BYZ GLOBAL ENERGY BIOGAS PLANT

Document Prepared by

Project Title	*BYZ GLOBAL ENERGY BIOGAS PLANT*
Version	*05.0*
Report ID	*220912*
Date of Issue	*01-August-2023*
Project ID	*#2457*
Monitoring Period	*30-07-2019 to 31-07-2022*
Prepared By	*CS Climate Solutions Danışmanlık Anonim Şirketi*
Contact	*Kazımdirik Mah. 372/12 Sk. No:11* *Bornova/İZMİR – TURKEY* *www.climatesolutions.com/en/home* *umut.onder@climatesolutions.com* *+905445118953*

CONTENTS

1 PROJECT DETAILS 4

1.1 Summary Description of the Implementation Status of the Project 4

1.2 Sectoral Scope and Project Type 5

1.3 Project Proponent 5

1.4 Other Entities Involved in the Project 6

1.5 Project Start Date 6

1.6 Project Crediting Period 7

1.7 Project Location 8

1.8 Title and Reference of Methodology 12

1.9 Participation under other GHG Programs 14

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions 14

1.11 Sustainable Development Contributions 15

2 SAFEGUARDS 20

2.1 No Net Harm 20

2.2 Local Stakeholder Consultation 20

2.3 AFOLU-Specific Safeguards 24

3 IMPLEMENTATION STATUS 24

3.1 Implementation Status of the Project Activity 24

3.2 Deviations 31

3.3 Grouped Projects 33

4 DATA AND PARAMETERS 33

4.1 Data and Parameters Available at Validation 33

4.2 Data and Parameters Monitored 40

4.3 Monitoring Plan 82

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS 91

5.1 Baseline Emissions 91

5.2 Project Emissions 99

5.3 Leakage 105

5.4 Net GHG Emission Reductions and Removals 105

APPENDIX 1: ADDITIONAL CALIBRATION DETAILS 109

APPENDIX 2: MONITORED GHG ACCOUNTING-RELATED SDG PARAMETERS/INDICATORS 111

APPENDIX 3: 114

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

BYZ Global Energy Biogas Plant (hereafter referred to as the project) is a biogas-to-energy project that generates renewable energy by capturing biogas from animal manure -via anaerobic digestion- and utilizing it to produce thermal and electric energy. The animal manure as the main feedstock of the project is collected from the neighboring animal farms with special trucks and transferred to the biogas plant. Continuously Stirred Tank Reactor (CSTR) type anaerobic digesters are used to capture methane-rich biogas. Captured biogas is then utilized in cogeneration units. The thermal energy is used mainly for heating anaerobic fermenters. The electricity generated is used not only fed to the national grid but also used for auxiliary/internal consumption required for the plant to function.

The beginning of project implementation process can be chronologically demonstrated as obtaining the EIA approval on 27/09/2018 and the electricity generation license from EMRA on 18/10/2018. Upon stabilizing the operating conditions of the digesters and commissioning the gas engines, the provisional acceptance was obtained on 30/07/2019. On this date, the commissioning of engines was officially approved by the Ministry of Energy and Natural Resources and the provisional acceptance to generate electricity is issued. Since then, the project is under operation.

The current monitoring period, as the project's 1st crediting period, is from 30/07/2019 to 31/07/2022 (start and end dates included). During the current monitoring period, the project activity generated renewable energy by utilizing animal manure that would be otherwise left to decay in anaerobic conditions at the neighboring farms, daily, through feeding them into the anaerobic digesters at the project site.

The emission reductions that the project generates per annum were estimated as 61,243 tCO_2eq in the project's registered Project Description (PD). The total net actual GHG emission reductions or removals achieved by the project in this monitoring period are measured as 168,813 tCO_2eq.

Audit Type	Period	Program	VVB Name	Number of years
Validation	03-December-2021	Verra/VCS	TÜV SÜD South Asia Pvt. Ltd	-
Verification	30-July-2019—31-July-2022	Verra/VCS	TÜV SÜD South Asia Pvt. Ltd	3,01
Total	-	-	-	3,01

1.2 Sectoral Scope and Project Type

The proposed project activity as a biogas project captures methane, one of the six Kyoto Protocol greenhouse gases, generated from animal manure that would be otherwise left to decay in anaerobic conditions at the neighboring farms by utilizing/treating animal manure in CSTR-type anaerobic digesters at the project site, mainly for electricity generation. Thus, the project's type can be determined as "Waste Handling and Disposal". Consequently, the project falls under the Sectoral Scope 13, namely 'waste handling and disposal'[1].

The project is not a grouped project.

1.3 Project Proponent

Organization name	*CS CLIMATE SOLUTIONS DANIŞMANLIK ANONİM ŞİRKETİ[2] (hereafter referred to as **Climate Solutions**)*
Contact person	*Dr. Umut ÖNDER*
Title	*Chairperson (Project Consultant)*
Address	*Kazımdirik Mah. 372/12 Sk. No:11 Bornova/İZMİR - TURKEY*
Telephone	*+905445118953*
Email	*umut.onder@climatesolutions.com*

[1] https://cdm.unfccc.int/DOE/scopes.html (Accessed on 25/01/2023)

[2] Deed of accession in respect of VCS registration of representation issued by the Project Owner (PO) on February 4th, 2022, for Climate Solutions were submitted to both the VVB and VCS Registry. Hence, Climate Solutions, as a new PP, has been added.

Organization name	*Kuzey Global Enerji ve Gübre Anonim Şirketi on behalf of BYZ Global Enerji ve Gübre Üretimi Ticaret Sanayi Anonim Şirketi*[3]
Contact person	*Mr. Başar BEYAZOĞLU*
Title	*Chairperson (Project Owner)*
Address	*Bostancı Mahallesi, Kitapçı Mehmet Sk., A Blok Köşk Apt. No: 11/1, Kadıköy, İstanbul/TURKEY, 34744*
Telephone	*+902164131040*
Email	*basarbeyazoglu@renesco.com.tr*

Partial release between Kuzey Global Enerji ve Gübre Anonim Şirketi and Bio Solutions Yenilenebilir Enerji ve Danışmanlık Hizmetleri Sanayi ve Ticaret Limited Şirketi, as the released project participant from the registered PD, was signed on 03/02/2022, while accession letter between Kuzey Global Enerji ve Gübre Anonim Şirketi and CS Climate Solutions Danışmanlık Anonim Şirketi, a new PP, was signed on 04/02/2022. The documents will be submitted both to the VCS to the VVB in time of verification. Dr. Umut Önder, the chairperson of CS Climate Solutions is appointed as the carbon manager of Kuzey Global Enerji ve Gübre Anonim Şirketi.

1.4 Other Entities Involved in the Project

N/A

1.5 Project Start Date

The project start date is defined on the VCS Program Definitions 4.3[4] as the date on which the project began generating GHG emission reductions or removals.

The project implementation timeline as given in Table 1 starts with obtaining the Environmental Impact Assessment (EIA) was obtained by the Ministry of Environment, Urbanization and Climate Change in Turkey on 27/09/2018. Shortly after, the installation of gas engines took place on 01/10/2018, and the installation of weighbridge on 31/05/2019. During this period,

[3] Please see the Annex of the notarized authorization letter (08.06.2021) containing the Board Decision assigning Mr. BEYAZOĞLU as the designated/authorized Carbon Manager on behalf of BYZ Global Enerji ve Gübre Üretimi Ticaret Sanayi Anonim Şirketi.

[4] VCS Program Definitions v4.3 (Release date: 21/12/2022) https://verra.org/wp-content/uploads/2022/12/VCS-Program-Guide-v4.3-FINAL.pdf (Accessed on 25/01/2023)

production license was issued by Energy Market Regulatory Authority (EMRA) on October 18th, 2018. The start-up of the Anaerobic Digesters (ADs) took place by the mid-June 2019. After the adaptation process of ADs to the biogas production under mesophilic conditions by the mid-June 2019, as well as the performance testing was completed, the provisional acceptance to generate electricity was obtained by the Ministry of Energy and Natural Resources in turkey on 30/07/2019. Therefore, this date is considered as the project start date, since, in alliance with the definition of VCS, the project technically and officially began to generate GHG emission reductions by this date.

Table 1. Project Implementation Timeline

Date	Project Milestones
27/09/2018	Environmental Impact Assessment (EIA) Decision
1/10/2018	Installation of Gas Engine
18/10/2018	EMRA Production License
31/05/2019	Installation of Weighbridge
Mid-June 2019	Start-up of Anaerobic Digesters
30/07/2019	**Provisional Acceptance to Generate Electricity (Start Date of the Project)**

1.6 Project Crediting Period

The VCS Standard 4.4[5] states that the projects crediting period for non-AFOLU projects shall be either seven years, twice renewable for a total of 21 years, or ten years fixed. As stated in the registered PD, the project adopted the fixed crediting period of 10 years, determined as the period between 30/07/2019 and 29/07/2029 (the start and end dates included).

The current crediting period as part of the project's first crediting period subjected to this Monitoring Report is from 30/07/2019 to 31/07/2022 (the start and end dates included).

[5] https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf (page 28) (Accessed on 25/01/2023)

1.7 Project Location

The project is located in in Buğdaylı village, Kocasinan district, Kayseri province, Turkey. The central coordinates of the project location are longitude of +35.5514131 and latitude of +38.8171642.

The location of the project is illustrated in Figure 1 and Figure 2 while the project's aerial view is given in Figure 3 below.

Figure 1. The project's location on Google Earth

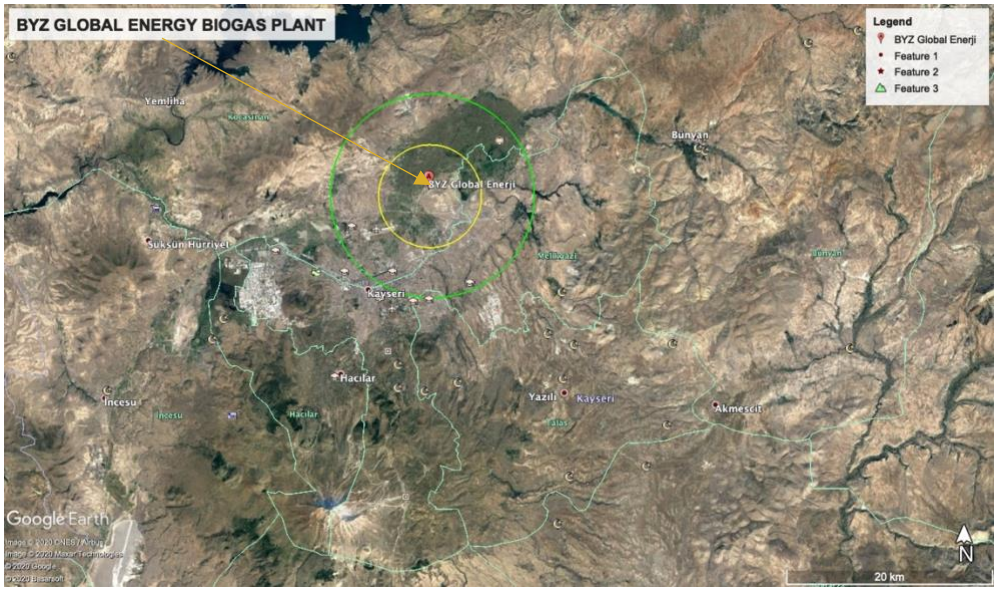

Figure 2. The project's location close-up on Google Earth

Figure 3. The project's aerial view

One of the Methodologies applied to the Project[6], the 21st Version of AMS-III.D. Methodology as the most current and active version of the CDM Methodology in time of preparation of the Monitoring Report (MR), clearly states under Section 4.1 that project boundary includes the physical, geographical site(s) of animal manure management systems as well.

Table 2 below clearly states the animal farms included in the project boundary not only at time of validation but also during the current monitoring period. It is important to note that the supplier farms list has been subjected to a change after the validation of project activity where 16 farms were excluded from the list for the current monitoring period. Further, 10 new farms have been included during the current monitoring period. Excluded and included farms during the monitoring period have been clearly indicated at the Table 2 below. Newly added farms comply with the applicability conditions of the applied Methodology AMS-III.D as the livestock population is managed under confined conditions, manure or streams obtained after treatment are not discharged into natural water resources, The annual average temperature of baseline site is higher than 5°C, and no methane recovery and destruction by flaring or combustion for gainful use takes place at the baseline sites. Furthermore, in Appendix 3, Table 8 the project

[6] Please see Section 1.8 of the MR.

proponent has declared the lagoon depths and the retention periods of the manure of the current farms.

Table 2. Name of the Farms Declared at the Time of Validation	Manure Supplier Farms at the Current Monitoring Period
Admar Besi (Muhsin Seyitoğlu)	Admar Besi Çiftliği
Ahmet Seyitoğlu Besi	Ahmet Seyitoğlu Besi Çiftliği
Atalay Besi	Atalay Besi Çiftliği
Ateş Besi (Al Ateş Besi)	Al Ateş Besi Çiftliği
Başyazıcıoğlu Besi	Başyazıcıoğlu Besi Çiftliği
Birlik Yumurta	Kayseri Yem (Birlik Yumurta)
Ercüment Aslan (Aslan Besi)	Aslan Besi Çiftliği
Genç Seyitoğlu	Genç Seyitoğlu Besi Çiftliği
Gürbüz Besi	Gürbüz Besi
İsmail Seyitoğlu Besi (Site Tarım)	Site Tarim Besi Çiftliği
Recep Yıldırım Besi (Ry Besi)	Ry Besi Çiftliği
Bulut Besi[7]	Adem Seyitoğlu Besi Çiftliği[8]
Cabbar Kaya Besi[7]	Çetinoğlu Besi Çiftliği[8]
Fatih Acar Besi[7]	Emin Besi Çiftliği[8]
Halit Taştan Besi[7]	Erciyes Besi Çiftliği[8]
İbrahim Mazmaloğlu Besi[7]	Erciyes Tavukçuluk[8]
Kalender Besi[7]	İhsan Seyitoğlu Besi Çiftliği[8]
Karakaş Besi[7]	Kayalar Besi Çiftliği[8]
Mehmet Seyitoğlu Besi[7]	M. Kudbettin Seyitoğlu Besi Çiftliği[8]
Nizamettin Şen Besi[7]	Mehmet Bellek Besi Çiftliği[8]
Ömer Yalçın Besi[7]	Yeşilbaş Besi Çiftliği[8]
Selahattin Aras[7]	
Serkan Seyitoğlu Besi[7]	
Site Besi[7]	
Süleyman Seyitoğlu Besi[7]	
Şimsek Besi[7]	
Yalınoğlu Yumurta[7]	

[7] Removed from the manure supplier farm list at the current monitoring period.

[8] Included to the manure supplier farm list at the current monitoring period.

Hence, for the sake of integrity that any third party may trace the project's feedstock sources, not only the locations but also the names of 21 farms from where animal manure was supplied to the project during the current monitoring period are provided in Table 3 below.

Table 3. Central Locations of the Farms Supplying Manure to the Project[9]

	FARMS' NAME[10]	ANIMAL TYPE	LATITUDE	LONGITUDE	Distance Between Itineraries (km)
1	BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	+38.81706	+35.55132	0.5
2	AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	+38.81701	+35.61332	15
3	GÜRBÜZ BESİCİLİK	Other Cattle	+38.81473	+35.61021	16
4	ATALAY BESİ ÇİFTLİĞİ	Other Cattle	+38.81469	+35.54837	1
5	ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	+38.80182	+35.49908	7
6	ADMAR BESİ ÇİFTLİĞİ	Other Cattle	+38.80346	+35.50088	7
7	AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	+38.80222	+35.50009	7
8	ASLAN BESİ ÇİFTLİĞİ	Other Cattle	+38.77188	+35.52750	8
9	EMİN BESİ ÇİFTLİĞİ	Other Cattle	+38.80394	+35.50074	7

[9] VCU ownership belongs to the Kuzey Global Enerji ve Gübre Anonim Şirketi as per the signed manure supply agreements between the Animal Farms and Kuzey Global Enerji ve Gübre Anonim Şirketi as well as the wet-signed statements provided in the Monitoring Surveys. Such documents were provided to VVB as supporting documents in time of verification.

[10] The provided farms represent the current manure suppliers of the project. However, new suppliers might be included in the project, or these suppliers might be excluded from the project within the next monitoring period of the project activity. These potential changes might be dependent on the activities of the farms, manure quality, or the agreements between the farm owners and the project owner. The changes, if any, in this list will be reported in the next monitoring periods and provided to the VVB.

10	ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	+38.82092	+35.60548	14
11	GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	+38.80516	+35.50398	8
12	MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	+38.82618	+35.59591	13
13	RY BESİ ÇİFTLİĞİ	Other Cattle	+38.80678	+35.54332	3
14	SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	+38.80214	+35.49980	8
15	İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	+38.80516	+35.50397	8
16	M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	+38.80208	+35.50407	8
17	YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	+38.80347	+35.50278	8
18	ÇETİNOĞLU BESİ ÇİFTLİĞİ	Other Cattle	+38.80209	+35.50407	8
19	KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	+38.81581	+35.54564	2
20	KAYSERİ YEM (BİRLİK YUMURTA)	Hens	+38.82092	+35.19692	38
21	ERCİYES TAVUKÇULUK	Hens	+38.83622	+35.51692	9

1.8 Title and Reference of Methodology

The project involves the replacement or modification of anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane. It also covers treatment of manure collected from several farms in a centralized plant. In addition, while doing so, the Project, as a Greenfield plant, generates renewable energy used both for auxiliary consumption at the plant and supplied to the national grid.

The project proponent as shown in the registered PD had decided to apply the methodologies given below:

Applied approved baseline and monitoring methodologies:

- ***AMS-III.D.: "Methane recovery in animal manure management systems", Version 21.0***[11]
    - Sectoral scopes:
        - 13 – Waste handling and disposal
- ***AMS-I.D.: "Grid connected renewable electricity generation", Version 18.0***[12]
    - Sectoral scopes:
        - 1 – Energy industries (renewable - / non-renewable sources)

Applied tools:

- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", Version 03.0[13];
- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", Version 03.0[14];
- "Project emissions from flaring", Version 04.0[15];
- "Project and leakage emissions from anaerobic digesters", Version 02.0[16];
- "Tool to calculate the emission factor for an electricity system", Version 07.0[17];
- "Tool to determine the remaining lifetime of equipment", Version 01[18];

[11] https://cdm.unfccc.int/UserManagement/FileStorage/1AWXEKHVTYF423LCN56Z9GIMQOS8JR (Accessed on 25/01/2023)

[12] https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC (Accessed on 25/01/2023)

[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf (Accessed on 25/01/2023)

[14] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf (Accessed on 25/01/2023)

[15] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v4.0.pdf (Accessed on 25/01/2023)

[16] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v2.pdf (Accessed on 25/01/2023)

[17] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf (Accessed on 25/01/2023)

[18] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf (Accessed on 25/01/2023)

- "Project and leakage emissions from biomass", Version 05.0[19];
- "Project and leakage emissions from road transportation of freight", Version 1[20].

1.9 Participation under other GHG Programs

The project did not apply to and, hence, is not registered under any other approved and/or voluntary GHG programs, such as CDM[21], JI[22], Climate Action Reserve[23], Gold Standard for Global Goals[24] (GS4GG), International Carbon Registry[25] (ICR), BioCarbon[26] and Global Carbon Council[27] (GCC), or any other rather than VERRA/VCS[28].

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

The project does not reduce GHG emissions from activities that are included in any emissions trading program or any other mechanism that includes GHG allowance trading.

The project has not sought or received another form of GHG-related credit or renewable energy certificates, such as Renewable Energy Certificate (REC). In accordance with the methodologies applied to the project, no leakage and/or double counting effects are accounted for.

Supply Chain (Scope 3) emissions are assessed in line with the VCS Standard 4.4 and Corporate Value Chain (Scope 3) Accounting and Reporting Standard Standard[29]. According to these sources, this section is not applicable since the project does not directly impact emissions associated with any good or service other than the electricity supplied to the national grid. However, according to the statement given at the Corporate Value Chain (Scope 3) Accounting

[19] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-16-v5.0.pdf (Accessed on 25/01/2023)

[20] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.pdf (Accessed on 25/01/2023)

[21] https://cdm.unfccc.int/Projects/projsearch.html (Accessed on 25/01/2023)

[22] https://ji.unfccc.int/JI_Projects/ProjectInfo.html (Accessed on 25/01/2023)

[23] https://www.climateactionreserve.org/ (Accessed on 25/01/2023)

[24] https://registry.goldstandard.org/projects?q=&page=1 (Accessed on 25/01/2023)

[25] https://iceland.itmoregistry.net/Public/Project (Accessed on 25/01/2023)

[26] https://biocarbonregistry.com/en/projects/ (Accessed on 25/01/2023)

[27] https://projects.globalcarboncouncil.com/pages/submitted_projects (Accessed on 25/01/2023)

[28] https://registry.verra.org/app/search/VCS (Accessed on 25/01/2023)

[29] Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf (ghgprotocol.org) (Accessed on 25/01/2023)

and Reporting Standard "The generator does not account for scope 3 emissions associated with sold electricity because the emissions are already accounted for in scope 1."

Consequently, the project activity is not related with any scope 3 emissions. Nevertheless, the PP has taken the action to notify manure supplier farm owners regarding the VCU ownership as mentioned in the Section 1.8 of this MR.

1.11 Sustainable Development Contributions

During the current monitoring period, the project positively contributed to four of the UN Sustainable Development Goals (SDGs) in total. These SDGs are given below.

- SDG 7 Affordable & Clean Energy,
- SDG 8 Decent Work & Economic Growth,
- SDG 13 Climate Action,
- SDG 17 Partnerships for The Goals.

- **Goal 7: Affordable and Clean Energy**

The project as a biogas-to-energy technology generates renewable energy by capturing biogas from animal manure -via anaerobic digestion- and utilizing it to produce thermal and electric energy. Whilst heat generated at the plant is used at the facility mainly to warm the digesters, the generated electricity is used both for auxiliary consumption at the plant and supplied to the national grid. The amount of renewable electricity (MWh) generated by the project that was fed into the national grid was continuously monitored via electricity meters installed at the plant. The data obtained from the meters was recorded and archived electronically on the on-site project data logbooks by the project proponents, whilst the data was cross-checked with the bills generated by the designated official electricity distribution company.

During the current monitoring period, the amount of renewable energy fed to the Turkish national grid by the project is given in the Table 3 below:

Table 3: Amount of Renewable Energy Supplied to the National Grid during the Current Monitoring Period

Monitoring Period (Calendar Based Breakdowns)	Amount of Electricity Supplied to the National Grid (MWh)
30/07/2019 – 31/12/2019	466
01/01/2020 – 31/12/2020	8,793
01/01/2021 – 31/12/2021	10,541
01/01/2022 – 31/07/2022	4,077
The Current Monitoring Period **30/07/2019 – 31/07/2022**	**23,877**

The project's net positive contribution to SDG Goal 7 during the current monitoring period has been in alliance with the nationally stated development goals[30] as well. By supplying 23,877 MWh to the national grid, the project contributed to the national objective 'to ensure uninterrupted, high-quality, sustainable, reliable and affordable energy supply' (ibid.:122) stated in the eleventh development plan of the Republic of Turkey[31]. More specifically, the project contributed to the measure of the nationally stated goal 'Electricity generation from renewable energy sources will be increased' (ibid.:123).

- Goal 8: Decent Work and Economic Growth

The project activity has created 15 permanent jobs for maintenance and operation during the current monitoring period. In addition, the employees were provided with occupational health and safety trainings. The data on number of permanent and skilled jobs created by the project activity is provided by the project proponent, based on the project's administrative and training records. Such data is recorded electronically and cross-checked with the project's personnel affairs' official records submitted to the governmental offices, together with the company's official social security and training records.

[30] https://www.sbb.gov.tr/wp-content/uploads/2022/07/On_Birinci_Kalkinma_Plani-2019-2023.pdf (Accessed on 25/01/2023)

[31] https://www.sbb.gov.tr/wp-content/uploads/2022/07/On_Birinci_Kalkinma_Plani-2019-2023.pdf (Accessed on 25/01/2023)

The project's net positive contribution to SDG Goal 8 during the monitoring period has been in alliance with the nationally stated development goals as well. By providing 15 people employment opportunity, the project contributed the objective 'to provide decent work opportunities to all segments of the society' (ibid:144).

- **Goal 13: Climate Action**

The total GHG emission reductions generated during the current monitoring period are calculated as 168,813 tCO_2eq. The data was calculated as per the applied Meth. and verified by the assigned VVB. One should note that this value is slightly higher than the ER claimed (in Section 5 of this report) during the monitoring period, since the 60,000 tCO_2/yr cap of the small scale methodology (AMS-III.D.) is not applied here. By reducing GHG emissions through the project activity, contribution to a national goal defined as 'to reduce carbon emissions will be developed through additional measures' (ibid.:123) is ensured.

The amount of "net" emission reductions generated by the project during the current monitoring period is given in the Table 4 below:

Table 4: Net GHG emission reductions generated by the project activity during the current monitoring period

Monitoring Period (Calendar Based Breakdowns)	Net GHG Reductions (tCO_2eq)
30/07/2019 – 31/12/2019	13,047
01/01/2020 – 31/12/2020	60,844
01/01/2021 – 31/12/2021	64,003
01/01/2022 – 31/07/2022	30,918
The Current Monitoring Period 30/07/2019 – 31/07/2022	**168,813**

- **Goal 17: Partnerships for the Goals**

The project has a contractual agreement with the Turkish state under the Public-Private Partnership-based (PPP) Renewable Energy Support Scheme (YEKDEM) aiming at increasing electricity generation from renewable sources in Turkey. The official data on the electricity sale under the scheme were obtained from the project owner and recorded electronically on the on-site project data logbooks by the project proponents. The data have been further cross-checked with the electricity bills and the records on the electricity meters.

The project's contributions to SDGs in the monitoring period are summarized in the Table 5 below:

Table 5: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	The amount of electricity fed to the grid by the project during the current monitoring period is as follows: - 466 MWh between 30/07/2019 and 31/12/2019, - 8,793 MWh between 01/01/2020 and 31/12/2020, - 10,541 MWh between 01/01/2021 and 31/01/2021, - 4,077 MWh between 01/01/2022 and 31/07/2022, Accordingly, the total electricity fed to the grid during the current monitoring period is 23,877 MWh.	This is the first SDG Contribution report, relevant data are included in the current contributions section.
2)	8.0	Number of permanent and skilled job created	Implemented activities to increase	The project activity has created 15 permanent jobs for maintenance and operation during the current monitoring period. In addition, the employees were provided with occupational health and safety trainings.	This is the first SDG Contribution report, relevant data are included in the current contributions section.

3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project has generated 168,813 metric tons of CO_2eq in total net GHG emissions reductions during the current monitoring period.	This is the first SDG Contribution report, relevant data are included in the current contributions section.
4)	17.17	17.17.1 Amount in United States dollars committed to public-private partnerships for infrastructure	Implemented activities to increase	The project has a contractual agreement with the Turkish state under the Public-Private Partnership-based (PPP) Renewable Energy Support Scheme (YEKDEM) aiming at increasing electricity generation from renewable sources in Turkey. The scheme has enabled the project to receive USD 0.133 per kWh fed to the national grid for the first ten years following the project's implementation.	This is the first SDG Contribution report, relevant data are included in the current contributions section.

2 SAFEGUARDS

2.1 No Net Harm

The Environmental Impact Assessment (EIA) Report was approved and issued by the Ministry of Environment, Urbanization and Climate Change in Turkey on 27/09/2018. In accordance with the Turkish laws and regulations, the EIA's approval is only issued if the project subjected to the approval does not make any negative environmental and socio-economic impacts. Considering the fact that the proposed project activity already obtained the EIA approval by the Ministry of Environment, Urbanization and Climate Change in Turkey, it is therefore possible to claim that there is no net harm linked to the project.

2.2 Local Stakeholder Consultation

Due to the COVID-19 pandemic the project owner conducted an online local stakeholder consultation meeting on 21/01/2022. Before the stakeholder consultation meeting, the project information with contact information and the stakeholder meeting notice were published on a local newspaper Gazete Kayseri. In addition, personal invitation letters were sent to the local governmental officials.

Minutes of the LSC Meeting

The LSC meeting was held online on 21/01/2022, as planned. 22 people attended the meeting.

a) Opening of the meeting & Introduction (14:00 – 14:05):

The person appointed as the Moderator of the meeting greeted the participants and shared the purpose and agenda of the meeting. Then, site manager of the Project, Mr. Gökhan Pak, who is actively working on the project and its field, was invited to present the technical description of the project.

b) Project Introduction and Description (14:05 – 14:20):

The site manager Mr. Gökhan Pak made a presentation of the improvements at the project site. They provided detailed information on how the Kayseri Biogas Plant functions and talked about the technical information in a way that could easily be understood by the audience. His presentation included the following points:

- Background of the project site;

- What biogas is;

- How a biogas plant would generate renewable energy;

- Waste characterization of the incoming waste stream;

- Technical details of the Kayseri Biogas Plant;

- The installed capacity of the plant;

- The main motivation behind implementing the Project;

- Its exact location;

- Its main outcomes in terms of electricity;

- Its process flow chart;

- Its main components;

- Its main phases;

- The timelines for implementing the Project;

- The key milestones of the Project.

The rules of the webinar, links for the question submission and feedback form about the project were continuously shared by the moderator in the "chat" section. Also, Dr. Önder's mail address was continuously shared as a part of continuous feedback mechanism.

c) Brief introduction to climate change, sustainable development, carbon offsetting mechanisms and registration processes (14:20 – 14:40):

Climate & Sustainability Consultant Mrs. Yüzer, provided insights into the historical backgrounds of Sustainable Development and Climate Change at the international arena, including, the establishment of UNFCCC in 1994 and the 1997 Kyoto Protocol. Then, she briefly explained what the UN's Sustainable Development Goals were. During her presentation, the audience were informed about how they could learn more about the SDGs by showing the official UN's web sites in Turkish, the local language. She continued by explaining main greenhouses gas types and results of this gases on the world and gave an end to her speech by providing insight about how to manage a biogas site in an environmentally friendly manner.

Mr. Göker Avcı started his speech later on by explaining the audience that one of the central subjects and aims in organizing the meeting was to assess the Project's contribution in achieving sustainable development goals and in tackling climate crisis. He sketchily explained what VERRA/VCS was, how it functioned and what the main requirements were for projects like Kayseri Biogas Plant to access to its certification.

He continued by explaining MRV Monitoring, Measuring, Reporting and Verifying processes. He then clarified the two main requirements which a carbon offsetting activity needs to fulfill: 'contribution to sustainable development in host country/communities' and 'additionality'. In order to simplify these complex terms to an appropriate level that met the stakeholders' understanding, examples were provided.

d) Questions and Answers (14:40 – 15:00):

Majority of the questions were linked to the technical details of the project. The questions asked by the attendees are as follows;

- How was the location of the facility determined? Does the location have an advantage or disadvantage?

Our facility is located close to the center of Kayseri and animal farms. In addition, being close to Başyazıcı Animal Farm, our main investor, saves us time in the collection process of approximately 40% of our feedstock needs. At the same time, we prevent releasing emissions during the transportation of feedstocks.

- What is the potential of Kayseri province for biogas facilities?

We collect 60% of the waste generated in a radius of approximately 20 km from our location. Therefore, there is space for many more facilities.

- How is the transport of waste carried out in integrated facilities?

We carry out the transportation of feedstock with special trucks in our facility.

- In addition to generating electricity, does the facility also provide any benefit to the local farmers?

Fermented manure, which is formed as a by-product in the electricity generation process, is distributed free of charge to the farmers who request it. We get positive feedback from the farmers who apply it on their land.

- What is the percentage of manure in the region that the facility can collect among?

We collect 60% of the waste generated in a radius of approximately 20 km from our location in our facility.

- Do you accept interns to the facility?

We accept them if they meet the necessary conditions for the trainee position. Applications are mostly from the department of energy systems engineering. We have recruited interns before.
- Can you temporarily store the energy when you are unable to feed the city grid due to an instant stop of the plant?
We do not have a chance to store the electricity generated. Since we have planned our generation, such a situation has not occurred yet. To be prepared for this situation, if we cannot generate electricity, we filter the stored methane gas not to harm the environment.
Starting at 14:40, moderator of the meeting checked submitted questions and directed those to the relevant presenters in the meeting.

e) Discussion of continuous input/grievance mechanism (15:00 – 15:15):

With the links shared by the moderator during the webinar, feedback on the project and meeting started to be received. During the project, feedback forms were left at the security booth at the project site entrance so that the stakeholders could give feedback, and project consultant Dr. Umut Önder's e-mail information has been shared continuously. In addition, the participants were informed that the project will be published on the VCS website for 1 month and that they can give feedback on the VCS website during this time.

f) Discussion on Monitoring Sustainable Development & Closure of the Meeting (15:15 – 15:45):

At the final section, Sustainable Development Contributions of the project and the monitoring method were presented by the moderator, Mr. Göker Avcı. The audience were invited to make comments about the Project's sustainable development impacts. The audience was reminded of the Project's proposed positive impacts on the sustainable development, which were discussed earlier at the meeting during the climate crisis information section. The moderator ensured that the audience was aware that they, as the stakeholders, had responsibilities to monitor these impacts. He reminded the stakeholders that their voices would be heard, and their concerns would be considered in every single phase of the proposed Project activity, particularly via the Continuous Input and Grievance Mechanisms explained earlier.

Following the discussion on the Project's impacts on sustainable development, the audience was invited to complete the Local Stakeholder Consultation Meeting Feedback Form. 5 out of 22 attendees completed the forms.

	Method Chosen (include all known details e.g., location of book, phone number)	Justifications
Continuous Input / Grievance Expression Process Book	A grievance book is put both at the project site and the project owners headquarter.	The grievance book is kept both at the project site and at the project owner headquarter. Anyone can go there to record their grievance or comment in the book. The project owner personnel will review and respond to the comments and record the response in the book as well.
Telephone access	Dr. ÖNDER's personal cell phone number is provided to the stakeholders attended to the LSC Meeting.	
Email access	Dr. ÖNDER's email address is provided to the stakeholders attended to the LSC Meeting.	

2.3 AFOLU-Specific Safeguards

Since the Project is not an AFOLU project, this section is not required.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project is being implemented by BYZ GLOBAL ENERJİ VE GÜBRE ÜRETİMİ TİCARET SANAYİ ANONİM ŞİRKETİ in Kocasinan district, Kayseri province, in Turkey.

In accordance with the VCS regulations, the restructuring of the project proponents has been executed. As stated in Section 1.3 of this monitoring report, partial release has been signed between Bio Solutions and KUZEY GLOBAL ENERJİ VE GÜBRE A.Ş on 03/02/2022, and the deed of accession in respect of VCS registration of representation issued by the Project Owner (PO) on 04/02/2022, for Climate Solutions will be submitted to both the VVB and VCS Registry. Accordingly, Climate Solutions, as a new PP, has been added.

The simplified flow sheet of the BYZ Global Energy Biogas Plant is shown in Figure 4 below.

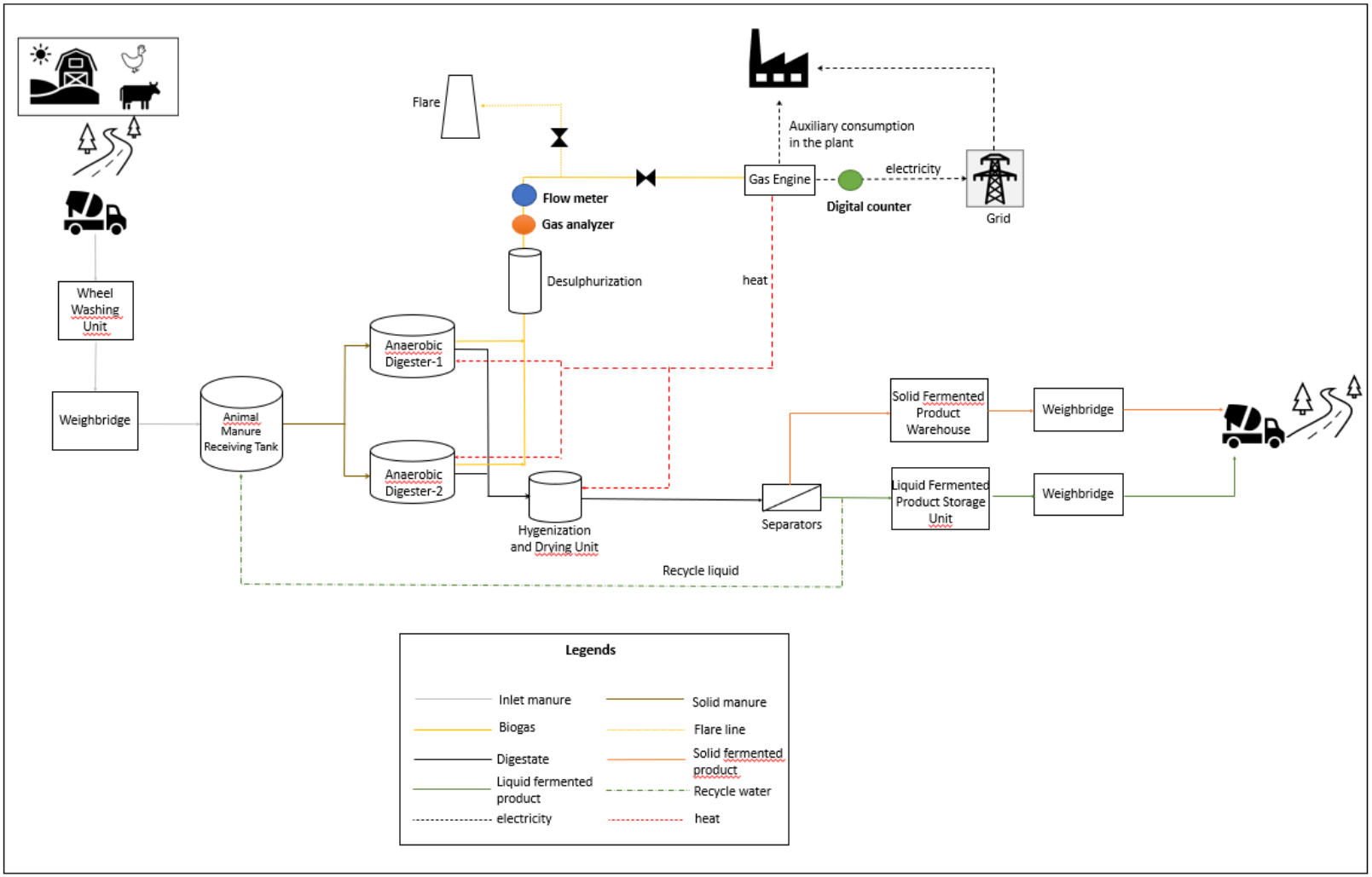

Figure 4. Flow chart of the project

The project consists of the installation of weighbridge, manure receiving tanks, anaerobic digestion reactor, gas cleaning unit (desulphurization), flaring unit, gas engine, hygenization and drying unit, separator unit, liquid fermented product storage, and solid fermented product warehouse.

The list of machinery and equipment to be used within the scope of the project is given in the table 6 below.

Table 6. Units involved in the project

UNIT NAME	NUMBER OF UNITS (Unit)
Parking Area	1
Wheel Washing unit	1
Weighbridge	1
Waste Feeding and Pre-Pools (Waste Receiving Tanks)	1
Fermenter Tank	2
Hygiene Tank	1
Separator	1
Liquid Fermented Product Storage Unit	1
Solid Fermented Product Warehouse	1
Biogas Generator System	1
Desulphurization System	1
Flare	1
Transformer	1
Engine room	1
Gas Engine	1
Administrative Building	1

Parking Area

A 65 m^2 vehicle parking area is created at the entrance of the operation area, where all vehicles coming to the facility can park.

Wheel Washing Unit

A wheel washing unit is established on an area of 80 m^2 in order to ensure the cleaning of vehicles' wheels entering and leaving the facility. The wheel washing unit will consist of a 40 cm deep pool and a pressurized washing system. Washing wastewater to be collected in the settling pond connected to the wheel washing unit is drawn by a special truck and sent to the nearest wastewater treatment plant.

Waste Receiving Unit

Wastes shall be accepted to the facility in a way that does not pose an environmental risk and necessary control systems shall be established to monitor the processing of wastes. In order to collect the animal wastes brought to the facility daily and prepare them to be shipped to the fermenting tanks with a pump, a pool made of C30 concrete with impermeability insulation is constructed. This pool is used for preliminary acceptance of bovine animals' waste. The pool will also be used as a unit where the amount of bovine animals' solid matter is balanced.

Fermenter Tank

Within the scope of the project, there are two digesters with a capacity of 5,500 m^3 each, where the waste coming from receiving tank is collected and the animal waste is fermented around for 35-45 days. It was covered with EPDM membrane and water and heat insulation was performed. There is a heating system in the fermenter where the hot water obtained partly from the biogas generator system is circulated. The length of pipes required for the heating system is determined according to the heat loss calculation, and the fittings are installed on the base and side walls of the fermenter units. Heat insulation is made on the ground and exterior of the fermenter in order to protect the heat inside.

Temperature, pressure, pH, solids content, organic loading values, alkalinity, volatile fatty acids and biogas production in the reactor where the fermentation process takes place shall be continuously monitored.

Figure 5. A fermenter tank of the project

Hygiene Unit

As per "Mechanical Separation, Bio-Drying and Biomethanization Plants and Fermented Product Management Communiqué"[32] (hereafter referred to as the Communiqué) issued by the Ministry of Environment, Urbanization and Climate Change in Turkey on October 10, 2015), the fermented product was heat treated for 1 hour at 70°C in a separate pool in order to meet the fermented product quality criteria listed in Annex-2 and Annex-3, and hygiene was ensured.

Separator

The separator is the machine necessary for the conversion of animal waste fermented in biogas plants to solid and liquid form. One separator is used within the scope of the project. The fermented output is separated in a separator with a power of 5.5-7.5 kW, operating according to the squeezing screw filter principle to be transformed into the final product in liquid and solid form.

Liquid Fermented Product Storage Unit

The fermented product can be used as a liquid or a solid by dehydrating. Products with a dry matter content of up to 15% are considered liquid fermented products. In case the liquid

[32] The communiqué/the notice is setting the technical and operational standards that biogas power plants in Turkey are mandated to meet. https://www.resmigazete.gov.tr/eskiler/2015/10/20151010-3.htm (Accessed on 25/01/2023)

fermented product is dehydrated, the oxygenated process is applied to ensure that the solid product obtained provides the stability values in Annex-4 of the Communiqué. The liquid fermented product coming from the separator was stored in a closed pool with a total area of 7,200 m^3. Liquid fermented product storage unit built in the facility area is 25 meters long, 57.6 meters wide and 5 meters deep, and built in a way not to be affected by meteorological events. An impermeable structure was insulated with an EPDM membrane.

Solid Fermented Product Warehouse

As stated in the Communiqué, for the solid fermented product coming out after passing hygiene and drying unit and the separator, a storage area with a total area of 760 m^2 was built, in a size where these products are deposited for at least 6.5 months without being affected by meteorological events.

Desulphurization System

The methane gas obtained is taken to the desulphurization device by blower. Desulphurisation device shall reduce the unwanted H_2S in the biogas below 200 ppm and at the same time keep the biogas constant at the desired 150 mbar pressure at the zero-pressure regulator inlet of the biogas engine. As long as the pressure and m^3 values of the biogas are kept under the desired conditions, electricity production shall be carried out by starting the biogas unit.

Biogas Burning Chimney (Flare)

If a problem is encountered in the biogas power plant, a torch (emergency gas burning system) with approximately 1700 kW thermal power is used to stabilize the gas in the safest way in the case that the gas cannot be spent in the biogas unit and stored.

Gas Engine

The gas produced in the reactor is cooled in a humidifier and the excess moisture is removed. Here, it is transferred to the gas engine with the help of a blower. In the gas engine, there is a system that we call the gas train and evaluates the parameters related to the gas in its content. Combustion occurs after the gas passing through here is mixed with air in the gas engine. The mechanical energy generated here is transferred to the alternator by the shaft in order to convert it into electrical energy. Mechanical energy is converted into electrical energy here and sent first to the transformers and then to the network line.

OUTPUT / FUEL CONSUMPTION

Power according to ISO Standards ICFN	kW	1.501
Effective fuel pressure and nominal speed	Bar	20.17
Fuel Type		Biogas
Methane content / Minimum methane content	MZ	135 (117 d)
Compression Ratio	Epsilon	12.5
Min. / Max. gas pressure (gas train inlet)	mbar	120 -200 c)
Gas pressure max. fluctuation	mbar/sec	10
Section 2 inlet temperature	°C	55
Specific engine fuel consumption	g/kWh	0.20
Max. oil temperature	°C	85
Jacket water temperature max.	°C	95
Oil tank capacity (filling)	Lit	~437

TECHNICAL DATA		
Manner of work		4 cycle
Configuration		V 70
Number of cylinders		20
Diameter	mm	145
Piston travel	mm	185
Nominal speed	rpm	1,500
Average piston speed	m/s	9.25
Length	mm	3,750
Width	mm	1,580
Height	mm	2,033
Empty weight	kg	7,200
Gross weight	kg	7,900
Moment of inertia	kgm^2	11.64
Rotation direction (from flywheel view)		Left
Radio interference level VDE 0875		N

Starter motor output	kW	13
Starter motor voltage	V	24

The project activity not only avoids methane emission through the above-mentioned capture and utilization processes but also reduces CO2 emission from fossil-fuel based electricity generation by supplying biogas-based electricity to the national grid.

In the registered PD, the emission reductions that the project generates per annum are estimated 61,243 tCO_2eq. The current monitoring period as the project's 1st crediting period is from July 30, 2019, to July 31, 2022. The total net GHG emission reductions or removals achieved in this monitoring period are 168,813 tCO_2eq.

In accordance with the VCS regulations, the restructuring of the project proponents has been executed. As stated in Section 1.3 of this monitoring report, the deed of accession in respect of VCS registration of representation issued on February 4th, 2022, for Climate Solutions were submitted to both the VVB and VCS Registry. Hence, Climate Solutions, as a new PP, has been added.

3.2 Deviations

3.2.1 Methodology Deviations

There is no deviation from the methodology during current monitoring.

3.2.2 Project Description Deviations

During the current monitoring period, one project deviation was applied. This deviation aims to reveal the changes (included and/or excluded farms) in the animal manure supplying farms during the current monitoring period and the animal farms declared in time of validation. These changes depend on the activities of the farms, manure quality, or the agreements between the farm's owners and the project owner. Accordingly, a more accurate way to apply the methodology of AMS-III.D has been achieved in line with Section 3.20 of VCS Standard 4.4[33]

Deviation 1: Changes in the animal manure supplying farms between the validation and verification period of the project

VCS Standard 4.4 Section 3.20 states that;

[33] https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf (Accessed on 20/06/2023).

''Projects may deviate from the validated project description in certain cases in order to accommodate changing circumstances post-validation. Such deviations must be described and assessed by a validation/verification body during the next project verification.''

In order to make the project's documentation more in alliance with the applied methodology and VCS Standard 4.4 requirements, the included/excluded farms supplying animal manure in the project activity during the current monitoring period which are different from farms declared during the validation period have been provided.

27 animal farms were reported in total, during the validation of the project. Following the validation of the project activity, 16 farms were excluded from the animal manure supplier farms list during the current monitoring period, updating the list of farms that supply animal manure. Furthermore, 10 new farms have been included during the current monitoring period. Excluded and included farms during the monitoring period have been clearly indicated in the table below and in Section 1.7 of VCS MR, as well.

Name of the Farms Declared at the Time of Validation	Name of the Farms Removed from the Current Monitoring Period	Manure Supplier Farms Included at the Current Monitoring Period
Admar Besi (Muhsin Seyitoğlu)	Bulut Besi	Adem Seyitoğlu Besi Çiftliği
Ahmet Seyitoğlu Besi	Cabbar Kaya Besi	Çetinoğlu Besi Çiftliği
Atalay Besi	Fatih Acar Besi	Emin Besi Çiftliği
Ateş Besi (Al Ateş Besi)	Halit Taştan Besi	Erciyes Besi Çiftliği
Başyazıcıoğlu Besi	İbrahim Mazmaloğlu Besi	Erciyes Tavukçuluk
Birlik Yumurta	Kalender Besi	İhsan Seyitoğlu Besi Çiftliği
Ercüment Aslan (Aslan Besi)	Karakaş Besi	Kayalar Besi Çiftliği
Genç Seyitoğlu	Mehmet Seyitoğlu Besi	M. Kudbettin Seyitoğlu Besi Çiftliği
Gürbüz Besi	Nizamettin Şen Besi	Mehmet Bellek Besi Çiftliği
İsmail Seyitoğlu Besi (Site Tarım)	Ömer Yalçın Besi	Yeşilbaş Besi Çiftliği
Recep Yıldırım Besi (Ry Besi)	Selahattin Aras	
Bulut Besi	Serkan Seyitoğlu Besi	
Cabbar Kaya Besi	Site Besi	
Fatih Acar Besi	Süleyman Seyitoğlu Besi	
Halit Taştan Besi	Şimsek Besi	
İbrahim Mazmaloğlu Besi	Yalınoğlu Yumurta	
Kalender Besi		
Karakaş Besi		
Mehmet Seyitoğlu Besi		
Nizamettin Şen Besi		
Ömer Yalçın Besi		
Selahattin Aras		

Serkan Seyitoğlu Besi		
Site Besi		
Süleyman Seyitoğlu Besi		
Şimsek Besi		
Yalınoğlu Yumurta		

In addition, it is important to note that the changes in the animal manure supplying farms are in line with the applied methodology of AMS-III.D and VCS Standard 4.4, do not require any methodological revisions do not have any impact on parameters and/or data use to demonstrate the project's additionality and does not affect the appropriateness of the baseline scenario.

3.3 Grouped Projects

Not Applicable since the proposed project activity is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	D_{CH4}
Data unit	t/m^3
Description	Density of methane at normal (at room temperature 20°C and 1 atm pressure) conditions
Source of data	Approved Large-Scale Methodology of AM0073: GHG emission reductions through multi-site manure collection and treatment in a central plant, Version 1.0[34]
Value applied	0.00067
Justification of choice of data or description of measurement methods and procedures applied	0.00067 t/m^3 at room temperature 20°C and 1 atm pressure
Purpose of Data	Used in

[34] https://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_8CTM5MFZLTDO7SZK1A6D7AK3YPIG7S (Accessed on 25/01/2023)

	• Calculation of baseline emissions
Comments	-

Data / Parameter	GWP_{CH4}
Data unit	t CO_2e/t CH_4
Description	Global Warming Potential for CH_4
Source of data	IPCC Fifth Assessment Report, Chapter 8, Table 8.A.1[35] (page 73)
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Default value from IPCC is used as per the applied methodology and as per Version 4.4 of the VCS Standard[36]
Purpose of Data	Used in • Calculation of baseline emissions • Calculation of project emissions
Comments	In Version 4.4 of the VCS Standard, an update to VCS rules requires use of global warming potential values from the IPCC Fifth Assessment Report (updating from the Fourth Assessment Report) for calculating greenhouse gas (GHG) emission reductions. This update is consistent with the Paris Agreement and other carbon crediting programs[37].

Data / Parameter	UF_b
Data unit	Fraction
Description	Model correction factor
Source of data	AMS-III.D. Version 21.0, paragraph 18[38]

[35] https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf (Accessed on 25/01/2023)

[36] https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf (Accessed on 25/01/2023)

[37] https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf (Accessed on 25/01/2023)

[38] https://cdm.unfccc.int/UserManagement/FileStorage/1AWXEKHVTYF423LCN56Z9GIMQOS8JR (Accessed on 25/01/2023)

Value applied	0.94
Justification of choice of data or description of measurement methods and procedures applied	Model correction factor to account for model uncertainties
Purpose of Data	Used in • Calculation of baseline emissions
Comments	-

Data / Parameter	$B_{0,LT}$
Data unit	m^3CH_4/kg- VS-dm
Description	Maximum methane producing potential of the volatile solid generated for animal type 'LT'
Source of data	2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2019), Volume 4, Chapter 10, Table 10.16, page 10.66[39] In accordance with 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2019), Turkey is regarded as part of the Middle East region.
Value applied	For Other Region – High Productivity Systems (PS), Other Cattle: 0.18; Chicken Layer (Hens): 0.39 Accordingly, the detailed default values for each farm is given in the Table below:

Farm Name	Type of Livestock (L)	$B_{0,LT}$ (m^3CH_4/kg-VS-dm)

[39] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf (Accessed on 25/01/2023)

ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	0.18
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	0.18
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	0.18
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	0.18
ASLAN BESİ ÇİFTLİĞİ	Other Cattle	0.18
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	0.18
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	0.18
ÇETİNOĞLU BESİCİLİK	Other Cattle	0.18
EMİN BESİ ÇİFTLİĞİ	Other Cattle	0.18
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	0.18
ERCİYES TAVUKÇULUK	Hens	0.39
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	0.18
GÜRBÜZ BESİCİLİK	Other Cattle	0.18
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	0.18
KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	0.18
KAYSERİ YEM (BİRLİK YUMURTA)	Hens	0.39
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	0.18
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	0.18
RY BESİ ÇİFTLİĞİ	Other Cattle	0.18
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	0.18

	YEŞİLBAŞ BESİ ÇİFTLİĞİ | Other Cattle | 0.18
Justification of choice of data or description of measurement methods and procedures applied	In accordance with 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2019), Turkey is regarded under Middle East region.
Purpose of data	Used in • Calculation of baseline emissions
Comments	Since there is no country specific data on $B_{0,LT}$ values for other cattle and hens, default values are used for developed countries in line with IPCC 2019 Refinement to the IPCC 2006 Guidelines (page 10.66 Table 10.16-Updated). Considering that only two types of animal manure (other cattle- and hens) are used as feedstock in the biogas production process of the project, the default maximum methane producing potential of the volatile solid generated values other cattle, and chicken in the animal category have been chosen. According to 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories[40] (IPCC 2019), since Turkey is considered a Middle East country, the above-mentioned values (Other Cattle: 0.18 and Hens: 0.39) in the other region category have been used. Since the farms supplying feedstocks to the project are doing commercial production and sales-oriented farms, high-productivity values for other regions have been chosen as per the definition stated in the 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (ibid.: 10.13).

Data / Parameter	$EF_{CH4,default}$
Data unit	Fraction (t CH_4 leaked / t CH_4 produced)

[40] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf (Accessed on 25/01/2023)

Description	Default emission factor for the fraction of CH4 produced that leaks from the anaerobic digester
Source of data	Methodological Tool 14: Project and leakage emissions from anaerobic digesters, Version 02.0
Value applied	0.028
Justification of choice of data or description of measurement methods and procedures applied	Digesters with steel or lined concrete or fiberglass digesters and a gas holding system (egg shaped digesters) and monolithic construction.
Purpose of data	Used in • Calculation of project emissions
Comments	

Data / Parameter	$EF_{CO2,transport}$
Data unit	$kgCO_2/km$
Description	CO_2 emission factor from fuel use due to transportation
Source of data	Methodological tool: Project and leakage emissions from transportation of freight, Version 1.
Value applied	0.245
Justification of choice of data or description of measurement methods and procedures applied	Default value for light vehicles is selected. Selection is conservative compared to heavy vehicles and in agreement with the type of vehicles to be used for the project transportation activities.
Purpose of Data	Used in • Calculation of project emissions
Comments	-

Data / Parameter	$EF_{EF,j,y} = EF_{grid,y}$
Data unit	tCO2e/MWh
Description	Emission factor for the Turkish National Grid
Source of data	Published data from The Ministry of the Energy and Natural Resources in Turkey[41]
Value applied	0.5403
Justification of choice of data or description of measurement methods and procedures applied	Emission factor for the Turkish National Grid was sourced from the published data by the Ministry of Energy and Natural resources of Turkey which follows the applicable "Tool to calculate the emission factor for an electricity system", version 07.0. According to this, the PP used the ex-ante simple OM calculation method. In the case of the BM, the PP chose **Option 1** (ex-ante option) in terms of availability of vintage of data. In line with the applied tool and published data, the default weights for the operating margin and build margin emission factors were taken as 0.5. Hence, calculating the weighted average CM, the PP used the value of 0.5403 in the ER calculations.
Purpose of data	Used in • Calculation of baseline emissions • Calculation of project emissions
Comments	-

Data / Parameter	$SPEC_{flare}$
Data unit	Temperature - °C Flow rate or heat flux - kg/h or m3/h Maintenance schedule - number of days
Description	Manufacturer's flare operating specifications for temperature, flow rate and maintenance schedule

[41] https://enerjiapi.etkb.gov.tr/Media/Dizin/ETKB/Duyurular/0c6b62ea-bf2f-4fea-b9b3-28bc6f48ddf2_Bilgi_Formu_-_Web_Sitesi.pdf (Accessed on 25/01/2023)

Source of data	ENT Flare Ltd. Şti.
Value applied:	Temperature – 30-800°C Flow rate or heat flux – 250-750 m3/h Maintenance schedule – Shall be scheduled in case of changing operating conditions.
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	-
Comments	

4.2 Data and Parameters Monitored

Data / Parameter	$Q_{manure,LT,y}$
Data unit	Tonnes-dm/year
Description	Quantity of manure treated from livestock type LT at animal manure management system j
Source of data	On site measurement, operational and lab logbooks (weighbridge and lab logbook records)
Description of measurement methods and procedures to be applied	Each manure load transported to the site is measured with weight balance / or truck load capacity. (In case of weigh bridge failure, rated capacity of truck load is considered for the calculation.) In addition, since the applied Meth requires quantity of manure to be measured in dry basis, the weighbridge data is multiplied with dry matter parameter measured for each farm.
Frequency of monitoring/recording	Annually, based on daily measurement and monthly aggregation.

Value monitored		
	Farm Name	$Q_{manure,LT,y}$ (tonnes-dm/yr)
	2019 (30/07/2019 – 31/12/2019)	
	ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	104.53
	ADMAR BESİ ÇİFTLİĞİ	88.74
	AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	75.82
	AL ATEŞ BESİ ÇİFTLİĞİ	2141.11
	ASLAN BESİ ÇİFTLİĞİ	73.54
	ATALAY BESİ ÇİFTLİĞİ	183.45
	BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	2612.85
	ÇETİNOĞLU BESİCİLİK	71.42
	EMİN BESİ ÇİFTLİĞİ	170.17
	ERCİYES BESİ ÇİFTLİĞİ	135.98
	GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	209.62
	GÜRBÜZ BESİCİLİK	243.82
	İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	73.91
	KAYALAR BESİ ÇİFTLİĞİ	247.12
	M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	144.35
	MEHMET BELLEK BESİ ÇİFTLİĞİ	167.41

RY BESİ ÇİFTLİĞİ	321.74
SİTE TARIM BESİ ÇİFTLİĞİ	204.96
YEŞİLBAŞ BESİ ÇİFTLİĞİ	365.54
TOTAL2019	**7,636.08[42]**
2020 (01/01/2020 – 31/12/2020)	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	179.26
ADMAR BESİ ÇİFTLİĞİ	152.47
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	134.50
AL ATEŞ BESİ ÇİFTLİĞİ	3758.60
ASLAN BESİ ÇİFTLİĞİ	121.42
ATALAY BESİ ÇİFTLİĞİ	340.94
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	4328.61
ÇETİNOĞLU BESİCİLİK	122.71
EMİN BESİ ÇİFTLİĞİ	296.53
ERCİYES BESİ ÇİFTLİĞİ	227.82
ERCİYES TAVUKÇULUK	2326.93
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	366.24
GÜRBÜZ BESİCİLİK	400.44
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	133.47
KAYALAR BESİ ÇİFTLİĞİ	431.04

[42] The Project started to treat hens manure by the beginning of 2020. Hence, the number of farms in 2019 is lower than other years.

KAYSERİ YEM (BİRLİK YUMURTA)	6555.76
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	252.96
MEHMET BELLEK BESİ ÇİFTLİĞİ	275.61
RY BESİ ÇİFTLİĞİ	557.70
SİTE TARIM BESİ ÇİFTLİĞİ	344.70
YEŞİLBAŞ BESİ ÇİFTLİĞİ	627.67
$TOTAL_{2020}$	**21935.35**
2021 (01/01/2021 – 31/12/2021)	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	221.52
ADMAR BESİ ÇİFTLİĞİ	200.19
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	213.51
AL ATEŞ BESİ ÇİFTLİĞİ	4443.52
ASLAN BESİ ÇİFTLİĞİ	89.24
ATALAY BESİ ÇİFTLİĞİ	354.31
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	5121.96
ÇETİNOĞLU BESİCİLİK	156.73
EMİN BESİ ÇİFTLİĞİ	357.51
ERCİYES BESİ ÇİFTLİĞİ	310.72
ERCİYES TAVUKÇULUK	2398.95
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	434.91

GÜRBÜZ BESİCİLİK	494.99
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	191.80
KAYALAR BESİ ÇİFTLİĞİ	485.29
KAYSERİ YEM (BİRLİK YUMURTA)	7723.61
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	355.05
MEHMET BELLEK BESİ ÇİFTLİĞİ	335.10
RY BESİ ÇİFTLİĞİ	410.45
SİTE TARIM BESİ ÇİFTLİĞİ	391.97
YEŞİLBAŞ BESİ ÇİFTLİĞİ	851.88
TOTAL$_{2021}$	**25543.20**
2022 **(01/01/2022 – 31/07/2022)**	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	104.74
ADMAR BESİ ÇİFTLİĞİ	169.84
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	74.55
AL ATEŞ BESİ ÇİFTLİĞİ	2389.21
ASLAN BESİ ÇİFTLİĞİ	137.52
ATALAY BESİ ÇİFTLİĞİ	108.84
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	2715.55
ÇETİNOĞLU BESİCİLİK	71.87
EMİN BESİ ÇİFTLİĞİ	167.81

	ERCİYES BESİ ÇİFTLİĞİ	137.41
	ERCİYES TAVUKÇULUK	1493.09
	GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	194.02
	GÜRBÜZ BESİCİLİK	234.18
	İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	74.10
	KAYALAR BESİ ÇİFTLİĞİ	238.17
	KAYSERİ YEM (BİRLİK YUMURTA)	4111.49
	M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	148.63
	MEHMET BELLEK BESİ ÇİFTLİĞİ	147.35
	RY BESİ ÇİFTLİĞİ	312.67
	SİTE TARIM BESİ ÇİFTLİĞİ	196.71
	YEŞİLBAŞ BESİ ÇİFTLİĞİ	354.52
	$TOTAL_{2022}$	**13,582.26**
	TOTAL (30/07/2019 – 31/07/2022)	**68,696.89**

Monitoring equipment	Weighbridge scales at the entrance and/or truck load capacity and trip aggregation. Also, lab logbook is used to obtain DM parameter for each farm.

Name:	Weighbridge
Manufacturer:	TUNAYLAR

	Type:	Non-Automatic weighbridge with a capacity of 60,000-80,000 kg
	Accuracy Class:	±0.02 tons
	Series Number:	15943
	Calibration Date:	31/05/2019
	Calibration Standard:	The Measurement and Measuring Instrument Regulations[43]'
	Measurements for dry matter are made with Shimadzu UniBloc MOC63u moisture analyser.	
QA/QC procedures to be applied	The monitored equipment for the weighbridge is calibrated periodically in accordance with manufacturer's recommendations and/or local/international standard to ensure accuracy and data is recorded and backed up.	
Purpose of data	Used in • Calculation of baseline emissions	
Calculation method	The weighbridge data monitored to measure quantity of raw manure (Q_y) supplied by each farm is multiplied with DM ratios for each farm in order to calculate quantity of manure in dry basis.	
Comments	-	

Data / Parameter	Q_y
Data unit	Tonnes-wet basis/year
Description	Quantity of raw manure co digested in the year y
Source of data	On site measurement, operational logbooks (weighbridge records)

[43] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=18793&MevzuatTur=7&MevzuatTertip=5#:~:text=a)%20Tart%C4%B1%20aletlerinin%20periyodik%20muayene,y%C4%B1l%20birinci%20y%C4%B1l%20olarak%20say%C4%B1l%C4%B1r. (Accessed on 25/01/2023)

Description of measurement methods and procedures to be applied	Each manure load transported to the site is measured with weight balance / or truck load capacity. (In case of weigh bridge failure, rated capacity of truck load is considered for the calculation.)
Frequency of monitoring/recording	Annually, based on daily measurement and monthly aggregation
Value monitored	

Farm Name	Q_y (Tonnes-wet basis/yr)
2019 (30/07/2019 – 31/12/2019)	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	559
ADMAR BESİ ÇİFTLİĞİ	472
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	417
AL ATEŞ BESİ ÇİFTLİĞİ	12,821
ASLAN BESİ ÇİFTLİĞİ	872
ATALAY BESİ ÇİFTLİĞİ	944
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	14,489
ÇETİNOĞLU BESİCİLİK	414
EMİN BESİ ÇİFTLİĞİ	1,002
ERCİYES BESİ ÇİFTLİĞİ	820
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	1,128
GÜRBÜZ BESİCİLİK	1,336
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	389
KAYALAR BESİ ÇİFTLİĞİ	1,337

M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	781
MEHMET BELLEK BESİ ÇİFTLİĞİ	878
RY BESİ ÇİFTLİĞİ	1,747
SİTE TARIM BESİ ÇİFTLİĞİ	1,169
YEŞİLBAŞ BESİ ÇİFTLİĞİ	2,044
$TOTAL_{2019}$	**43,619**
2020 **(01/01/2020 – 31/12/2020)**	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	976
ADMAR BESİ ÇİFTLİĞİ	842
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	750
AL ATEŞ BESİ ÇİFTLİĞİ	22,895
ASLAN BESİ ÇİFTLİĞİ	1,499
ATALAY BESİ ÇİFTLİĞİ	1,765
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	24,398
ÇETİNOĞLU BESİCİLİK	725
EMİN BESİ ÇİFTLİĞİ	1,789
ERCİYES BESİ ÇİFTLİĞİ	1,407
ERCİYES TAVUKÇULUK	9885
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	2,016
GÜRBÜZ BESİCİLİK	2,235

İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	728
KAYALAR BESİ ÇİFTLİĞİ	2,364
KAYSERİ YEM (BİRLİK YUMURTA)	35,426
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	1,395
MEHMET BELLEK BESİ ÇİFTLİĞİ	1,504
RY BESİ ÇİFTLİĞİ	3,120
SİTE TARIM BESİ ÇİFTLİĞİ	2,007
YEŞİLBAŞ BESİ ÇİFTLİĞİ	3,651
$TOTAL_{2020}$	**121,197**
2021 **(01/01/2021 – 31/12/2021)**	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	1,205
ADMAR BESİ ÇİFTLİĞİ	1,106
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	1,190
AL ATEŞ BESİ ÇİFTLİĞİ	27,026
ASLAN BESİ ÇİFTLİĞİ	1,104
ATALAY BESİ ÇİFTLİĞİ	1,835
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	28,802
ÇETİNOĞLU BESİCİLİK	926
EMİN BESİ ÇİFTLİĞİ	2,158
ERCİYES BESİ ÇİFTLİĞİ	1,920

ERCİYES TAVUKÇULUK	10,681
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	2,394
GÜRBÜZ BESİCİLİK	2,764
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	1,050
KAYALAR BESİ ÇİFTLİĞİ	2,664
KAYSERİ YEM (BİRLİK YUMURTA)	42,418
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	1,958
MEHMET BELLEK BESİ ÇİFTLİĞİ	1,827
RY BESİ ÇİFTLİĞİ	2,293
SİTE TARIM BESİ ÇİFTLİĞİ	2,280
YEŞİLBAŞ BESİ ÇİFTLİĞİ	4,960
TOTAL$_{2021}$	**142,561**
2022 **(01/01/2022 – 31/07/2022)**	
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	587
ADMAR BESİ ÇİFTLİĞİ	985
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	426
AL ATEŞ BESİ ÇİFTLİĞİ	13,401
ASLAN BESİ ÇİFTLİĞİ	840
ATALAY BESİ ÇİFTLİĞİ	1,024

		BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	14,368
		ÇETİNOĞLU BESİCİLİK	408
		EMİN BESİ ÇİFTLİĞİ	998
		ERCİYES BESİ ÇİFTLİĞİ	843
		ERCİYES TAVUKÇULUK	6,458
		GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	1,204
		GÜRBÜZ BESİCİLİK	1,301
		İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	419
		KAYALAR BESİ ÇİFTLİĞİ	1,379
		KAYSERİ YEM (BİRLİK YUMURTA)	23,154
		M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	850
		MEHMET BELLEK BESİ ÇİFTLİĞİ	842
		RY BESİ ÇİFTLİĞİ	1,830
		SİTE TARIM BESİ ÇİFTLİĞİ	1,162
		YEŞİLBAŞ BESİ ÇİFTLİĞİ	2,096
		$TOTAL_{2022}$	**74,575**
		TOTAL (30/07/2019 – 31/07/2022)	**382,952**
Monitoring equipment	Weigh bridge scales at the entrance and/or truck load capacity and trip aggregation.		

	Name:	Weighbridge
	Manufacturer:	TUNAYLAR
	Type:	Non-Automatic weighbridge with a capacity of 60,000-80,000 kg
	Accuracy Class:	±0.02 tons
	Series Number:	15943
	Calibration Date:	31/05/2019
	Calibration Standard:	The Measurement and Measuring Instrument Regulations[44]'
QA/QC procedures to be applied	The monitored equipment for the weighbridge is calibrated periodically in accordance with manufacturer's recommendations and/or local/international standard to ensure accuracy and data are recorded and backed up.	
Purpose of data	Used in • Calculation of project emissions	
Calculation method	-	
Comments	-	

Data / Parameter	$SVS_{LT,y}$
Data unit	tonnes VS/tonnes-dm
Description	Specific volatile solids content of animal manure from livestock type LT and animal manure management system j in year y
Source of data	Project proponents, Lab logbook records
Description of measurement methods and procedures to be applied	Volatile solids are measured/determined at the laboratory of the project as per Annex 2 of the methodology AM00073. These weekly measurements are then averaged for each farm to find the SVS value on the monitoring year.
Frequency of monitoring/recording	Weekly, aggregated to find annually.

[44] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=18793&MevzuatTur=7&MevzuatTertip=5#:~:text=a)%20Tart%C4%B1%20aletlerinin%20periyodik%20muayene,y%C4%B1l%20birinci%20y%C4%B1l%20olarak%20say%C4%B1l%C4%B1r. (Accessed on 25/01/2023)

Value monitored	Farm Name	Type of Livestock (L)	$SVS_{LT,y}$ (tonnes VS /tonnes-dm)
	2019 (30/07/2019 – 31/07/2022)		
	ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	70.38%
	ADMAR BESİ ÇİFTLİĞİ	Other Cattle	74.42%
	AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.27%
	AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	73.15%
	ASLAN BESİ ÇİFTLİĞİ	Other Cattle	74.12%
	ATALAY BESİ ÇİFTLİĞİ	Other Cattle	73.12%
	BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.72%
	ÇETİNOĞLU BESİCİLİK	Other Cattle	71.87%
	EMİN BESİ ÇİFTLİĞİ	Other Cattle	72.95%
	ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	72.32%
	GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	74.87%
	GÜRBÜZ BESİCİLİK	Other Cattle	75.25%
	İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.22%
	KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	74.87%
	M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	73.23%
	MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	72.18%

RY BESİ ÇİFTLİĞİ	Other Cattle	72.63%
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	72.52%
YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	74.20%
2020 (01/01/2020 – 31/12/2020)		
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	66.24%
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	74.86%
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	66.25%
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	73.83%
ASLAN BESİ ÇİFTLİĞİ	Other Cattle	73.08%
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	73.64%
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.16%
ÇETİNOĞLU BESİCİLİK	Other Cattle	72.66%
EMİN BESİ ÇİFTLİĞİ	Other Cattle	74.98%
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	72.25%
ERCİYES TAVUKÇULUK	Hens	83.5%
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	74.19%
GÜRBÜZ BESİCİLİK	Other Cattle	74.19%
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	73.00%
KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	74.85%
KAYSERİ YEM (BİRLİK YUMURTA)	Hens	81.39%

M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.61%
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	73.74%
RY BESİ ÇİFTLİĞİ	Other Cattle	73.45%
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	72.70%
YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	73.31%
2021 **(01/01/2021 – 31/12/2021)**		
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	71.69%
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	74.19%
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	70.51%
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	74.29%
ASLAN BESİ ÇİFTLİĞİ	Other Cattle	73.94%
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	71.83%
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	71.64%
ÇETİNOĞLU BESİCİLİK	Other Cattle	71.82%
EMİN BESİ ÇİFTLİĞİ	Other Cattle	75.56%
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	73.80%
ERCİYES TAVUKÇULUK	Hens	82.71%
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	77.25%
GÜRBÜZ BESİCİLİK	Other Cattle	71.42%
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	74.58%

KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	74.97%
KAYSERİ YEM (BİRLİK YUMURTA)	Hens	83.44%
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	73.66%
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	72.23%
RY BESİ ÇİFTLİĞİ	Other Cattle	75.44%
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	71.99%
YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	74.47%
2022 **(01/01/2022 – 31/07/2022)**		
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.18%
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	73.76%
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.17%
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	73.29%
ASLAN BESİ ÇİFTLİĞİ	Other Cattle	72.25%
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	71.49%
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	71.56%
ÇETİNOĞLU BESİCİLİK	Other Cattle	73.14%
EMİN BESİ ÇİFTLİĞİ	Other Cattle	73.13%
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	73.43%
ERCİYES TAVUKÇULUK	Hens	82.24&
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	73.12%

	GÜRBÜZ BESİCİLİK	Other Cattle	72.04%
	İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	72.32%
	KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	73.18%
	KAYSERİ YEM (BİRLİK YUMURTA)	Hens	72.93%
	M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	82.88%
	MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	73.25%
	RY BESİ ÇİFTLİĞİ	Other Cattle	73.42%
	SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	73.92%
	YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	73.86%

Monitoring equipment	The three main equipment used to determine volatile solid excretion rate in animal waste are as follow: • Muffle Furnace: MagmaTherm MTP-1100-20-P PRIMARY 1100°C Kamara; • Dry air sterilizer: Nükleon NST Series; • Precision balance: OHAUS PR Series.
QA/QC procedures to be applied	Logbook records of laboratory are checked for cross verification
Purpose of the data	Used in • Calculation of baseline emissions
Calculation method	Analyses have been performed in line with the Annex 2: 'Method for determination for Volatile Solids in animal waste' and the Annex 4: 'Guidance on sample extraction and statistical procedures' of the approved baseline and monitoring CDM methodology of AM0073: "GHG emission reductions through multi-site manure collection and treatment in a central plant, Version 1.0[45].

[45] https://cdm.unfccc.int/methodologies/DB/2N19WQ6DCXNYRNJVZQQOHG7TK0Q2D8 (Accessed on 25/01/2023)

	After determining the weekly VS values as mentioned above, their yearly average is calculated for each farm to obtain $SVS_{LT,y}$.
Comments	Detailed lab logbook data sheet on W1, W2 and Wf used in the SVS calculations as per Annex 2 of the methodology AM0073 are recorded in the lab logbook in hard copy version.

Data / Parameter	CT_y
Data unit	tonnes/truck
Description	Average truck capacity for transportation
Source of data	On site measurement / vehicle licenses
Description of measurement methods and procedures to be applied	Minimum capacity of the special trucks stated in the licences is taken as a conservative value.
Frequency of monitoring/recording	-
Value monitored	

Monitoring Period	CT_y (tonnes/truck)
(30/07/2019 – 31/12/2019)	15
(01/01/2020 – 31/12/2020)	15
(01/01/2021 – 31/12/2021)	15
(01/01/2022 – 31/07/2022)	15

Monitoring equipment	Weighbridge and vehicle licences

Name:	Weighbridge
Manufacturer:	TUNAYLAR

	Type:	Non-Automatic weighbridge with a capacity of 60,000-80,000 kg
	Accuracy Class:	±0.02 tons
	Series Number:	15943
	Calibration Date:	31/05/2019
	Calibration Standard:	The Measurement and Measuring Instrument Regulations[46]'
QA/QC procedures to be applied	Values are cross-checked with the recordings of the net capacity of the trucks at weighbridge readings, together with their official vehicle licences containing relevant information.	
Purpose of data	Used in • Calculation of project emissions	
Calculation method	-	
Comments	The parameter is also used to define the parameter $EF_{CO2,transport}$ as per the Methodological Tool: Project and leakage emissions from transportation of freight, Version 1.	

Data / Parameter	DAF_w
Data unit	km/truck
Description	Average incremental distance for raw solid manure transportation
Source of data	Project proponent measurements of distance
Description of measurement methods and procedures to be applied	Direct measurement of the distance between the collection point of manure-to-manure discharge point

[46] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=18793&MevzuatTur=7&MevzuatTertip=5#:~:text=a)%20Tart%C4%B1%20aletlerinin%20periyodik%20muayene,y%C4%B1l%20birinci%20y%C4%B1l%20olarak%20say%C4%B1l%C4%B1r. (Accessed on 25/01/2023)

Frequency of monitoring/recording	A fixed value is assumed until the locations of the collection point and discharge point are changed.
Value monitored	<table><tr><th>*Monitoring Period*</th><th>DAF_w</th></tr><tr><td>*(30/07/2019 – 31/12/2019)*</td><td>7.8</td></tr><tr><td>*(01/01/2020 – 31/12/2020)*</td><td>9.3</td></tr><tr><td>*(01/01/2021 – 31/12/2021)*</td><td>9.3</td></tr><tr><td>*(01/01/2022 – 31/07/2022)*</td><td>9.3</td></tr></table>
Monitoring equipment	Google maps
QA/QC procedures to be applied	-
Purpose of data	Used in • Calculation of project emissions
Calculation method	-
Comments	In case of any changes in the source of manure it will be logged and recorded electronically for the crediting period plus two years.

Data / Parameter	$EG_{PJ,y} = EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Electricity meter recordings / Bills issued to EPİAŞ

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>This parameter is monitored electricity meters Class 0.5S</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuous measurements and monthly recorded.</td></tr>
<tr><td>Value applied</td><td>
<table>
<tr><th>Monitoring Period</th><th>$EG_{PJ,y}$ (MWh/yr)</th></tr>
<tr><td>(30/07/2019 – 31/12/2019)</td><td>466</td></tr>
<tr><td>(01/01/2020 – 31/12/2020)</td><td>8,793</td></tr>
<tr><td>(01/01/2021 – 31/12/2021)</td><td>10,541</td></tr>
<tr><td>(01/01/2022 – 31/07/2022)</td><td>4,077</td></tr>
<tr><td>TOTAL</td><td>23,877</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td>Name:</td><td>Electricity meter - Main</td></tr>
<tr><td>Type:</td><td>Landis + Gyr E550</td></tr>
<tr><td>Accuracy Class:</td><td>0.5S</td></tr>
<tr><td>Series Number:</td><td>42595919</td></tr>
<tr><td>Calibration Date:</td><td>27/06/2019</td></tr>
<tr><td>Calibration Standard:</td><td>The Measurement and Measuring Instrument Regulations[47]’</td></tr>
</table>
<table>
<tr><td>Name:</td><td>Electricity meter – Back-up</td></tr>
<tr><td>Type:</td><td>Landis + Gyr E550</td></tr>
<tr><td>Accuracy Class:</td><td>0.5S</td></tr>
</table>
</td></tr>
</table>

[47] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5#:~:text=Naklimetre%20ve%20hububat%20muayene%20aletlerinin,ve%20Ayar%20Te%C5%9Fkilat%C4%B1%20taraf%C4%B1ndan%20yap%C4%B1l%C4%B1r (Accessed on 25/01/2023)

	Series Number:	42595975
	Calibration Date:	27/06/2019
	Calibration Standard:	The Measurement and Measuring Instrument Regulations'
QA/QC procedures to be applied	The electricity meter recordings are cross checked with the bills issued to EPİAŞ. The monitored equipment was calibrated and tested both by the manufacturer and the officially designated company in compliance with the Turkish legislation titled 'The Measurement and Measuring Instrument Regulations'[48], and data was recorded and backed-up. The calibration of the flow meter is valid for ten years in line with the Turkish Regulations.	
Purpose of data	Used in • Calculation of project emissions	
Calculation method	-	
Comments	-	

Data / Parameter	$EC_{PJ,j,y}$
Data unit	MWh/yr
Description	Quantity of electricity consumed by the project electricity consumption source the national grid in year y
Source of data	Bill issued by regional electricity distribution company named KEPSAŞ[49]
Description of measurement methods	This parameter is monitored via electricity meter Class 0.5S - Landis + Gyr E550

[48] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5#:~:text=Naklimetre%20ve%20hububat%20muayene%20aletlerinin,ve%20Ayar%20Te%C5%9Fkilat%C4%B1%20taraf%C4%B1ndan%20yap%C4%B1l%C4%B1r (Accessed on 25/01/2023)

[49] The local official electricity distribution company.

and procedures to be applied	
Frequency of monitoring/recording	Monitoring: Continuous measurements and monthly recorded Recording: Archive electronically during project plus 5 years
Value monitored	The following values have been monitored:

Monitoring Period	$EC_{PJ,y}$ (MWh/yr)
(30/07/2019 – 31/12/2019)	98
(01/01/2020 – 31/12/2020)	595
(01/01/2021 – 31/12/2021)	723
(01/01/2022 – 31/07/2022)	451
TOTAL	**1,867**

Monitoring equipment

Name:	Electricity meter - Main
Type:	Landis + Gyr E550
Accuracy Class:	0.5S
Series Number:	42595919
Calibration Date:	27/06/2019
Calibration Standard:	The Measurement and Measuring Instrument Regulations'

Name:	Electricity meter – Back-up
Type:	Landis + Gyr E550
Accuracy Class:	0.5S
Series Number:	42595975
Calibration Date:	27/06/2019

	Calibration Standard:	The Measurement and Measuring Instrument Regulations'
QA/QC procedures to be applied	These values are compared with the electricity consumption bills issued by the regional distribution company monthly; bills containing the amount of electricity consumed monthly. The monitored equipment was calibrated and tested both by the manufacturer and the officially designated company in compliance with the Turkish legislation titled 'The Measurement and Measuring Instrument Regulations'[50], and data was recorded and backed-up. The calibration of the flow meter is valid for ten years in line with the Turkish Regulations.	
Purpose of data	Used in • Calculation of project emissions	
Calculation method	-	
Comments	-	

Data / Parameter	$TDL_{j,y}$
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source of data	Calculated from the Data Provided by Turkish Electricity Transmission Corporation (TEİAŞ)[51] in accordance with Methodological Tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 3.0[52].

[50] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5#:~:text=Naklimetre%20ve%20hububat%20muayene%20aletlerinin,ve%20Ayar%20Te%C5%9Fkilat%C4%B1%20taraf%C4%B1ndan%20yap%C4%B1l%C4%B1r (Accessed on 25/01/2023)

[51] https://webapi.teias.gov.tr/file/512cbf1d-0ca3-4492-b901-3722c7b682f7?download (Accessed on 25/01/2023)

[52] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf (Accessed on 25/01/2023)

Description of measurement methods and procedures to be applied	The annual average value based on the most recent data available within Turkey is used from the data provided by TEİAŞ. In accordance with the Methodological Tool, for the data from the relevant year, 2021, is absence, most recent figures are used, but not older than 5 years. Accordingly, the annual network losses for the years of 2017, 2018, and 2019 are taken into account in calculating $TDL_{j,y}$.
Frequency of monitoring/recording	Annually
Value monitored	0.11
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Used in • Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	$Q_{CH4,y}$
Data unit	tCH_4/y
Description	Quantity of methane produced in the anaerobic digester in year y (tCH4/y)
Source of data	Flow meter readings
Description of measurement methods and procedures to be applied	The SCADA software system which is an automized control panel providing data on biogas production processes at the site instantaneously, provides the data on the amount of biogas produced in the anaerobic digesters, along with the methane

<table>
<tr><td></td><td>fraction in the biogas. These data are exported daily and recorded to the operational logbook.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Annually, based on daily records, monthly aggregation</td></tr>
<tr><td>Value monitored</td><td>
<table>
<tr><th>Monitoring Period</th><th>$Q_{CH4,y}$</th></tr>
<tr><td>(30/07/2019 – 31/12/2019)</td><td>772</td></tr>
<tr><td>(01/01/2020 – 31/12/2020)</td><td>2,240</td></tr>
<tr><td>(01/01/2021 – 31/12/2021)</td><td>2,331</td></tr>
<tr><td>(01/01/2022 – 31/07/2022)</td><td>1150</td></tr>
<tr><td>TOTAL</td><td>6493</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>The two main equipment used to determine quantity of methane produced in the anaerobic digester are as follow:
<table>
<tr><td>• Gas flow meter Name:</td><td>Biogas Flow Meter</td></tr>
<tr><td>Type:</td><td>Prosonic Flow B 200 HART</td></tr>
<tr><td>Accuracy Class:</td><td>≤ +/- 0.2%</td></tr>
<tr><td>Series Number:</td><td>N803BA02000</td></tr>
<tr><td>Calibration Date:</td><td>24/10/2018</td></tr>
<tr><td>Calibration Standard:</td><td>The Measurement and Measuring Instrument Regulations’</td></tr>
</table>
• Gas analyser
<table>
<tr><td>Name:</td><td>Gas Analyser – Biogas / Methane – Four ports</td></tr>
</table>
</td></tr>
</table>

	Type:	AwiFLEX Cool+
	Accuracy Class:	≤ +/- 0.2%
	Series Number:	2546
	Calibration Date:	11/10/2018
	Calibration Standard:	'The Measurement and Measuring Instrument Regulations'
QA/QC procedures to be applied	The monitoring equipments were calibrated and tested on 24/10/2018 and 11/10/2018, respectively by the manufacturer in compliance with the Turkish legislation titled 'The Measurement and Measuring Instrument Regulations'[53]. The calibration of the flow meter valid for ten years in line with the Turkish Regulations.	
Purpose of data	Used in • Calculation of project emissions	
Calculation method	-	
Comments	This parameter is calculated using the formula below in accordance with the Tool 14: Project and leakage emissions from anaerobic digesters as per the applied methodology. $Q_{CH4} = Q_{biogas,y} * w_{CH4} * \rho_{CH4,t}$	

Data / Parameter	MCF_j
Data unit	Fraction
Description	Annual methane conversion factor (MCF) for the baseline animal manure management system j
Source of data	Obtained from 2019 Refinement to 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2019), Volume 4, Chapter 10, Table 10.17 (Updated), page 67[54]

[53] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5#:~:text=Naklimetre%20ve%20hububat%20muayene%20aletlerinin,ve%20Ayar%20Te%C5%9Fkilat%C4%B1%20taraf%C4%B1ndan%20yap%C4%B1l%C4%B1r (Accessed on 25/01/2023)

[54] https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf (Accessed on 25/01/2023)

Description of measurement methods and procedures to be applied	For the project location, Kayseri province in Turkey, during the current monitoring period; **Meteorological Data[55]** / **2019** (30/07/2019 – 31/12/2019) / **2020** (01/01/2020 – 31/12/2020) / **2021** (01/01/2021 – 31/12/2021) / **2022** (01/01/2022 – 31/07/2022) Mean annual temperature: 11.8 / 11.95 / 11.45 / 9.9 Mean annual precipitation (MAP): 32.45 / 34.86 / 34.74 / 45.37 Potential Evapotranspiration (PET): 118.94 / 150.21 / 92.85 / 134.48 As per the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 3: Consistent Representation of Lands, Figure 3A.5.2, page 3.39, considering the meteorological data (mean annual temperature and MAP/PET) stated above, Kayseri's climate zone is determined as Warm Temperature Dry. Furthermore, in accordance with Information Required to Determine Climate Zones According to Chapter 3 of Volume 5 Current Guideline of IPCC 2019, page 10.129, Kayseri's climate zone is also considered as **Warm Temperate Dry**. j is Uncovered anaerobic lagoon. Thus, $MCF_{uncovered\ anaerobic\ lagoon}$ is, accordingly, accounted as 0.76.
Frequency of monitoring/recording	-
Value monitored	0.76
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Used in

[55] The official meteorological data obtained from the nearest meteorology center to the project location by the project proponents during the related monitoring period.

	• Calculation of baseline emissions
Calculation method	
Comments	The MCF value has been considered as 0.76 for related monitoring period (30/07/2019, to 31/07/2022, start and end dates included) according to the official meteorological data obtained from the nearest meteorology station to the project location by the project proponents during the related monitoring period and regarding the meteorological data.

Data / Parameter	DM
Data unit	%
Description	Residue remaining after water is removed from the manure by evaporation; dry matter
Source of data	Lab logbook records
Description of measurement methods and procedures to be applied	Measurements are made with Shimadzu UniBloc MOC63u moisture analyser.
Frequency of monitoring/recording	Weekly, aggregated to find annually.
Value monitored	

Farm Name	Type of Livestock (L)	DM %
2019 (30/07/2019 – 31/12/2019)		
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.70
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	18.80
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.18
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	16.70

ASLAN BESİ ÇİFTLİĞİ	Other Cattle	8.43
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	19.43
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.03
ÇETİNOĞLU BESİCİLİK	Other Cattle	17.25
EMİN BESİ ÇİFTLİĞİ	Other Cattle	16.98
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	16.58
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	18.58
GÜRBÜZ BESİCİLİK	Other Cattle	18.25
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	19.00
KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	18.48
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.48
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	19.07
RY BESİ ÇİFTLİĞİ	Other Cattle	18.42
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	17.53
YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	17.88
2020 **(01/01/2020 – 31/12/2020)**		
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.37
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	18.11
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.93
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	16.42

ASLAN BESİ ÇİFTLİĞİ	Other Cattle	8.10
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	19.32
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.74
ÇETİNOĞLU BESİCİLİK	Other Cattle	16.93
EMİN BESİ ÇİFTLİĞİ	Other Cattle	16.58
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	16.19
ERCİYES TAVUKÇULUK	Hens	23.54
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	18.17
GÜRBÜZ BESİCİLİK	Other Cattle	17.92
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.33
KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	18.23
KAYSERİ YEM (BİRLİK YUMURTA)	Hens	18.60
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.13
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	18.33
RY BESİ ÇİFTLİĞİ	Other Cattle	17.88
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	17.18
YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	17.19
2021 **(01/01/2021 – 31/12/2021)**		
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.38
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	18.10

AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.94
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	16.44
ASLAN BESİ ÇİFTLİĞİ	Other Cattle	8.08
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	19.31
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.78
ÇETİNOĞLU BESİCİLİK	Other Cattle	16.93
EMİN BESİ ÇİFTLİĞİ	Other Cattle	16.57
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	16.18
ERCİYES TAVUKÇULUK	Hens	22.46
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	18.17
GÜRBÜZ BESİCİLİK	Other Cattle	17.91
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.27
KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	18.22
KAYSERİ YEM (BİRLİK YUMURTA)	Hens	18.21
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.13
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	18.34
RY BESİ ÇİFTLİĞİ	Other Cattle	17.90
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	17.19
YEŞİLBAŞ BESİ ÇİFTLİĞİ	Other Cattle	17.18
2022 **(01/01/2022 – 31/07/2022)**		

ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.84
ADMAR BESİ ÇİFTLİĞİ	Other Cattle	17.24
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.50
AL ATEŞ BESİ ÇİFTLİĞİ	Other Cattle	17.83
ASLAN BESİ ÇİFTLİĞİ	Other Cattle	16.37
ATALAY BESİ ÇİFTLİĞİ	Other Cattle	10.63
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	Other Cattle	18.90
ÇETİNOĞLU BESİCİLİK	Other Cattle	17.61
EMİN BESİ ÇİFTLİĞİ	Other Cattle	16.81
ERCİYES BESİ ÇİFTLİĞİ	Other Cattle	16.30
ERCİYES TAVUKÇULUK	Hens	23.12
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	Other Cattle	16.11
GÜRBÜZ BESİCİLİK	Other Cattle	18.00
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.69
KAYALAR BESİ ÇİFTLİĞİ	Other Cattle	17.27
KAYSERİ YEM (BİRLİK YUMURTA)	Hens	17.76
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	Other Cattle	17.49
MEHMET BELLEK BESİ ÇİFTLİĞİ	Other Cattle	17.50
RY BESİ ÇİFTLİĞİ	Other Cattle	17.09
SİTE TARIM BESİ ÇİFTLİĞİ	Other Cattle	16.93

	YEŞİLBAŞ BESİ ÇİFTLİĞİ | Other Cattle | 16.91
Monitoring equipment	Shimadzu UniBloc MOC63u moisture analyser.
QA/QC procedures to be applied	-
Purpose of data	Used in • Calculation of baseline emissions
Calculation method	-
Comments	The moisture analyser initially measures the weight of the wet sample, then heats it up until it's dry, and measures the dried sample weight to find the dry matter fraction. The heating procedure continues until the weight reading is no longer changing. The device in the end gives the DM fraction on it's digital screen, hence this value is taken into account.

Data / Parameter	$BG_{burnt,y} = Q_{biogas,y}$
Data unit	m^3
Description	Biogas flared or combusted in year y
Source of data	Flow meter readings
Description of measurement methods and procedures to be applied	The SCADA software system which is an automized control panel providing data on biogas production processes at the site instantaneously, provides the data on the amount of biogas produced in the anaerobic digesters, along with the methane fraction in the biogas. These data are exported daily and recorded to the operational logbook.
Frequency of monitoring/recording	Annually, based on continuous flow measurement with accumulated volume recording
Value monitored	
Monitoring equipment	The main equipment used to determine quantity of biogas produced in the anaerobic digester is as follows:

Year	2019	2020	2021	2022
$BG_{burnt,y}$	2,134,421	5,749,637	5,911,903	3,248,431

	• Gas flow meter Name: Biogas Flow Meter Type: Prosonic Flow B 200 HART Accuracy Class: ≤ +/- 0.2% Series Number: N803BA02000 Calibration Date: 24/10/2018 Calibration Standard: The Measurement and Measuring Instrument Regulations'
QA/QC procedures to be applied	The monitored equipment was calibrated and tested on 05.11.2020 by the manufacturer in compliance with the Turkish legislation titled 'The Measurement and Measuring Instrument Regulations'[56] . The calibration of the flow meter valid for ten years in line with the Turkish Regulations.
Purpose of data	Used in • Calculation of net emission reduction
Calculation method	-
Comments	Since biogas flared and utilized are not monitored separately and recovered biogas is only used for electricity generation under normal operating conditions, this parameter is also equal to the amount of biogas captured ($Q_{biogas,y}$). This parameter is utilized for the calculation of quantity of methane produced in the anaerobic digester in year y ($Q_{CH4,y}$)

Data / Parameter	$w_{CH4,y}$
Data unit	Volume fraction
Description	Methane content in biogas in the year y
Source of data	Operational Logbook Records
Description of measurement methods	Volumetric fraction of methane in the captured biogas is measured and monitored with the gas analyzer whose data are transferred

56 https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5#:~:text=Naklimetre%20ve%20hububat%20muayene%20aletlerinin,ve%20Ayar%20Te%C5%9Fkilat%C4%B1%20taraf%C4%B1ndan%20yap%C4%B1l%C4%B1r (Accessed on 25/01/2023)

and procedures to be applied	into the Automation Control System/Screen (SCADA) and recorded to operational logbooks.
Frequency of monitoring/recording	Annually, based on daily records, monthly aggregation
Value monitored	

Period	$W_{CH4,y}$
July, 2019	0.54
August, 2019	0.54
September, 2019	0.54
October, 2019	0.54
November, 2019	0.53
December, 2019	0.54
Average (30/07/2019 – 31/12/2019)	**0.54**
January, 2020	0.56
February, 2020	0.57
March, 2020	0.57
April, 2020	0.60
May, 2020	0.59
June, 2020	0.59
July, 2020	0.58
August, 2020	0.60
September, 2020	0.59
October, 2020	0.58

November, 2020	0.58
December, 2020	0.57
Average (01/01/2020 – 31/12/2020)	**0.58**
January, 2021	0.58
February, 2021	0.60
March, 2021	0.61
April, 2021	0.60
May, 2021	0.58
June, 2021	0.62
July, 2021	0.60
August, 2021	0.59
September, 2021	0.58
October, 2021	0.60
November, 2021	0.58
December, 2021	0.57
Average (01/01/2021 – 31/12/2021)	**0.59**
January, 2022	0.54
February, 2022	0.54
March, 2022	0.52
April, 2022	0.54

	<table><tr><td>May, 2022</td><td>0.53</td></tr><tr><td>June, 2022</td><td>0.54</td></tr><tr><td>July, 2022</td><td>0.52</td></tr><tr><td>**Average (01/01/2022 – 31/07/2022)**</td><td>**0.53**</td></tr></table>
Monitoring equipment	The main equipment used to determine the volume fraction of methane produced in the anaerobic digester is as follows: • Gas analyser <table><tr><td>Name:</td><td>Gas Analyser – Biogas / Methane – Four ports</td></tr><tr><td>Type:</td><td>AwiFLEX Cool+</td></tr><tr><td>Accuracy Class:</td><td>≤ +/- 0.2%</td></tr><tr><td>Series Number:</td><td>2546</td></tr><tr><td>Calibration Date:</td><td>11/10/2018</td></tr><tr><td>Calibration Standard:</td><td>'The Measurement and Measuring Instrument Regulations'</td></tr></table>
QA/QC procedures to be applied	The monitored equipment was calibrated and tested on 11/10/2018 by the manufacturer in compliance with the Turkish legislation titled 'The Measurement and Measuring Instrument Regulations'[57].
Purpose of data	Used in • Calculation of "net" emission reduction • Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	FE
Data unit	%
Description	The flare efficiency
Source of data	Applied Methodology AMS-III.D: Methane Recovery in Animal Manure Management Systems, V21.0
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	-
Value monitored	90%
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Used in • Calculation of net emission reduction
Calculation method	-
Comments	As stated in Section 5.4 of VCS MR, the separate measurements of the respective flows are not performed in the project activity (please refer to Section 3.1 of VCS MR), the parameter of FE used in the MDy calculations has been considered as 90% in line with Methodological Tool: Project emissions from flaring, version 04.0.

Data / Parameter	$\eta_{flare,m}$
Data unit	%
Description	The flare efficiency
Source of data	Project emissions from flaring, version 04.0
Description of measurement methods	-

and procedures to be applied	
Frequency of monitoring/recording	-
Value applied	0%
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of data	Used in • Calculation of project emissions
Calculation method	-
Comments	The flare efficiency is determined based on the outlined in ''Project emission from flaring'' version 04.0 which states that "In the case of enclosed flares, project participants may choose between the following two options to determine the flare efficiency for minute m ($\eta_{flare,m}$). Option A: apply a default value for flare efficiency. Option B: measure the flare efficiency " Since flare efficiency is not measured within the project activity, Option A is selected. According to Option A "The flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating: (a) The temperature of the flare ($T_{EG.m}$) and the flow rate of the residual gas to the flare is within the manufacturer's operating specification for the flare ($SPEC_{flare}$) in the minute m; and (b) The flame is detected in the minute m ($Flame_m$). Otherwise $\eta_{flare,m}$ is 0%." Thus, flare efficiency is determined as 0% for the monitoring period.

Data / Parameter	$Flame_m$
Data unit	Flame on or Flame off
Description	Flame detection of flare in the minute m
Source of data	Operational Logbook Records
Description of measurement methods and procedures to be applied	Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off
Frequency of monitoring/recording	Once per minute.
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Used in • Calculation of project emission
Calculation method	-
Comments	As mentioned in 'PE_{flare}' and box, the project activity only involves the use of flare in case of emergencies or excess biogas. Therefore, detectors will become active when flare is operating.

Data / Parameter	$T_{EG,m}$
Data unit	°C
Description	Temperature in the exhaust gas of the enclosed flare in the minute m
Source of data	Operational Logbook records
Description of measurement methods and procedures to be applied	Thermocouple

Frequency of monitoring/recording	Once per minute Archive electronically during project plus 5 years
Value applied	-
Monitoring equipment	Thermocouple
QA/QC procedures to be applied	Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule
Purpose of data	Used in • Calculation of project emissions
Calculation method	-
Comments	This parameter will be measured in the case that flare is used. However, since flare is only an emergency equipment, it is not taken into account during current monitoring period.

4.3 Monitoring Plan

Organizational Structure

The Carbon Manager assigned to the project, is responsible for designing the monitoring plan and monitoring activities as per the guidelines of the Methodology. In doing so, the carbon manager ensures that quantifications of GHG emission reductions are real, reliable, and traceable. The organizational structure of the project, along with the personnel engaged with the plan, is given in Figure 6.

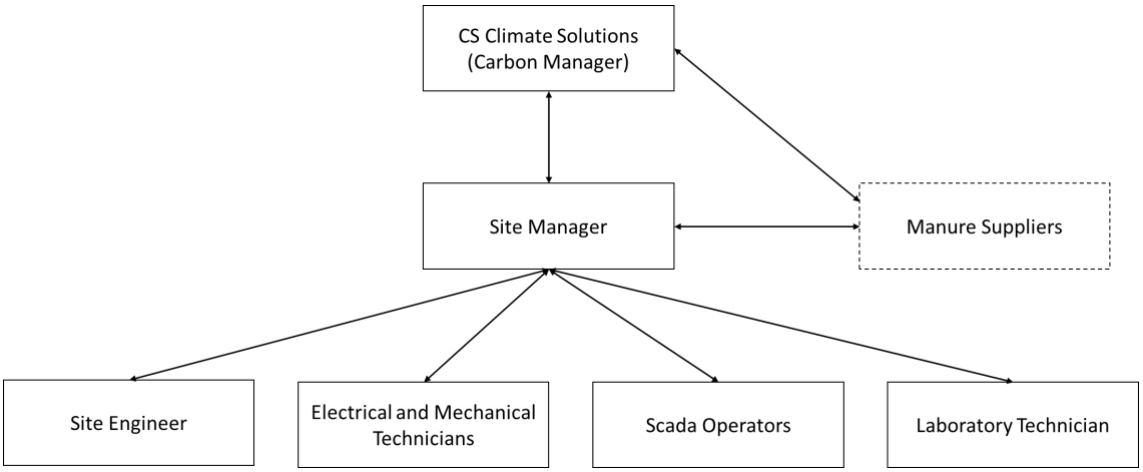

Figure 6. Organizational Structure of the Plant

The key roles and responsibilities of the personnel in carrying out the monitoring activities are defined as follows:

Carbon manager –

- Developing the project, determining the monitoring procedure, and providing the necessary guidance to the site manager as well as to the site personnel, in line with the available guidelines and rules of the Methodology and of VERRA/VCS.
- Preparing monitoring surveys to obtain relevant and necessary data related to animal manure and animal farm owners such as the monitoring parameters N_p (number of animals produced annually of type LT) and N_{da} (number of days animal is alive in the farm in the year), and as well to obtain information regarding the situation before the project activity, in other words, information regarding the baseline scenario.
- Ensuring the appropriateness of monitoring surveys that are conducted by the site engineer.
- Overseeing the implementation of the monitoring plan, in accordance with the methodological requirements.

Site manager –

- Executively managing all activities and operations (managing the budget and personnel, process controlling) in the plant, including the control unit of the plant, monitoring equipment and the staff.
- Recording the amount of diesel oil used by vehicles that transport manure, as well as the amount of treated fermented products, daily.
- Carrying-out/conducting monitoring surveys with the manure supplying farms. Surveys are kept in hard copy formats at the project site, then, passed to electronic records.
- Taking pictures and videos of anywhere within the project boundaries, such as desulphurization unit and uncovered anaerobic lagoons at the farms, when necessary.
- Overall, all the collected monitoring data from the site personnel, as well as the manure suppliers, are conveyed to the Carbon Manager by the site manager.

Site engineer (Process Engineer) –

- Overseeing biogas production process in the plant.
- Recording process parameters.
- Following up lab tests, commenting on lab analysis, biogas measurements and manure management.
- Ensuring the calibration of the equipment.
- Gathering the weighbridge recordings from the assigned personnel of the plant.
- Lastly, site/process engineer is also in charge of reporting to the site manager.

Electrical and mechanical technicians –

- Tracking the continuous operation of the gas engines, all electrical and mechanical equipment for electricity generation, as well as maintenance and calibration.
- Keeping operational logbook records and submitting them to the site manager periodically.

Both the site manager and the electrical and mechanical technicians are in charge of recording the data on the amount of electricity generated and supplied to the national grid.

SCADA operator–

- Monitoring all equipment and process variables (flow rate, biogas content, temperature, pressure, etc.) on SCADA System.
- Keeping electronic records extracted from SCADA and archiving them.

Both the electrical/mechanical technicians and SCADA operator at site are responsible for recording the data from flow meter as well as flame detector associated to the flare.

Laboratory personnel –

- Accredited technicians working at the Lab. are responsible for collecting samples from the assigned sampling points and conducting the necessary measurements/analysis on periodical basis.
- The analyses results are, first, recorded by the personnel to lab logbooks in a hard copy format and, then, to electronic records.
- The data recorded electronically will be archived during project plus five years, as per the applied Meth.
- The lab personnel are also in charge of ensuring the lab equipment is periodically calibrated.

Description of the Monitoring Plan

Table 7 describes the parameters monitored at the project site. Also, the Figure 7 shows on the flow sheet at which part of the project activity monitoring parameters are measured.

Table 7. Parameters monitored at the project site

Monitoring Parameter	Method to monitor/record	Responsible

$Q_{manure,LT,y}$ – quantity of manure treated from livestock type LT at animal manure management system j	Each manure load transported to the site is measured with weight balance / or truck load capacity. (In case of weigh bridge failure, rated capacity of truck load is considered for the calculation.) In addition, since the applied Meth requires quantity of manure to be measured in dry basis, the weighbridge data is multiplied with dry matter parameter measured for each farm.	Site manager / Site engineer
Q_y – quantity of raw manure co digested in the year y	Each manure load transported to the site is measured with weight balance / or truck load capacity. (In case of weigh bridge failure, rated capacity of truck load is considered for the calculation.)	Site manager / Site engineer
$SVS_{LT,y}$ – specific volatile solids content of animal manure from livestock type LT and animal manure management system j in year y	Volatile solids are measured/determined at the laboratory of the project as per Annex 2 of the methodology AM00073. These weekly measurements are then averaged for each farm to find the SVS value on the monitoring year.	Carbon manager and laboratory personnel
DM - Residue remaining after water is removed from the manure by evaporation; dry matter	Dry matter is measured / determined at the laboratory of the project using Shimadzu UniBloc MOC63u moisture analyser.	Carbon manager and laboratory personnel
CT_y – average truck capacity for transportation	Minimum capacity of the special trucks stated in the licences is taken as a conservative value.	Site manager / Site engineer
DAF_w - average incremental distance for raw solid manure transportation	Direct measurement of the distance between the collection point of manure-to-manure discharge point.	Site manager / Site engineer
$EG_{PJ,y} = EG_{facility,y}$ - Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Monitored by electricity meter readings and cross-checked with bills raised by EPİAŞ. Electricity meter readings are recorded by the staff.	Site manager and the electrical and mechanical technicians

$EC_{PJ,j,y}$ – Quantity of electricity consumed by the project electricity consumption source j in year y	Electricity meter readings and bills generated by regional distribution company.	Site manager and the electrical and mechanical technicians
$Q_{CH4,y}$ - Quantity of methane produced in the anaerobic digester in year y	The SCADA software system which is an automized control panel providing data on biogas production processes at the site instantaneously, provides the data on the amount of biogas produced in the anaerobic digesters, along with the methane content in the biogas. These data are exported daily and recorded to the operational logbook.	SCADA operator
$BG_{burnt,y}$ - Biogas flared or combusted in year y	Monitored by the flow meter at the main gas line after the anaerobic digesters.	SCADA operator
$w_{CH4,y}$ - Methane content in biogas in the year y	Monitored by the gas analyser at the main gas line after the anaerobic digesters.	SCADA operator
$T_{EG,m}$ - Temperature in the exhaust gas of the enclosed flare in the minute m	Monitored once per minute via thermocouple	SCADA operator / electrical technicians
$Flame_{,m}$ - Flame on or Flame off	Flame is detected if flare is used and residual gas is flared under emergency conditions.	SCADA operator / electrical technicians

The table above lists all the parameters monitored on site. The Carbon manager, as a PP, also monitors

- parameters taken from the IPCC guidelines, such as MCF_j;
- parameters taken from applied Methodologies and tools such as FE and $\eta_{flare,m}$;
- and carbon emissions factor for the grid in the project scenario ($EF_{grid,y}$) sourced from the Turkish Ministry of Energy and Natural Resources.

SDG related parameters / indicators are also monitored by the PP, the Carbon manager in particular. Amount of electricity supplied to the national grid (related to SDG 7) is monitored through the electricity bills and two-way electricity meters as indicated above for the $EG_{facility,y}$ parameter as well. Quantity of removed/avoided net GHG emission (related to SDG 13) is monitored through the ER calculations completed by the Carbon manager. Number of

permanent and skilled job created (related to SDG 8) is monitored through the personnel affairs' official records. Project's participation in public-private partnerships for infrastructure is monitored through YEKDEM scheme records. All the recordings related to SDG contributions will also be archived electronically at least for five years after the end of the last crediting period.

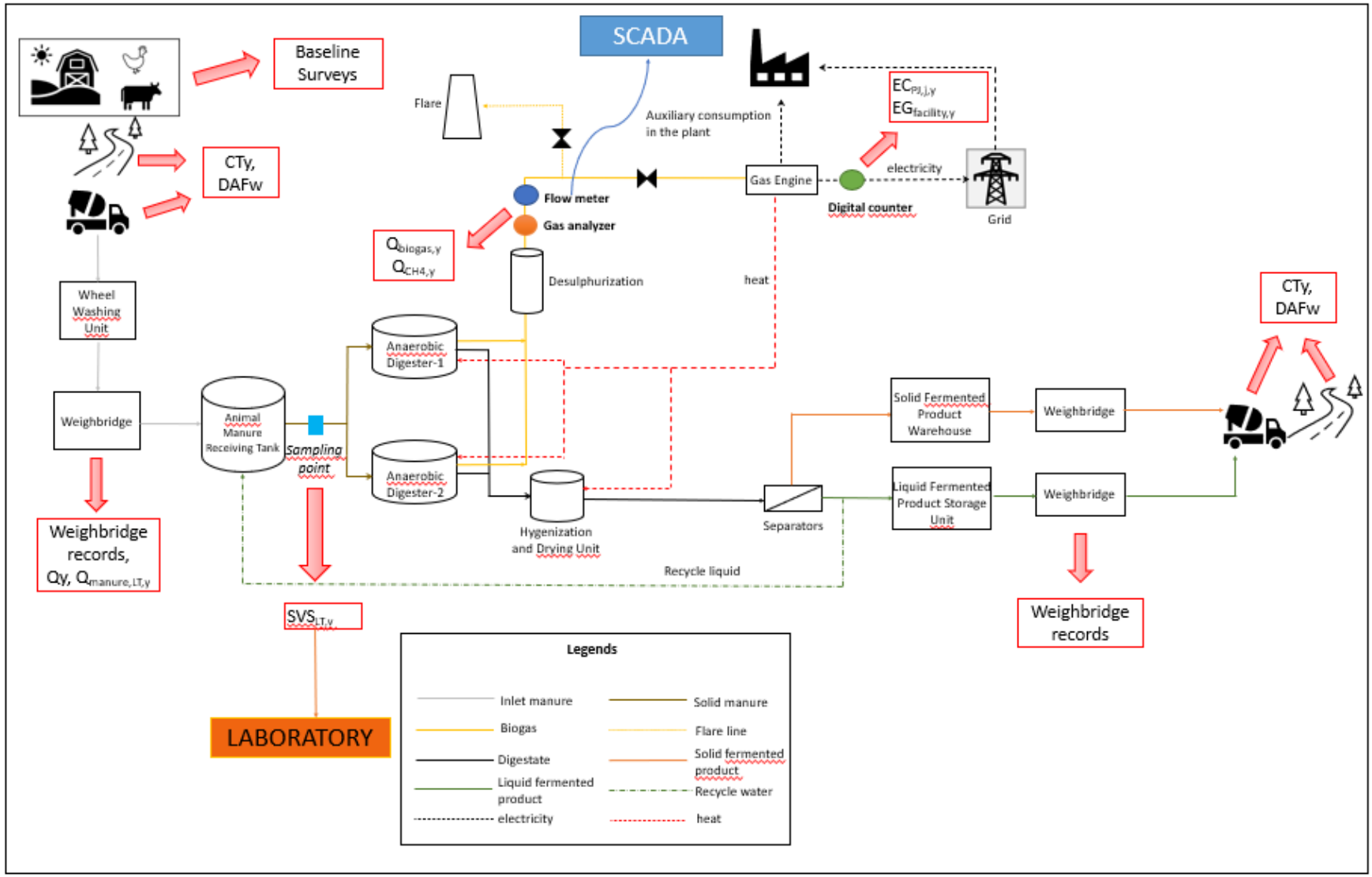

Figure 7: Flow Chart of BYZ GLOBAL ENERGY BIOGAS PLANT

Quality Control / Quality Assurance Procedures

Quality control and quality assurance procedures will guarantee the quality of monitored data.

Storing Process Variables and Recording Operational Data

All important process variables and measurement values are recorded and stored by the SCADA operator, site engineer, and site manager. The process variables can be displayed as needed. Data is monitored in line with the monitoring frequency of each variable/parameter. Monitored data is archived electronically and backed up every 24 hours online. Further, all data collected as part of monitoring will be archived electronically and be kept at least for five years after the end of the last crediting period. Written data and documents such as electricity invoices and diesel oil receipts are copied and archived and will be kept at least for five years after the end of the last crediting period.

Staff Trainings

As competency of staff involved in the monitoring activities is highly important, necessary trainings are provided by the project owner. Each member of the monitoring staff is informed about technical/methodological requirements for conducting a reliable monitoring operation. Only the qualified staff members are given the responsibility of monitoring.

Procedure in case of failure

If a monitoring equipment is in fault, it will be immediately repaired or replaced with another calibrated equipment by a professional staff. In the meantime, for the continuously monitored parameters, monitoring should be resumed via a backup equipment if possible.

Sampling Plan

Applied methodology requires testing according to the guideline in annex 2 of AM0073. Consequently, sampling procedure is conducted in line with the Annex 4 of the methodology AM0073. According to this guidance, the liquid material is collected using continuous-flow samples at the entrance or exit point of the pertinent treatment stage; samples are collected in clean wide-mouth glass bottles; are analyzed as soon as possible; and storage of the samples is performed at 4°C. Laboratory staff ensures that the suspended matter does not adhere to the

walls, prior to the analysis procedure and the dry matter content is determined after oven drying at 103°C for 24 hours or until constant weight is obtained. Such procedures are applied to the parameters subject to essays described in annex 2 of the methodology AM0073. The laboratory staff is responsible to adhere these guides and the site manager is responsible for ensuring the laboratory staff is trained to properly carry out the sampling procedure.

Emergency Preparedness:

Site Manager ensures that the project personnel acquire the skills to carry out emergency tasks properly through capacity building practices and trainings.

The whole staff receives health and safety trainings to minimize exposure to workplace hazards. At every shift, at least one trained technical personnel is present. All relevant information such as data files, maintenance, defect records and other monitoring related records are kept at a designated location in a transparent and organized manner.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Calculation of Baseline Emissions as per AMS-III.D.

As per the paragraph 17 of AMS-III.D., version 21.0., the baseline scenario is the situation where, in the absence of the project activity, animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere. To calculate the baseline emissions, the project proponents propose to utilize the Option 17 (b) presented in the AMS-III.D., version 21.0., Paragraph 17. This is because the project proponents are aware of the existing animal manure management systems i.e, anaerobic lagoon and the IPCC guidelines are utilized for determining the manure characteristics. The available laboratory facility of the project enables the direct measurement of the specific volatile solids (SVS) parameter, that is measured periodically and aggregated to find yearly for each of the farm. In addition, parameter ($Q_{manure,j,LT,y}$), being the quantity of manure treated for each farm and animal type is measured through weighbridge, continuously, and aggregated to find monthly and yearly. The direct measurement of these parameters allow the PP to use Option Para 17(b) as follows: As per AMS III.D., version 21.0.

Baseline emissions

Calculation of Baseline Emissions as per AMS-III.D.

In accordance with the methodology AMS III.D., version 2, baseline emissions were calculated based on the direct measurement of quantity of manure and its specific volatile solids content, as follows:

Equation (1)

$$BE_y = GWP_{CH4} \times D_{CH4} \times UF_b \times \sum_{j,LT} (MCF_j \times B_{0,LT} \times Q_{manure,jLT,y} \times SVS_{j,LT,y})$$

Where:

BE_y = Total baseline emissions in year y, in tCO_2e/year

GWP_{CH4} = Global Warming Potential of CH4 applicable to the crediting period (28 tCO2e/tCH4)

D_{CH4} = CH4 density (0.00067 t/m3 at room temperature (20°C) and 1 atm pressure)

UF_b = Model correction factor to account for model uncertainties (0.94)

LT = Index for all types of livestock

j = Index for animal manure management system

MCF_j = Annual methane conversion factor for the baseline animal manure management system j

$B_{0,LT}$ = Maximum methane producing potential of the volatile solid generated for animal type LT (m^3CH4/kg-dm)

$Q_{manure,j,LT,y}$ = Quantity of manure treated from livestock type LT and animal manure management system j (tonnes/year, dry basis)

$SVS_{j,LT,y}$ = Specific volatile solids content of animal manure from livestock type LT and animal manure management system j in year y (tonnes/tonnes, dry basis)

Parameter	Description	Value Applied	Unit
GWP_{CH4}	Global Warming Potential for CH4 - Default value obtained from IPCC Fifth Assessment Report, Synthesis Report, page 87 https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf	28	t CO_2e/t CH_4
D_{CH4}	Density of Methane - 0.00067 t/m^3 at room temperature 20 °C and 1 atm pressure	0.00067	t/m^3

MCF_j	Annual methane conversion factor (MCF) for the baseline animal manure management system j (Uncovered Anaerobic Lagoon) - Project site is Warm Temperate Dry	0.76	Fraction
$B_{0,Other\ Cattle}$	Maximum methane producing potential of the volatile solid generated for animal type 'Other Cattle' - For Other Region - High Productivity System	0.18	$m^3\ CH_4$ / kg-dm
$B_{0,Hens}$	Maximum methane producing potential of the volatile solid generated for animal type 'Hens' - For Other Region - High Productivity System	0.39	$m^3\ CH_4$ / kg-dm
UF_b	Conservativeness factor for MCF as per the Applied Meth.	0.94	Fraction

The other parameters, namely Q_{manure}, and SVS were given in the related boxes in Section 4.2 in the Monitoring Report.

Accordingly, the baseline emissions as per AMS-III-D were calculated as:

Parameter	Description	2019 (tCO_2)	2020 (tCO_2)	2021 (tCO_2)	2022 (tCO_2)	Total During the Current Monitoring Period (tCO_2)
$BE_{y,AMS-III.D.}$	Baseline emissions for the AMS-III.D. component	13,465	61,043	71,285	36,100	**181,895.4**

Calculation of Baseline Emissions as per AMS-I.D.

As per the paragraph 22 of AMS-I.D, version 18., 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:

Equation (2)

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

Where:

BE_y = Total baseline emissions in year y, (tCO_2)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of VCS project activity in year y (MWh)

$EF_{grid,y}$ = Combined margin CO_2 emission factor for 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)

Since the proposed project activity is the installation of a greenfield power plant, as per the paragraph 26 of AMS-I.D, version 18., $EG_{PJ,y}$ is calculated as follows:

Equation (3)

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

Where:

$EG_{PJ,facility,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y

This value for each year is given as follows, please refer to the Section 4.2, for more information on the related box.

Parameter	2019 (MWh)	2020 (MWh)	2021 (MWh)	2022 (MWh)	TOTAL
$EG_{PJ,facility,y}$	466	8,793	10,541	4,077	**23,877**

As per the paragraph 23 of AMS-I.D, version 18., the emission factor shall be calculated in a transparent and conservative manner. The project participants choose to calculate a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system", version 07.0.

According to the Tool, the "combined margin" emission factor is calculated through the following six steps:

Step (1): Identify the relevant electricity system;

Step (2): Choose whether to include off-grid power plant 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) emission factor.

Step 1: Identify the relevant electricity system

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, the relevant project electricity system has to be identified by the project participants. 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.

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

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, 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.

The project participants choose Option I and therefore only grid power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, 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.

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 (t CO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

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

Option B: Based on the total net electricity generation of all power plants serving and the fuel types and total fuel consumption of the project electricity system.

Ministry of Energy and Natural resources of Turkey has published the data for OM using simple OM calculation which uses ''Option A'' for calculations..[58]

In addition, PPs has chosen to apply ex-ante option for OM emission factor as described in the paragraph 42(a) of Tool 07, v07, Tool to calculate the emission factor for an electricity system that

> *"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. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation"*

$$EF_{grid,OM,y} = 0.6993 \text{ tCO2/MWh}$$

[58] https://enerjiapi.etkb.gov.tr/Media/Dizin/ETKB/Duyurular/0c6b62ea-bf2f-4fea-b9b3-28bc6f48ddf2_Bilgi_Formu_-_Web_Sitesi.pdf (Accessed on 25/01/2023)

For this approach (simple OM) to calculate the operating margin, the subscript y refers to the power plants/units delivering electricity to the grid.

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

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 PDD submission to the DoE for validation.

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 proposed project activity, the project participants choose **Option 1** in terms of availability of vintage of data.

Based on 2018 data, Ministry of Energy and Natural resources of Turkey has calculated build margin and published the data:

$$EF_{grid,BM,y} = 0.3812 \text{ tCO2/MWh}$$

Step 6: Calculate the combined margin emissions factor

According to the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, the calculation of the combined margin (CM) emission factor ($EFgrid,CM,y$) is based on one of the following methods:

The combined margin emissions factor is calculated as follows:

Equation (4)

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

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (t CO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (t CO_2/MWh)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor in year y (t CO_2/MWh)

w_{OM} = Weighted of operating margin emissions factor (per cent)

w_{BM} = Weighted of build margin emissions factor (per cent)

As per the applicable "Tool to calculate the emission factor for an electricity system", version 07.0, the default weights for the operating margin and build margin emission factors for the proposed project activity is defined as:

w_{OM}=0.50

w_{BM}=0.50

Based on the data obtained from Ministry of Energy and Natural Resources of Turkey given above, calculation of the parameter $EF_{grid,CM,y}$ is as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$
$$EF_{grid,CM,y} = 0.6993 \times 0.50 + 0.3812 \times 0.50$$
$$EF_{grid,CM,y} = 0.5403$$

Based on 2018 data, Ministry of Energy and Natural resources of Turkey has calculated combined margin and published the data:

$$\boldsymbol{EF_{grid,CM,y} = 0.5403}^{59}$$

[59] https://enerjiapi.etkb.gov.tr/Media/Dizin/ETKB/Duyurular/0c6b62ea-bf2f-4fea-b9b3-28bc6f48ddf2_Bilgi_Formu_-_Web_Sitesi.pdf (Accessed on 25/01/2023)

Replacing the parameters to equation 2, the values for each monitoring period were determined as:

Parameter	Description	2019 (tCO_2)	2020 (tCO_2)	2021 (tCO_2)	2022 (tCO_2)	Total During the Current Monitoring Period (tCO_2)
$BE_{y,AMS-I.D.} = BE_{EC,y}$	Baseline emissions for the AMS-I.D. component	252	4,751	5,695	2,203	**12,901**

Accordingly, the total baseline emissions including both the AMS-III.D. and AMS-I.D. components are as follows:

Parameter	Description	2019 (tCO_2)	2020 (tCO_2)	2021 (tCO_2)	2022 (tCO_2)	Total During the Current Monitoring Period (tCO_2)
BE_y	Total baseline emissions for the project	13,717	65,794	76,980	38,303	**194,794**

5.2 Project Emissions

Calculation of Project Emissions as per AMS-III.D.

In accordance with AMS-III.D., version 21.0., Project activity emissions consist of:

Equation (5)

$$\boldsymbol{PE_y = PE_{PL,y} + PE_{flre,y} + PE_{power,y} + P_{transp,y} + PE_{storage,y}}$$

As per the paragraph 21(b) of AMS-III.D., version 21.0., project emissions due to physical leakage of biogas from the animal manure management systems used to produce, collect, and transport the biogas to the point of flaring or gainful use are determined as, in accordance with the

paragraph 23 of the methodological tool "Project and leakage emissions from anaerobic digesters, version 02.0 (Tool14).

Equation (6)

$$\boldsymbol{PE_{PL,y} = PE_{CH4,y} = Q_{CH4}\ x\ EF_{CH4,y}\ x\ GWP_{CH4}}$$

Equation (7)

$$Q_{CH4} = Q_{biogas,y} * w_{CH4} * \rho_{CH4,t}$$

2019	2020	2021	2022	TOTAL	Symbol	Unit	Description
605	1,756	1,828	902	**5,091**	$PE_{CH4,} = PE_{PL,y}$	tCO_2e	Project emissions of methane from the anaerobic digester in year y
2,134,421	5,749,637	5,911,903	3,248,431	**17,044,392**	$Q_{biogas,y} = BG_{burnt,y}$	Nm^3 biogas	Amount of biogas collected at the digester outlet in year y
0.54	0.58	0.59	0.53	-	w_{CH4}	fraction	Methane content in biogas in year y
772	2,240	2,331	1,150	**6,493**	$Q_{CH4,y}$	tCH_4	Quantity of methane produced in the anaerobic digester in year y
0.028	0.028	0.028	0.028		$EF_{CH4,default}$	fraction	Default emission factor for the fraction of CH_4 produced that leaks from the anaerobic digester
28	28	28	28		GWP_{CH4}	tCO_2/tCH_4	Global warming potential of CH_4

As per the paragraph 23 of AMS-III.D., version 21.0., project emissions from electricity and fossil fuel consumption are determined by following the methodological tool "Project and leakage emissions from anaerobic digesters", version 02.0., where $PE_{power,y}$ is the sum of $PE_{EC,y}$ and $PE_{FC,y}$ in the tool.

In accordance with the technical feasibility report of the proposed project activity, a small portion of the electricity consumed as auxiliary shall be used from on-site electricity generation. This portion is monitored accordingly and $PE_{EC,y}$ is accounted as zero.

Nevertheless, the rest of the electricity consumed at the plant is supplied by the Turkish national grid. Hence, as per the paragraph 19 of the methodological tool "Project and leakage emissions from anaerobic digesters", version 02.0.,the project participants chose Option 1: Procedure using monitored data in the paragraph 20 of the tool which states that $PE_{EC,y}$ shall be calculated using the "Tool to calculate baseline, project and/or leakage emissions *from electricity consumption",* where the project emission source j referred to in the tool is the total electricity consumption associated with the anaerobic digestion facility.

Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", version 03.0. In accordance with the Tool, in the generic approach, project emissions from consumption of electricity are calculated based on the quantity of electricity consumed, an emission factor for electricity generation and a factor to account for transmission losses, as follows:

Equation (7)

$$\boldsymbol{PE_{power} = PE_{EC,y} = \sum_{j} (EC_{PJ,j,y} \times EF_{EF,j,y} \times (1 + TDL_{j,y})}$$

2019	2020	2021	2022	TOTAL	Symbol	Unit	Description
59	357	434	271	**1121**	$PE_{EC,y}$	tCO_2/yr	Project emissions from electricity consumption in year y
98.04	595.154	723.028	451.263	1867.485	$EC_{PJ,j,y}$	MWh/y	Quantity of electricity consumed by the project electricity consumption source j in year y
0.5403	0.5403	0.5403	0.5403		$EF_{EF,j,y}$	tCO_2/MWh	Emission factor for electricity generation for source j in year y

0.11	0.11	0.11	0.11		$TDL_{j,y}$	Fraction	Average technical transmission and distribution losses for providing electricity to source j in year y

As per the paragraph 22 of the methodological tool "Project and leakage emissions from anaerobic digesters", version 02.0., which determines project emissions from fossil fuel consumption ($PE_{FC,y}$), states that where the anaerobic digester facility uses fossil fuels, project participants shall calculate $PE_{EC,y}$ using the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". However, since in the proposed project activity the anaerobic digester facility does not use fossil fuels, $PE_{FC,y}$ is accounted as zero.

In accordance with the paragraph 22 of AMS-III.D., version 21.0., in the case of flaring of the recovered biogas, project emissions are estimated using the procedures described in the methodological tool "Project emissions from flaring", version 04.0.

Equation (8)

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

Where:

$PE_{flare,y}$ = Project emissions from flaring of the residual gas in year y (tCO_2e)

GWP_{CH4} = Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)

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

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

The flare efficiency is determined based on the outlined in ''Project emission from flaring'' version 04.0 which states that "In the case of enclosed flares, project participants may choose between the following two options to determine the flare efficiency for minute m ($\eta_{flare,m}$). Option A: apply a default value for flare efficiency. Option B: measure the flare efficiency " Since flare efficiency is not measured within the project activity, Option A is selected.

According to Option A "The flare efficiency for the minute m ($\eta_{flare,m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

(a) The temperature of the flare ($T_{EG.m}$) and the flow rate of the residual gas to the flare is within the manufacturer's operating specification for the flare ($SPEC_{flare}$) in the minute m; and

(b) The flame is detected in the minute m ($Flame_m$).

Otherwise $\eta_{flare,m}$ is 0%."

In the proposed project activity, an enclosed flare is installed. The flare is installed for the case of emergency and malfunction in the plant. Within the scope of the monitoring plan, measuring system is based on the use of valves for the control of gas flow. Since gas engine and flare are not designed to be operated simultaneously, gas flow is redirected to flare instead of gas engine in case of any emergency Thereby, the quantity of captured methane fed to the flare is measured via the flow meter and recorded. Moreover, flare is equipped with sensors that detect and response in the presence of a flame. All these monitoring activities has been recorded both in operational logbook and as electronic data by the staff. Upon checking such recordings, PP has confirmed, no flaring activity was observed during the monitoring period. Therefore, the project emissions from flaring considered as zero. Thus,

$$\boldsymbol{PE_{flare,y}} = 0$$

Nevertheless, , if any flaring activity is detected in the next monitoring periods,, the emissions from flaring the biogas shall be determined following the procedure described in the methodological tool project emissions from flaring, version 04.0.

As per the paragraph 24 of AMS-III.D., version 21.0., project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for if both condition (a) and condition (b) below are satisfied:

(a) The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester;

(b) The dry matter content of the manure when removed from the animal barns is less than 20%.

Since the storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester in the proposed project activity, $PE_{storage,y}$ shall be accounted as zero.

In accordance with AMS-III.D., version 21.0., $PE_{trans,y}$ is calculated as per the paragraph 14 of AMS-III.A0, version 01.0., which states project emissions due to incremental transport distances ($PE_{trans,y}$) are calculated based on the incremental distances between:

Equation (9)

$$PE_{trans,y} = (Q_y/CT_y)\ x\ DAF_w\ x\ EF_{CO2,transport}$$

2019	2020	2021	2022	Total	Symbol	Unit	Description
43,619	121,197	142,561	74,575	382,952	Q_y	tonnes	Quantity of raw waste/manure treated and/or wastewater co-digested in the year y
15	15	15	15		CT_y	tonnes/ truck	Average truck capacity for transportation
7.8	9.3	9.3	9.3		DAF_w	km/truck	Average incremental distance for raw solid waste/manure and/or wastewater transportation
0.245	0.245	0.245	0.245		$EF_{CO2,transport}$	$kgCO_2$/ km, (Methodological tool: Project and leakage emissions from transportation of freight)	CO_2 emission factor from fuel use due to transportation

Accordingly, the calculated $PE_{trans,y}$ values are rounded up as:

	2019	2020	2021	2022	TOTAL
$PE_{trans,y}$	6	19	22	12	**59**

5.3 Leakage

No leakage is accounted, since as per the applied tool "Project and leakage emissions from anaerobic digesters", Version 02.0; the storage of digestate occurs within the project boundary, and such emissions are considered within the project boundary.

5.4 Net GHG Emission Reductions and Removals

Type III Components

The emission reductions achieved by the project activity are determined ex post through direct measurement of the amount of methane fueled, flared or gainfully used. As per the methodology AMS-III.D., the emission reductions is achieved in any year are the lowest value of the following:

Equation (10)

$$ER_{y,ex\ post} = \min\left[\left(BE_{y,ex\ post} - PE_{y,ex\ post}\right), \left(MD_y - PE_{power,y,ex\ post}\right)\right]$$

The first part of the equation $\left(BE_{y,ex\ post} - PE_{y,ex\ post}\right)$ is calculated as:

Monitoring period	$BE_{y,\ ex\ post}$ (tCO_2eq)	$PE_{y,ex\ post}$ (tCO_2eq)	$\left(BE_{y,ex\ post} - PE_{y,ex\ post}\right)$ *(tCO2eq)*
30/07/2019 – 31/12/2019	13,465	670	**12,795**
01/01/2020 – 31/12/2020	61,043	2,132	**58,911**
01/01/2021 – 31/12/2021	71,285	2,284	**69,001**
01/01/2022 – 31/07/2022	36,100	1,185	**34,915**
Total	181,895	6,271	**175,622**

In the calculation of the second part of the equations right hand side, the parameter MD_y is used. The biogas flared or combusted (MD_y) is determined using the amount of biogas flared/combusted and the volumetric fraction of methane in the biogas as follows:

Equation (11)

$$MD_y = BG_{burnt,y} \times w_{CH4} \times D_{CH4} \times FE \times GWP_{CH4}$$

The applied methodology of AMS-III.D, version 21.0, states that:

''*Project activities where a portion of the biogas is destroyed through flaring and the other portion is used for energy may consider applying the flare efficiency to the portion of the biogas used for energy, if separate measurements of the respective flows are not performed. When the amount of methane that is combusted for energy and that is flared is separately monitored, or when only the biogas flow to the flare is monitored and the biogas used for energy is calculated based on electricity generation, a destruction efficiency of 100% can be used for the amount that is combusted for energy*.''

Since the separate measurements of the respective flows are not performed in the project activity (please refer to Section 3.1 of VCS MR), the parameter of FE used in the MDy calculations has been considered as 90% for the biogas used for electricity generation in line with Methodological Tool: Project emissions from flaring, version 04.0.

The combustion process occurring at the gas engines for electricity generation is within the project boundary (refer to section 3.1) and the associated parameters ($BE_{EC,y}$, and $EG_{PJ,y}$) are used in the calculation of emission reductions of the Type I Components (AMS-I.D.) of the project.

Accordingly,

2019	2020	2021	2022	Total	Symbol	Unit	Description
19,460	56,450	58,742	28,986	**163,639**	MD_y	tCO2e	Methane captured or destroyed or used gainfully by the project activity in year y
2,134,421	5,749,637	5,911,903	3,248,431	**17,044,392**	$BG_{burnt,y}$	m3	Biogas flared or combusted in year y
0.54	0.58	0.59	0.53		$w_{CH4,y}$	Vol. fraction	Methane content in biogas in the year y
0.00067	0.00067	0.00067	0.00067		ρ_{CH4}	t/m³	Density of methane at normal (at room temperature 20°C and 1 atm pressure) conditions
0.90	0.90	0.90	0.90		FE	fraction	Flare efficiency in the year y
28	28	28	28		GWP_{CH4}	tCO_2/tCH_4	Global warming potential of CH_4

Following that, the $ER_{y,ex,post}$ is determined for the Type III Components by comparing **(MD_y – $PE_{power, y, expost}$)** and $(\boldsymbol{BE_{y,ex\ post} - PE_{y,ex\ post}})$, and taking the minimum for **$ER_{y,ex,post}$:**

	30/07/2019 – 31/12/2019	01/01/2020 – 31/12/2020	01/01/2021 – 31/12/2021	01/01/2022 – 31/07/2022	Total
MD_y	19,460	56,450	58,742	28,986	**163,639**
PE_{power}	59	357	434	271	1,121
$(MD_y - PE_{power, y, expost})$	**19,401**	**56,093**	**58,308**	**28,715**	**162,518**
$(\boldsymbol{BE_{y,ex\ post} - PE_{y,ex\ post}})$	**12,795**	**58,911**	**69,001**	**34,915**	**175,624**
$ER_{y,ex,post}$	12,796	56,093	58,308	28,715	155,912

Important to note that during the monitoring period the ER of the type III components for none of the monitoring years was above 60,000 tCO_2e/yr. Hence, 60,000 tCO_2e annual ER threshold was not required to be applied as stated in the applied small scale methodology.

Additionally, for the monitoring periods 30/07/2019 – 31/12/2019, and 01/01/2022 – 31/07/2022, the number of monitoring days is 155, and 212, respectively. Considering the annual cap of 60,000 tCO_2e defined by the methodology AMS-III.D. for all Type III components for 365 days, the cap corresponding to these monitoring periods are 25,479 tCO_2e and 34,849 tCO_2e, respectively. The $ER_{y,expost}$ of the periods 30/07/2019 – 31/12/2019, 01/01/2020 – 31/12/2020 and 01/01/2022 – 31/07/2022 are below the cap.

<u>Type I Components</u>

The ER of the Type I Components is calculated as per the methodology AMS-I.D.

Parameter	Description	2019 (tCO_2)	2020 (tCO_2)	2021 (tCO_2)	2022 (tCO_2)	Total During the Current Monitoring Period (tCO_2)
$BE_{y,AMS-I.D.}$	Baseline emissions	252	4,751	5,695	2,203	**12,901**

	for the AMS-I.D.					
$PE_{y,AMS-I.D.}$	Project emissions for the AMS-I.D.	0	0	0	0	**0**
$ER_{y,AMS-I.D.}$	Emission reductions for AMS-I.D.	252	4,751	5,695	2,203	**12,901**

Final ER Value

The final value of the ER is calculated by adding up the Type III and I components.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
30-July-2019– 31-December-2019	13,717	670	-	13,047
01-January-2020– 31-December-2020	61,201	357	-	60,844
01-January-2021– 31-December-2021	64,437	434	-	64,003
01-January-2022– 31-July-2022	31,189	271	-	30,918
Total	170,544	1,732	-	168,813

The monitoring period covers from 30/07/2019 to 31/07/2022 with totally 1,098 days.

Based on the registered VCS PD, the amount of estimated emission reductions for this monitoring period would be 61,243/365 x 1098 = 184,232 tCO_2e. The actual emission reductions (164,273

tCO_2e) in this monitoring period are, accordingly, around 11% lower than the estimation given in the registered VCS PD.

Ex-ante emissions reductions /removals	Achieved emissions reductions /removals	Percent difference	Justification for the difference
184,232	168,813	-8%	Ex-ante calculations were based on estimated parameters that PP was able to gather in time of validation as well as the projected manure collection potential. The difference between ex-ante and achieved emission reductions stems from the use of detailed monitoring data as well as the conservative approach the PP has taken.

APPENDIX 1: ADDITIONAL CALIBRATION DETAILS

Calibration of Weighbridge:

Instrument/Device	Manufacturer	Type	Serial Number	Date of Calibration	Calibration Standard
Non-Automatic Weighbridge	TUNAYLAR	LOAD LINE	15943	31/05/2019	Turkish legislation titled 'The Weighing

					Instrument Regulations'[60]

[60] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=18793&MevzuatTur=7&MevzuatTertip=5#:~:text=a)%20Tart%C4%B1%20aletlerinin%20periyodik%20muayene,y%C4%B1l%20birinci%20y%C4%B1l%20olarak%20say%C4%B1l%C4%B1r. (Accessed on 25/01/2023)

APPENDIX 2: MONITORED GHG ACCOUNTING-RELATED SDG PARAMETERS/INDICATORS

Relevant SDG Indicator	Affordable and Clean Energy (SDG 7) Indicator 7.2.1 Renewable energy share in the total final energy consumption
Data/Parameter	Amount of electricity supplied to the national grid
Unit	MWe
Description	The renewable energy share in total final consumption is the percentage of final consumption of energy that is derived from renewable resources.
Source of data	On-site Operational Logbook & Electricity Meters & EPIAS[61] Public Data
Value(s) Applied	See table below
Measurement methods and procedures	Electricity meter / Bill generated

Period	Amount of Electricity (MWh)
30/07/2019 – 31/12/2019	466
01/01/2020 – 31/12/2020	8,793
01/01/2021 – 31/12/2021	10,541
01/01/2022 – 31/07/2022	4,077
30/07/2019 – 31/07/2022	**23,877**

[61] https://seffaflik.epias.com.tr/transparency/uretim/gerceklesen-uretim/gercek-zamanli-uretim.xhtml (Accessed on 25/01/2023)

Monitoring frequency	Monitoring: Annually Recording: Archive electronically during project plus 5 years
QA/QC procedures	-
Purpose of data	To monitor the proposed project activity's contribution to SDG 7.
Additional comment	-

Relevant SDG Indicator	Climate Action (SDG 13) Tonnes of greenhouse gas emissions avoided or removed
Data/Parameter	Quantity of removed/avoided net GHG emission
Unit	tCO_2e
Description	Annual reduction of CO_2 equivalent GHG emissions due to the proposed project activity's implementation that would otherwise be emitted by livestock farms' anaerobic manure management systems.
Source of data	Calculated
Value(s) Applied	

Period	Net GHG Reductions (tCO_2eq)
30/07/2019 – 31/12/2019	13,047
01/01/2020 – 31/12/2020	60,844
01/01/2021 – 31/12/2021	64,003
01/01/2022 – 31/07/2022	30,918
30/07/2019 – 31/07/2022	**168,813**

Measurement methods and procedures	

Monitoring frequency	Monitoring: Annually Recording: Archive electronically during project plus 5 years
QA/QC procedures	-
Purpose of data	To monitor the proposed project activity's contribution to SDG 13
Additional comment	It is noted that this value is slightly higher than the ER claimed (in Section 5 of this report) during the monitoring period, since the 60,000 tCO2/yr cap of the small scale methodology (AMS-III.D.) is not applied here.

APPENDIX 3:

Table 8: Name of Farms Supplying Manure to the Project, Depths of their Lagoons and Retention Periods

Farm Name	Lagoon Depth (in meters)	Retention period (in months)
ADEM SEYİTOĞLU BESİ ÇİFTLİĞİ	1.5	1-3
ADMAR BESİ ÇİFTLİĞİ	2	1-3
AHMET SEYİTOĞLU BESİ ÇİFTLİĞİ	2	1-3
AL ATEŞ BESİ ÇİFTLİĞİ	5	1-3
ASLAN BESİ ÇİFTLİĞİ	2	1-3
ATALAY BESİ ÇİFTLİĞİ	1.5	1-3
BAŞYAZICIOĞLU BESİ ÇİFTLİĞİ	3	1-3
ÇETİNOĞLU BESİCİLİK	2	1-3
EMİN BESİ ÇİFTLİĞİ	2	1-3
ERCİYES BESİ ÇİFTLİĞİ	2	1-3
ERCİYES TAVUKÇULUK	3.5	1-3
GENÇ SEYİTOĞLU-1 BESİ ÇİFTLİĞİ	2	1-3
GÜRBÜZ BESİCİLİK	2	1-3
İHSAN SEYİTOĞLU BESİ ÇİFTLİĞİ	1.5	1-3
KAYALAR BESİ ÇİFTLİĞİ	2.5	1-3
KAYSERİ YEM (BİRLİK YUMURTA)	4.5	1-3
M. KUDBETTİN SEYİTOĞLU BESİ ÇİFTLİĞİ	2.5	1-3
MEHMET BELLEK BESİ ÇİFTLİĞİ	2.5	1-3
RY BESİ ÇİFTLİĞİ	2	1-3
SİTE TARIM BESİ ÇİFTLİĞİ	2	1-3
YEŞİLBAŞ BESİ ÇİFTLİĞİ	3.5	1-3