare Meter	Validity
Type	Landis+Gyr E550	N/A	Landis+Gyr E550	N/A
Year of Manufacture	2021	N/A	2021	N/A
Serial Number	56753562	N/A	56735363	N/A
Date of Calibration #1	22/01/2021	22/01/2031	22/01/2021	21/01/2031
Manufacturing Standard / Class	0.5S	N/A	0.5S	N/A

Table 6: New Electricity Meters Calibration Schedule

Specification	Main Meter	Validity	Spare Meter	Validity
Type	Landis+Gyr E550	N/A	Landis+Gyr E550	N/A

Year of Manufacture	2021	N/A	2021	N/A
Serial Number	BYL067000832	N/A	BYL067000833	N/A
Date of Calibration #1	10/06/2021	10/06/2031	10/06/2021	10/06/2031
Manufacturing Standard / Class	0.5S	N/A	0.5S	N/A

Table 7: Gas Analyzer Calibration Schedule

Specification		**Validity**
Type	EPMK-P11024-E001	N/A
Year of Manufacture	2011	N/A
Serial Number	XMC02102854726	N/A
Date of Calibration	02/06/2023	10 years[25]

Table 8: Flowmeter Calibration Schedule

Specification		**Validity**
Model	Sierra Steelmass 640s	N/A
Year of Manufacture	2011	N/A
Serial Number	141381	N/A
Date of Calibration	21/02/2022	10 years

[25] Calibration frequency is 10 years as per Regulations of the host country.

Revision History

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