MRAMORAK 1&2 BUNDLED BIOGAS POWER PLANTS

Incigul Polat Erdogan, Kilittaşı Mühendislik Müşavirlik İnşaat Tic. Ltd. Şti.

Project Document Template (Version 2.0)	
Name of the project	Mramorak 1&2 Bundled Biogas Power Plants
Project proponent	Zlatar Mramorak Doo
Project proponent's contact information	Mail address: Zadružna 6; 26226 Mramorak, Serbia Phone: +381 13 2753003 Email: office@zlatarmramorak.rs.
Project holder	Milan Mitrović, General Director
Project holder's contact information	Mail address: adružna 6; 26226 Mramorak, Serbia Email: milan.mitrovic@zlatarmramorak.rs; Mobile: 063-446173; Phone: 013-2753 230
Project participants	Zlatar Mramorak Doo, project owner Kilittaşı Mühendislik Müşavirlik İnşaat Tic. Ltd. Şti, carbon consultant
Version	Rev 1.5
Date	24/08/2023
Project type	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)

Project Document Template (Version 2.0)	
	Sectoral Scope 13: Waste handling and disposal
Grouped project	Bundled project
Applied Methodology	AMS-III.AO Version 1.0 AMS-I.D. Version 18.0
Project location (City, Region, Country)	Belgrade, Serbia
Starting date	24/06/2020
Quantification Period of GHG emissions reductions	24/06/2020 to 23/06/2027
Estimated total and average annual GHG emission reduction amount	Total emission reduction: 161,587 tCO2 Annual emission reduction (average): 23,083 tCO2.
Sustainable Development Goals	SDG 7 Affordable and Clean Energy SDG Goal 8 Decent Work and Economic Growth SDG Goal 13 Climate Action

Project Document Template (Version 2.0)	
Special category, related to co-benefits	N/A

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1 Project eligibility

1.1 Scope

Eligibility of the Mramorak1&2 Bundled Biogas Power Plants (hereafter project, Mramorak1&2 project) as per the BCR Standard requirements is provided in the following table.

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO2), Methane (CH4) and Nitrous Oxide (N2O).	X
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	N/A
Quantifiable GHG emission reductions and/or removals generated by the implementation of GHG removal activities and/or REDD+ activities (AFOLU Sector).	N/A
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to activities in the energy, transportation and waste sectors.	X
Quantifiable GHG emission reductions generated by the implementation of activities in the energy, transportation and waste sectors.	X

Project eliminates CH4 emission through controlled anaerobic biodigestion; and avoids emission of CO2 through generating renewable electricity. Hence project satisfies the following criterion: “The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO2), Methane (CH4) and Nitrous Oxide (N2O).”

Project uses CDM methodologies AMS-III.AO and AMS-I.D. which are approved by BioCarbon Registry. Hence project satisfies the following criterion: “GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to activities in the energy, transportation and waste sectors.”

GHG emission reductions by the project activity are quantifiable as per the AMS-I.D and AMS-III.AO. Hence project satisfies the following criterion: "Quantifiable GHG emission reductions generated by the implementation of activities in the energy, transportation and waste sectors."

1.2 Project type

Mramorak 1&2 is a small scale bundled project falling under the following both categories: "Waste management and disposal" and "energy sector".

Activities in the AFOLU sector, other than REDD+	N/A
REDD+ Activities	N/A
Activities in the energy sector	X
Activities in the transportation sector	N/A
Activities related to Handling and disposing of waste	X

1.3 Project scale

Mramorak1&2 biogas project is a bundled project as per the UNFCCC CDM Annex21: General Principles[1] for Bundling.

Project meets the small-scale criteria of the CDM Annex 21 conditions given that it has an annual emission reduction less than 60k tCO2 with an installed capacity less than 15 MW.

[1] https://cdm.unfccc.int/EB/021/eb21repan21.pdf.

2 General description of the project

Mramorak 1&2 Biogas Power Plants (hereafter project and/or Mramorak 1&2 project) is a bundled Greenfield project activity, comprising two identical biogas power plants, implementing anaerobic treatment process to organic wastes to reduce Greenhouse gas (GHG) emissions through methane recovery and displace carbon intensive Serbian Electrical Power Supply (EPS) grid electricity with renewable biogas energy. Carbon credits created by the Mramorak1&2 projects are represented and owned by the Zlatar Mramorak Doo.

Project uses manure from cattle farms, non-hazardous food wastes, plant wastes (starch waste, liquid starch wastes, Corn Steep Liquor (CSL)) and agricultural plant residues (slage corn and slage barley) to produce renewable energy. Project also uses CSL which is one of the new applications in anaerobic digestion systems worldwide.

Generated renewable electricity is delivered to the Serbian national EPS grid system. Being a Greenfield activity, project has a total installed capacity of 1.998 MW with each biogas plant having an installed capacity of 0.999 MW separately. Operation start dates are 24/06/2020 and 26/03/2021 for Mramorak 1 and Mramorak 2 respectively

The purpose of the proposed project activity is to mitigate methane emission to the atmosphere that would otherwise be released through anaerobic digestion of cattle manure and municipal wastes, and generate renewable energy by capturing biogas from the biodigesters. Project aims to contribute to global carbon emission reduction efforts.

Mramorak1&2 is a small-scale project activity, not a debundled component of a larger CDM project activity.

Project received electricity generation license from the Ministry of Mining and Energy of Serbia. Mramorak 1 received its license on 27/11/2018 with the number of 312-01-01059/2018-06 by the Zlatar Mramorak Doo. Mramorak 2 received its license on 04/12/2018 with the number of 312-01-01058/2018-06 by the BioGold Energy Doo.[2] Both companies are owned by the same parent company, Almex doo. Electricity generation licenses were revised later. Mramorak 1's revised license is dated as

[2] Ministry of Mining and Energy, https://mre.gov.rs/sites/default/files/registri/RegistarPovlasPro12-8-2022.html.

17/06/2020 with the number of 312-01-00353/2020-06 and Mramorak 2's revised license is dated as 05/03/2021 with the number of 312-01-00021/2021-06.[3]

Operation start date is the date of the Mramorak 1 starting generating electricity and feeding the Serbian EPS grid. Ministry of Mining and Energy, after approving the Mramorak 1 plant by visiting the project site, revised the electricity generation license (17/06/2020 with the number of 312-01-00353/2020-06) and approved the project to feed the Serbian EPS grid. The Ministry of Mining and Energy mail/letter the revised license/approval document to the Zlatar doo. After one week, Zlatar Doo received the mail and the next day started to feed the Serbian EPS grid. This is the way of governmental process in Republic of Serbia. Hence, the date feeding the grid is accepted as the operation start date and the project crediting period. Similar to Mramorak 1, Mramorak 2 operation date is the one when the project owner recived the mail/letter of the revised generation license (05/03/2021 with the number of 312-01-00021/2021-06) from the Ministry of Mining and Energy. Mramorak 2 mail/letter was received on 26/03/2021 and this is the operation start date of the Mramorak 2.

Regarding the waste management, project received the permits with the registration numbers of 12 and 13 from the Kovin Municipal Administration-Department for Urban Planning and Housing Communal Affairs.

Project's central treatment plants are located in province of Mramorak in Serbia, on the "Zlatar Mramorak farm" land.

There are two main technology components of the project activity. These are anaerobic digesters and gas engine units. Main-digesters and post-digesters anaerobically digest/treat organic wastes; and gas engine units produce renewable electricity and heat. From the post-digester units, digestate effluent became a nutrient rich organic fertilizer which is utilized as fertilizer by the project owner.

Project only claims methane emission reductions from anaerobic digestion of cattle manure and non-hazardous food wastes, and does not claim methane emission reductions from anaerobic digestion of all other wastes and residues used in the project. Project also claims emission reduction from the replacement of the electricity from the national grid with renewable electricity.

[3] These licenses are provided as complementary document to the DOE.

Based on this claim, project boundary covers the sources of cattle manure and non-hazardous food wastes; central treatment plant; connection to the Serbian national EPS grid system; lagoons and farm lands where the solid and liquid digestate are stored to be used as fertilizer, and the road itineraries, where the transportation of residual waste after digestion.

Regarding the sources of feedstocks to the digesters, part of the manure is supplied onsite from Mramorak Zlatar farm, where the central treatment plants are located; and remaining part comes from the nearby dairy farm called “Stari Tamiš farm”, which is 18.5 km away from the project site and operated by the project owner. Mramorak Zlatar farm is also owned and operated by the project owner. Non-hazardous food wastes come from various entities from Belgrade, such as hotels, shopping centers, restaurants etc. These food wastes are transported by non-permeable trucks by the project owner from the sources to the project site. Plant based wastes fed to the biogas plants includes silage corn, silage barley and starch waste, including CSL, which are produced by the project owner’s parent company’s starch factories. Plant residues are also produced by the project owner’s farm lands. By the project activity, these wastes are converted into organic fertilizer through anaerobic digestion; preventing methane release in the baseline scenario.

Prior to the project activity, manure produced by the cattle farms, Mramorak and Stari Tamis, were stored in uncovered anaerobic lagoons where they were decayed anaerobically and released methane to the atmosphere. Non-hazardous food wastes from various sources in Belgrade, such as restaurants, hotels and shopping malls were left to decay anaerobically in a solid waste disposal site (SWDS-landfill) and released methane to the atmosphere. Plant based wastes (starch wastes, liquid starch waste and CSL) were stored in open lagoons and left to decay anaerobically. Plant residues that includes slage corn and slage barley were used to feed the cattles at Stari Tamis and Zlatar cattle farms. In addition to that, prior to the project activity, amount of renewable electricity generated by the project activity would be utilized from the carbon intensive Serbian national EPS grid system which is dominated by fossil fuel based power plants.

Mramorak 1&2 project, approximately, generates net amount of 15,500 MWh of renewable electricity annually. Consequently, the project results in 23,083 tCO2 emission reduction annually, and 161,587 tCO2 emission reduction for the first crediting period.

Implementation of the project activity creates many benefits to environment that includes reduction of methane and ammonia emissions from manure, reduction of

nitrate wash-out into the ground water, organic fertilizer, and reduction of CO2 emission by substitution of fossil fuel resources.

In terms of sustainable development achievements, project activity contributes to the diversification of energy mix of Serbia from fossil fuel to renewables; eliminates organic wastes and transform them into useful organic fertilizers; and avoids GHG emissions. Project also contributes to local economy through providing job opportunities.

Regarding the United Nations Sustainable Development Goals (SDGs), Mramorak 1&2 project achieves the following SDGs:

SDG 7 Affordable and Clean Energy: Project activity generates renewable energy, about 15.5 GWh annually, by capturing biogas from cattle manure, non-hazardous food wastes, plant wastes (starch waste, liquid starch wastes, CSL) and agricultural plant residues (slage corn and slage barley) via anaerobic digestion and supplies it to the fossil fuel dominated Serbian EPS grid system. Through this way, project contributes to the SDG 7 goals of the United Nations (UN).

SDG Goal 8 Decent Work and Economic Growth: Project created job opportunities during both construction and operation phases. During operation, project employs 6 people and 2 of them are from local villages.

SDG Goal 13 Climate Action: The project will naturally play an important role in global climate change mitigation activities through preventing emissions of methane that would otherwise be released to the atmosphere in the baseline conditions. Project annually achieves approximately 23,083 tCO2 emission reduction. Through this way, it contributes to SDG 13 goals of the UN.

2.1 GHG Project name

Name of the project activity is “Mramorak 1&2 Bundled Biogas Power Plants”.

2.2 Objectives

The purpose of the Mramorak1&2 project is to mitigate methane emission to the atmosphere that would otherwise be released through anaerobic digestion of cattle manure, municipal wastes and plant based wastes, and generate renewable electricity by capturing and combusting biogas from the biodigesters. In the absence of the project activity, the same amount of electricity would have been generated by the Serbian EPS system which is dominated by fossil fuel based power plants. Project aims to contribute to global carbon emission reduction efforts.

2.3 Project activities

Mramorak1&2 project is a small scale CDM project activity with a total installed capacity of 1.998 MW with each biogas plant having an installed capacity of 0.999 MW separately. Project falls under the Sectoral Scopes 13 (Waste handling and disposal) and 1 (Energy Industries – renewable/non-renewable sources) as per the UNFCCC CDM "List of Sectoral Scopes".

Project produces renewable electricity by using the biogas generated by the anaerobic treatment of organic wastes and plant residues. Organic wastes includes cattle manure, both in liquid and solid form, plant based organic wastes (starch waste, liquid starch waste, CSL), plant residues (silage corn and silage barley) and non-hazardous food wastes. Project operates full time (24 hr. per day and 365 days per year) and employs 6 workers.

Mramorak 1&2 project plant layout is given in Figure 1 Mramorak 1&2 Plants Layout; process flowchart is provided in Figure 2 Mramorak 1&2 Process Flow Diagram.

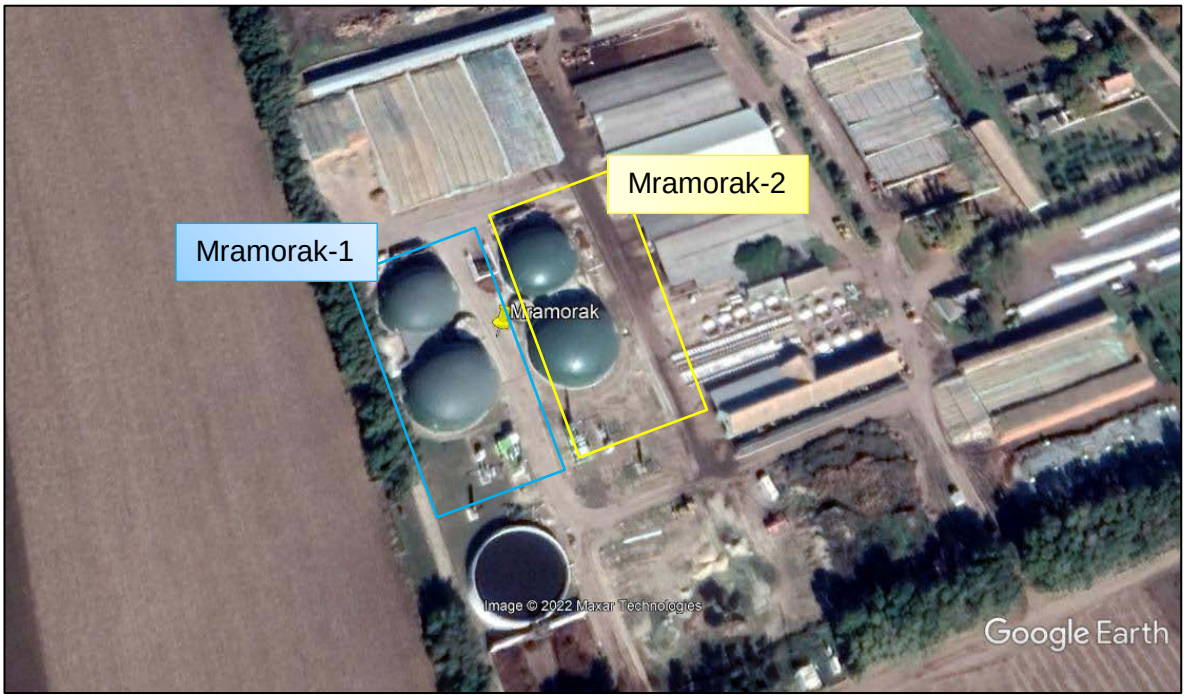

Figure 1 Mramorak 1&2 Plants Layout

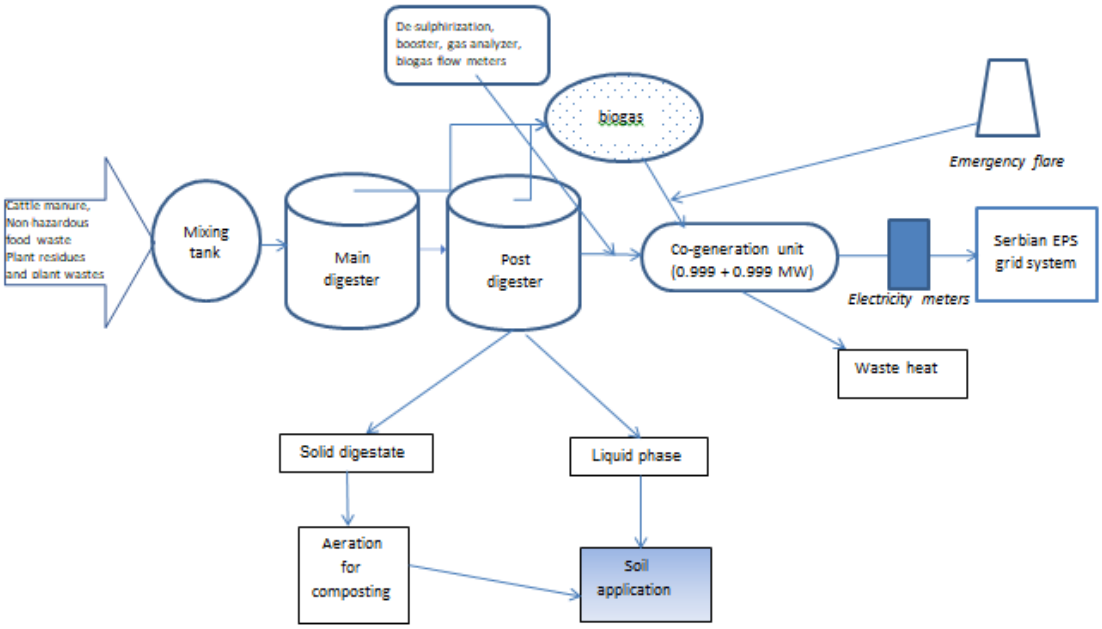

Figure 2 Mramorak 1&2 Process Flow Diagram

Mramorak 1&2 project has the following facilities/units:

Table 1 Mramorak 1&2 Project Site Facilities

Mramorak 1&2 Units	Mramorak 1&2 Sub-units
A- Waste Reception and Preparation Units	
Weighbridge	Wastes coming to the project site are weighted and recorded. Every shipment to the project site has a record in the log-book of the project owner.
Solid waste reception unit	Solid wastes are accepted and stored on a concrete layer.
Liquid waste reception tanks	Liquid wastes are disposed into the “liquid pit”.
Feeding system (waste balancing pool)	Waste is unloaded to the mixing tank
Pre-hygiene unit	Before disposing the wastes to the digesters, it is taken from

	separator.
B- Pump station and solid waste loading system units	
Pump station for liquid	Pump station pumps the liquid waste from the "liquid pit" to the main-digester.
Choppers	Solid wastes are chopped into fine parts before dosing to the main-digesters.
Dosing	Dosing is done by the system.
Solid biomass supply system	"Solid waste loading system" loads the solid waste to the main-digesters.
C- Anaerobic digestion system units	
Digesters	There are two digesters at each biogas plant (Mramorak 1 and Mramorak 2). Main-digester accepts raw wastes both in liquid and solid form. Post-digester accepts the "digested effluent" from the main-digester for further digestion and methane removal.
Mixers	Each digester has 2 mixers to have a homogenous environment within the digesters for a maximum efficiency for anaerobic digestion.
Gas booster	Produced biogas is pressurized before the gas engine unit to increase the combustion efficiency.
Heating system	Heating system keeps the digesters' temperature at the design level. Heat from gas engine unit is used to heat the digester.
Flare system	In case of gas engine unit is out of service, flare system is taken into operation and biogas is combusted.
Biogas analyzer	Gas is analyzed by the Awite gas analyzer, type AwiFLEX Cool+. It measures values of methane, carbon-dioxide, oxygen and hydrogen-sulfide. Serial number of gas analyzer is 2774.

Desulphurisation	Desulphurisation is done by Awite device, type AwiDesulf 500. It is pumping oxygen inside the Digesters in small amounts 0%-1% in total, keeping alive the colonies of bacteria which are fed by sulfur.
D- Post-digestion process units	
Separators	Effluent digestate from the Digester-2 goes through separation unit into liquid and solid form.
Solid digestate storage	Solid part of the separated digestate is stored on concrete based layers at the central treatment plants for a short time, approximately 1 or 2 days, then transported to the project owner's farm lands which are 5 km and 1 km away from the Mramorak 1&2 central treatment plants.
Liquid digestate storage	Liquid part of the digestate is pumped to the concrete made open lagoon which is about 1 km away from the Mramorak 1&2 central treatment plants.
E- Energy generating system units	
Gas storage	Gas is stored inside at the upper parts of digesters, between digestate and membranes. Walls of concrete are protected by special layers so the gas doesn't damage them. Membranes are keeping the gas inside.
Gas purification system	Gas purification unit contains special Altair filter which is filtrating H2S from the gas. Also there is a biogas filter in the gas line inside the gas engine unit.
Biogas flow meter	Woodward brand, TecJet 110 mode flow meters are installed to measure biogas flow rate. Mramorak 1 flow meter serial number: 22184210 Mramorak 2 flow meter serial number: 21813660
Gas engine units	Produced biogas is combusted within the gas engines unit and it produces electricity and heat.
Heat system	Produced heat energy by the gas engine is used to heat the

<table>
<tr><td></td><td>digesters.</td></tr>
<tr><td colspan="2">F- Energy transmission line</td></tr>
<tr><td>Power meter</td><td>Measures the amount of electricity before being transmitted to the Serbian EPS grid system.

Mramorak1&2 power meters within the gas engine units are Landis+Gyr E650 branded with an accuracy class of 0.5/1.0. They are active reactive, bi-directional.

<table>
<tr><td></td><td>Mramorak 1</td><td>Mramorak 2</td></tr>
<tr><td>Brand & Model</td><td>Landis+Gyr E650</td><td>Landis+Gyr E650</td></tr>
<tr><td>Serial number</td><td>43 267 888</td><td>44 202 354</td></tr>
</table>
Electricity generation is measured continously at the gas engine units.

At the substation connecting to the Serbian EPS grid system, the following power meter equiptment system with the following specifications: ST310FV(0.2) 3x58/100V 5-6A 15A23R55-SN00100 pbdqf kl.0.2 + GPRS/GSM modem CM23S-S2.

Serial numbers of power meters at the subtstation:

<table>
<tr><td>Mramorak 1</td><td>Mramorak 2</td></tr>
<tr><td>25 63 21</td><td>25 63 23</td></tr>
</table>
Electricity generation is measured continously at the substation.</td></tr>
<tr><td>Connection to the grid</td><td>Produced electricity is delivered to the Serbian EPS grid system through the sub-station which is 0,1 km away from the project site.</td></tr>
</table>

Project has an emergency flare unit located in each power plant. The purpose of it is to combust the biogas during the emergency situations and plant maintanence. Emergency flare units do not have biogas flow meters.

A- Waste reception and preparation unit

Wastes are accepted and handled at the project site as per the requirements and conditions of the Permit 12&13 issued by the Kovin Municipality. Wastes used for

biogas generation are both produced onsite at the Mramorak farm and transported from other locations.

Manure is collected from the onsite Zlatar Mramorak farm and the nearby farm Stari Tamiš. Both farms are operated by the project owner. At farms, the livestock comprises of diary and non-dairy cattle. Approximately in total, there are 3361 number of cattle at both farms.

As per the Permit 12&13, project owner keeps documentation records of all wastes received by the plants, stored and treated etc.

Wheels of trucks which bring wastes to the project site are washed; the wastes are weighted and recorded. Then wastes are taken into the relevant storage units. Liquid wastes are disposed into the “liquid pit”. Liquid pits have dispensers with submersible mixer. Solid wastes are disposed into a warehouse on a concrete base. Annual capacity of the warehouse is 55,050 ton/year.

Figure 3 Waste Preparation and Reception

Liquid manure and liquid wastes

Liquid manure from the onsite facility (Mramorak farm) is collected in a pit (Figure 4, image on the left) from where it is pumped to the "liquid pit" (Figure 4, image on the right). Liquid manure from the Stari Tamis farm is transported by non-permeable trucks to the project site where it is disposed to the "liquid pit". Liquid pit has a storage capacity of 3800 m^3.

Solid manure and solid organic wastes/residues

Solid manure produced on site and transported from the Stari Tamis farm goes through a chopping process where they are chopped into fine particulates which make its digestion easy within the digesters. After the chopping process solid manure is directly disposed to the liquid pits.

Manure from the Stari Tamis farm is transported by the impermeable trucks. Each day, two trips from Stari Tamis to the central treatment plants take place to carry manure.

Plant based and food wastes are transported by impermeable trucks which do not leak its content. Solid wastes go through a chopping process where they are chopped into fine particulates which make them easy for anaerobic digestion.

Figure 4 Onsite Manure Collection and Transporting to the Pit

B- Pump station and solid waste loading system units

By the scraper system, solid and liquid organic waste is collected in the pit and then it is pumped to the mixing tanks of biogas plants through underground pipes. Liquid pits are shown in Figure 3.

C- Anaerobic digestion system units

Anaerobic digestion system has two digesters. Main-digester receives raw wastes; post-digester receives the digested waste coming out from the main-digester. Each digester has two mixers.

Both digesters are cylindrical in shape, made with concrete material. Their height is 6 m and maximum loading is up to 5.5 m. Main-digester has a volume of 2920 m^3; post-digester has a volume of 3887 m^3.

Main-digester: The floor is made of concrete with a 30 cm of thickness. Between the floor and walls, there is a special rubber inside the concrete with the purpose of stopping leaking on the connections of walls and floor. Wall thickness is 30 cm. Digester's height is 6 m and 26 m in diameter.

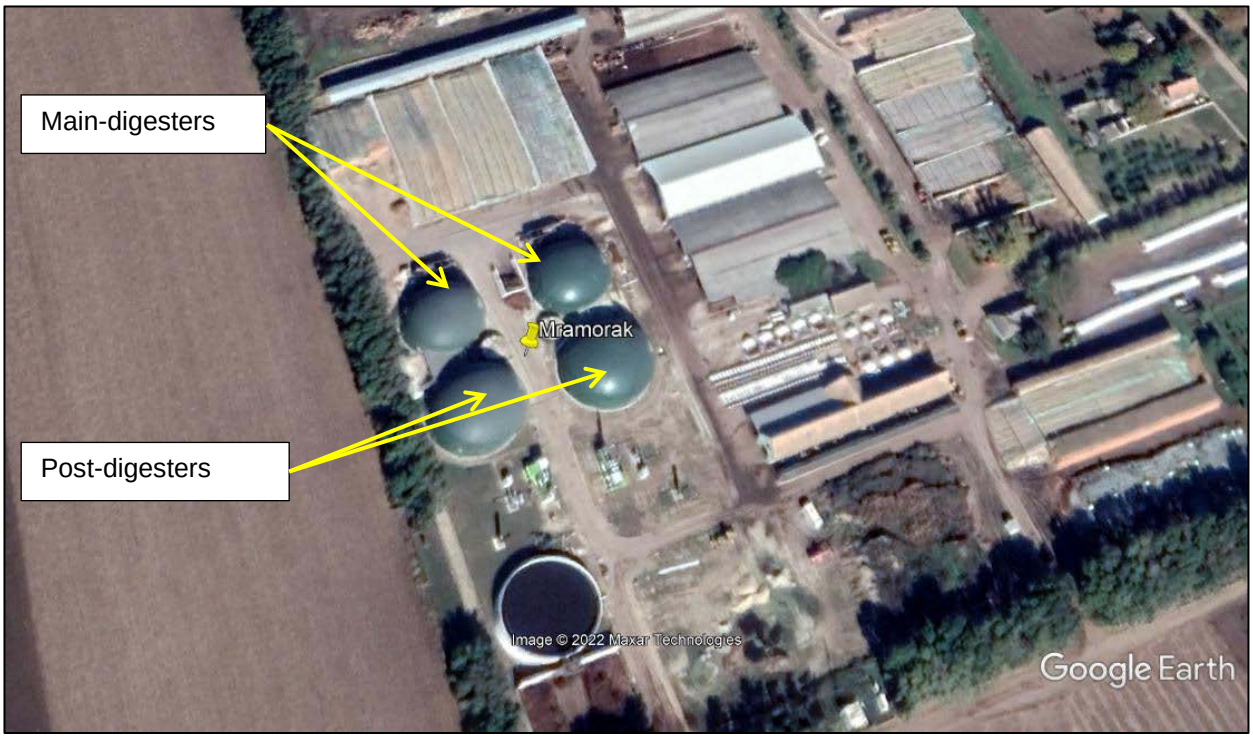

Figure 5 Mramorak 1&2 Digesters

Post-digestion process units

From both post-digesters, effluent flows to the impermeable circular open lagoon, having a volume of 3800 m^3 with a diameter of 30 m (Figure 6). From the circular open lagoon, digestate goes through a mechanical separation process. Solid part is stored right after the mechanical separation on a concrete layer. Solid phase is taken away every second or third day by tractor, and goes to the field for composting to be later used as fertilizer (Figure 8). In autumn, this compost is spread to the field.

Liquid part of the digestate flows to the open lagoon located in the vicinity of the project site through underground pipes. Lagoon is in rectangular shape and has a storage capacity of 28000 m^3. Lagoon is covered with an impermeable polyethylene film which does not allow leakage of waste water down to the ground (Figure 7). Digestate stays at the lagoon until autumn. Every autumn it is taken from the lagoon with special machines. A tractor spreads it on the field about 15 cm in dept. In spring, it is cultivated to the farm fields as fertilizer.

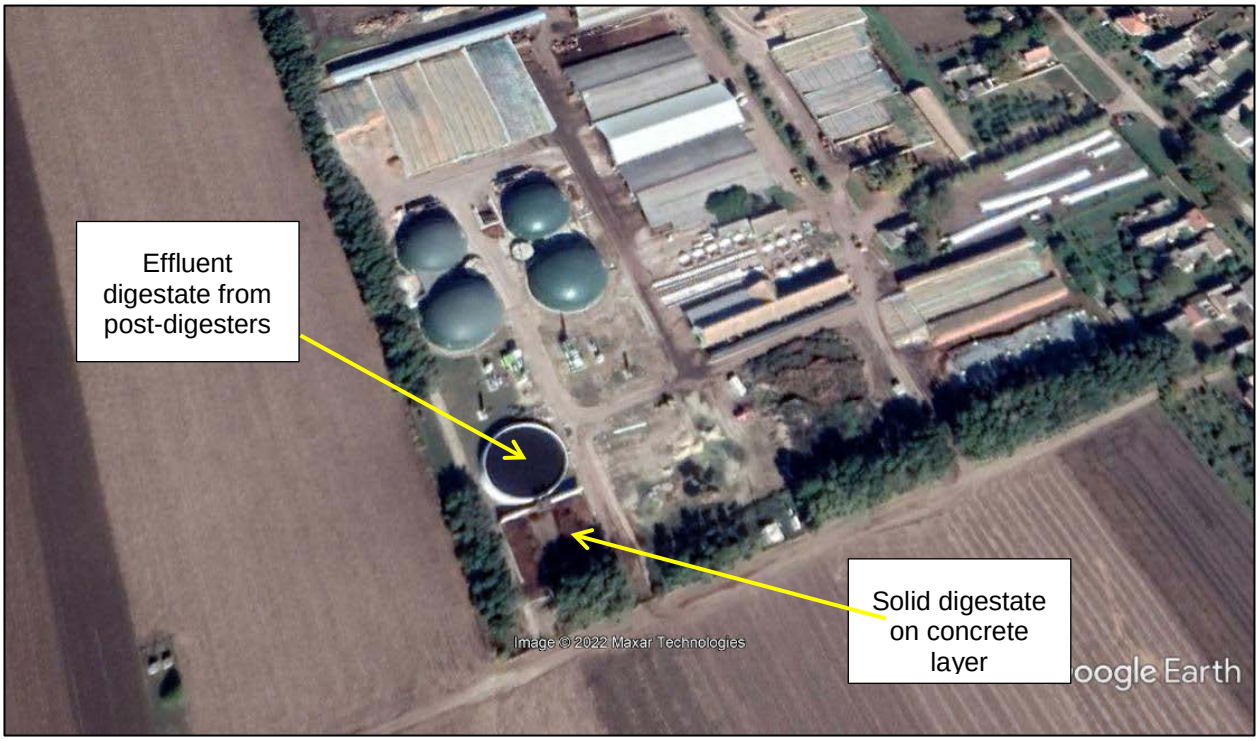

Figure 6 Effluent Digestate Handling Systems

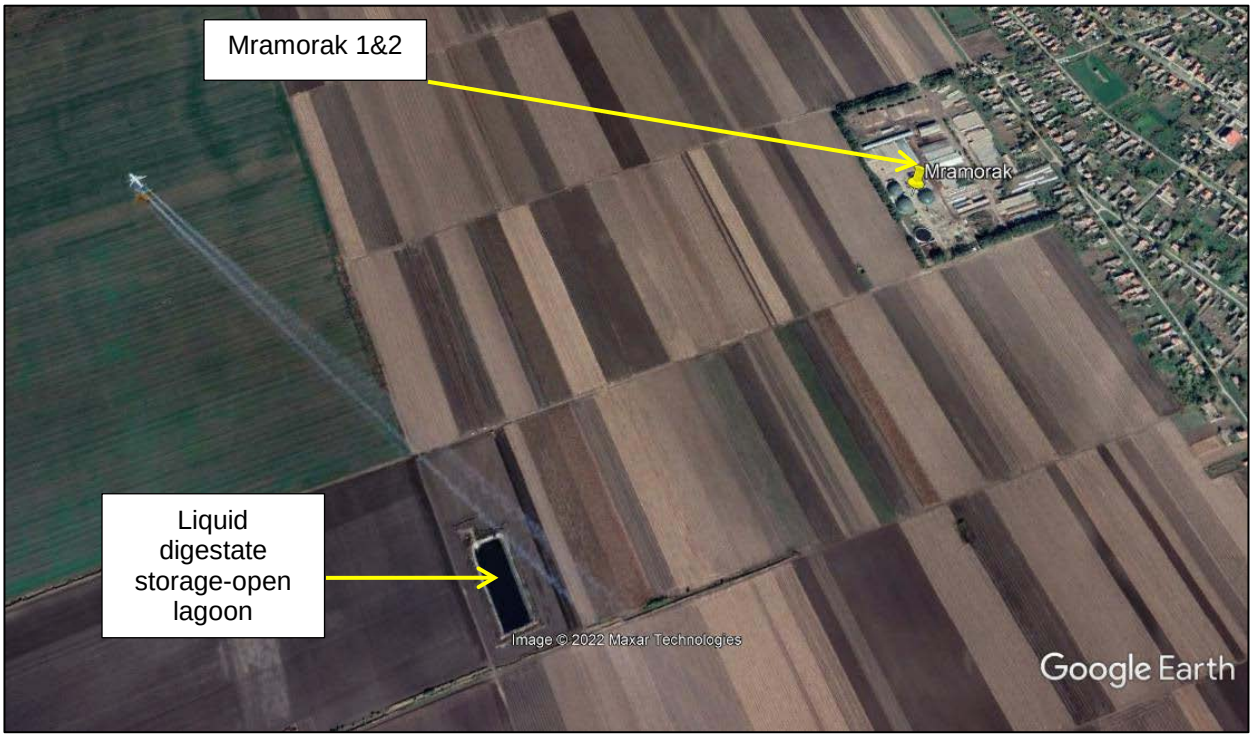

Figure 7 Farms, liquid Digestate Storage and Solid Digitate Storage Units Locations

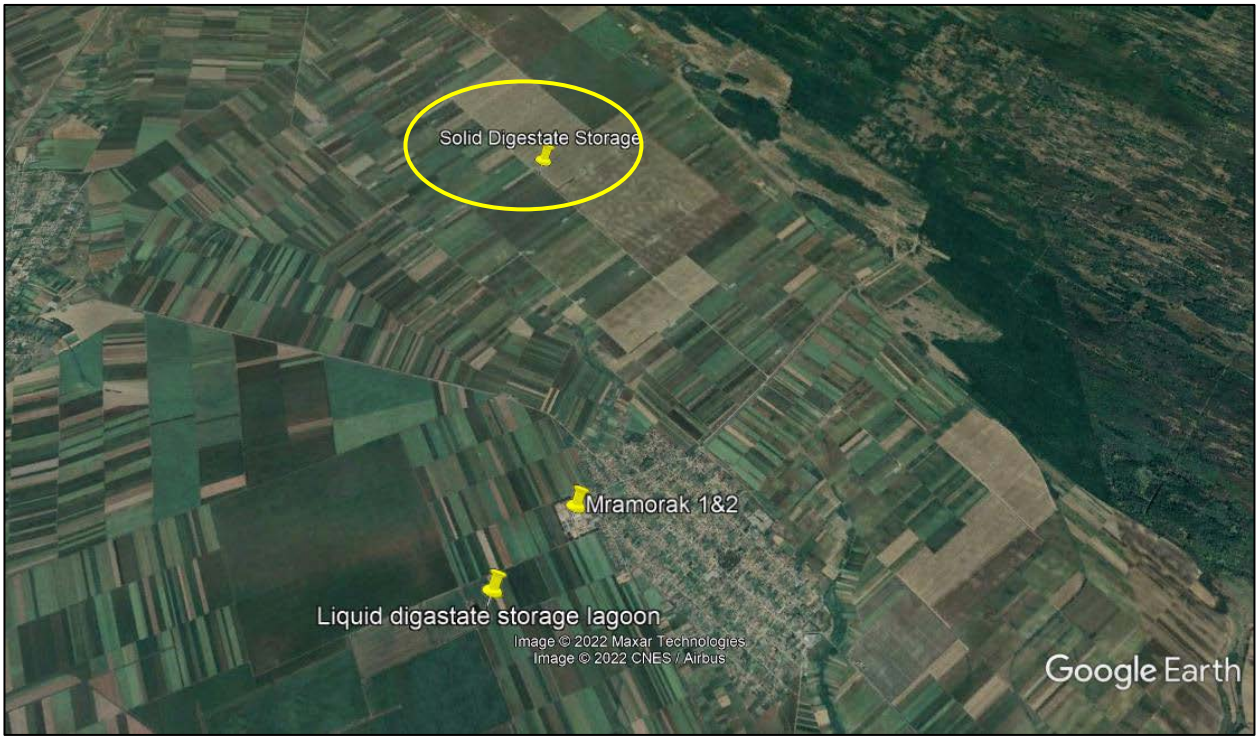

Figure 8 Solid Digestate Storage Location

D- Gas engine: Energy generating system units

At Mramorak 1 and Mramorak 2 biogas power plants, Northeast-Western Energy Systems brand gas engines were installed to generate heat and electricity. Each plant, Mramorak 1 and Mramorak 2, has one gas engine. See the following figure for further technical information about the gas engines.

	Brand Name: Northeast – Western Energy Systems Model: Jenbacher Model Type: J320 GS BL Fuel type: biogas Electrical Output: 1,059 kW Thermal output: 4,954 MBTU/hr.

Figure 9 Gas engine unit

Generated electricity is delivered to the Serbian national EPS grid. The produced electricity is delivered to the Grid based on the delivery contract with the government owned company, EPS Distribucija doo Belgrade.

Approximately 6% of the produced amount of electricity is consumed by the project activity by the gas engine unit. And the rest is transmitted to the grid. Hence electricity supplied to the grid is the net amount of electricity generated by the project activity.

Thermal energy produced is used to keep the temperature of the biodigesters at the designed level.

E- Energy transmission line

Generated electricity is supplied to the power station of the Serbian national grid system which is about 0.1 km away from the Mramorak1&2 central treatment plants. At the power station, there are two power meters operated by the EPS Distribucija doo. Project owners have no control on these power meters; they are sealed and protected from possible interventions. EPS Distribucija doo makes remote reading to these power meters and every month send invoice to the project owner. Monthly invoices are the sources of electricity generation data of the project activity.

Project owner has also power meters installed within the gas engine units. The readings of these power meters can be used for cross-checking.

Mramorak1&2 power meters within the gas engine units are Landis+Gyr E650 branded with an accuracy class of 0.5/1.0. They are active reactive, bi-directional.

	Mramorak 1	**Mramorak 2**
Brand & Model	Landis+Gyr E650	Landis+Gyr E650
Serial number	43 267 888	44 202 354

Project technical lifetime

Gas engines are the determining factor of the operational lifetime of the project. According to the Tool 10: Tool to determine the remaining lifetime of equipment, Version 01.", operational lifetime of gas engines up to 50 MW capacities is 150,000 hours. The project activity operates full time 365/year, therefore expected default

operational lifetime will be at least (150,000/(365x24)) 17.12 years. However, project owner applies regular maintenance; therefore its lifetime will be extended to beyond 20 years.

Hence, technical lifetime of the project activity is accepted as 20 years.

2.4 Project location

Mramorak1&2 project site is located in Republic of Serbia, on the eastern part of Belgrade, close to the border with Romania. Its physical address is “Zlatar Doo Mramorak, Zadružna street no. 6, at floor. parc. 690/3 ko Mramorak Serbia.”

Geographical coordinates of the project site:

Project Site	**Latitude**	**Longitude**
Mramorak1&2 central treatment plants	44°52'56.72"N	20°57'23.95"E
Mramorak Farm	44°52'56.72"N	20°57'23.95"E
Stari Tamis Farm	44°52'16.63"N	20°46'3.79"E
Liquid digestate storage lagoon	44°52'34.01"N	20°56'52.19"E
Solid digestate storage	44°55'0.56"N	20°57'5.80"E

Figure 10 Mramorak 1&2 Project -1

Figure 11 Mramorak 1&2 Project -2

Figure 12 Mramorak 1&2 Project -3

Figure 13 Mramorak 1&2 Project -4

Sources of non-hazardous food wastes are listed in the BCR_Mramorak1&2_ER_Calculations.xls document. All the food sources are within the maximum 186 km radius of the central treatment plants.

2.5 Additional information about the GHG Project

No public funding and/or Official Development Aid finances are used within the project. Project was implemented and has been operated by the project owners, Zlatar Mramorak Doo and BioGold Energy Doo, with their own financial resources. Both companies are belonged to the same parent company, Almex Doo.

Project did not receive and/or did not apply for any other GHG-related environmental crediting certifications. Project has not been registered or is not seeking registration under any other GHG programs.

Regarding the host country attestation, Republic of Serbia has not started to provide “host country attestation” to carbon mitigation projects. These issues are not clear yet in Serbia.

Mramorak1&2 biogas project is a bundled project as per the UNFCCC CDM Annex21: General Principles[4] for Bundling. Project meets the small-scale criteria of the CDM Annex 21 conditions given that it has an annual emission reduction less than 60k tCO2 with an installed capacity less than 15 MW.

3 Quantification of GHG emissions reduction

3.1 Quantification methodology

For waste handling and disposal component of the project activity, AMS-III.AO is used. Project also claims carbon emission reductions due to the replacement of the electricity from the Serbian EPS grid system with renewable electricity produced by the project activity. For renewable component, AMS-I.D. is used.

AMS-III.AO Methane recovery through controlled anaerobic digestion, Version 1.0.[5]

AMS-I.D. Grid connected renewable electricity generation, Version 18.0.[6]

Applicable tools as per the AMS-III.AO., Version 1.0:

1) "Tool 03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Version 03.0.[7]
2) "Tool 04: Emissions from solid waste disposal site" Version 8.0.[8] (Previous version of this tool referred in the AMS-III.AO methodology is called as "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
3) "Tool 06: Project emissions from flaring" Version 04.0[9]
4) AMS-III.D. Small-scale methodology: Methane recovery in animal manure management systems, Version 21.0.[10]
5) CDM Annex 24 "Attachment A of Appendix B[11] (for additionality analysis)

[4] https://cdm.unfccc.int/EB/021/eb21repan21.pdf.
[5] https://cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSU745LJQM81SDJJOJ2S4G7ID9EIKFGD
[6] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK.
[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf.
[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.0.pdf.
[9] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v4.0.pdf.
[10] https://cdm.unfccc.int/filestorage/1/A/W/1AWXEKHVTYF423LCN56Z9GIMQOS8JR/EB96_repan09_AMS-III.Dv21.pdf?t=NVJ8cmw2ZWJ2fDDIDQD4EosEc5RN5vtsLou .

Applicable tools as per the AMS-I.D., Version 18.0: [12]

Tool 07: Tool to calculate the emission factor for an electricity system, Version 7.0.[13]

Foor additionality analysis, AMS-III.AO Version 01 and AMS-I.D: Version 18.0 both refer to the CDM Annex 24 "Attachment A of Appendix B[14]". Financial analysis is applied as per this guideline. However this guideline does not refer to a specific CDM tool for additionality analysis. Therefore, following CDM tools are applied for financial analysis:

1. CDM Tool 21: Demonstration of additionality of small-scale project activities, Version 13.1.[15]
2. CDM Tool 01: Tool for the demonstration and assessment of additionality, Version 7.0.0.[16]
3. CDM Tool 27: Investment Analysis Version 12.0[17]

There are no deviations from the AMS-III.AO and AMS.I.D methodologies and as per the applied tools to the project activity.

3.1.1 Applicability conditions of the methodology

AMS-III.AO: Methane recovery through controlled anaerobic digestion, Ver. 1.0.

No	Applicability criteria	Applicability to the project
1	This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an animal waste management system (AWMS), or in a wastewater treatment system (WWTS). In the	

[11] Annex 24, Attachment A of Appendix B, Version 08., https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid05.pdf.
[12] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK.
[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf.
[14] Annex 24, Attachment A of Appendix B, Version 08., https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid05.pdf.
[15] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v13.1.pdf.
[16] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf.
[17] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v12.pdf.

No	Applicability criteria	Applicability to the project
	project activity, controlled biological treatment of biomass or other organic matters is introduced through anaerobic digestion in closed reactors equipped with biogas recovery and combustion/flaring system. The following conditions apply:	
1-a	Digestion of biomass or other organic matter (excluding animal manure and sludge generated in the wastewater treatment works) as a single source of substrate is included;	Not Applicable. Project uses more than one type of substrate, which are cattle manure, plant based organic wastes (starch waste, liquid starch waste, CSL), plant residues (silage corn and silage barley) and non-hazardous food wastes.
1-b	Co-digestion of multiple sources of biomass substrates, e.g. MSW, organic waste, animal manure, wastewater, where those organic matters would otherwise have been treated in an anaerobic treatment system without biogas recovery is also eligible;	Applicable Project uses more than one type of substrate, which are cattle manure, plant based organic wastes (starch waste, liquid starch waste, CSL), plant residues (silage corn and silage barley) and non-hazardous food wastes. These organic wastes would otherwise have been treated in an anaerobic treatment system without biogas recovery.
1-c	If for one or more sources of substrates, it cannot be demonstrated that the organic matter would otherwise been left to decay anaerobically, baseline emissions related to such organic matter shall be accounted for as zero, whereas project emissions shall be calculated according to the procedures presented in this methodology for all co-digested substrates;	Applicable. In the baseline scenario, manure is left to decay in open lagoons for extended periods of time (> 1 month) under anaerobic conditions. Municipal solid waste (non-hazardous food waste) was sent to the SWDSs and where it would have been decayed anaerobically. Methane emission reductions are not claimed from other sources of wastes inputs to the Mramorak biodigesters; hence baseline emissions are accepted as zero. Project emissions shall be calculated

No	Applicability criteria	Applicability to the project
		according to the procedures presented in methodology AMS III.AO. (V01) for all co-digested substrates.
1-d	Project participants shall apply the procedures related to the "competing use for the biomass" according to the latest "General guidance on leakage in biomass project activities";	Project does not use biomass. Not Applicable.
1-e	Project activities treating animal manure as single source substrate shall apply AMS-III.D "Methane recovery in animal manure management systems", similarly projects only treating wastewater and/or sludge generated in the wastewater treatment works shall apply AMS-III.H "Methane recovery in wastewater treatment";	Not Applicable. Since project uses multi type of sources, this condition is N/A. Therefore AMS-III.AO is used as methodology for the project activity.
1-f	The project activity does not recover or combust landfill gas from the disposal site (unlike AMS-III.G "Landfill methane recovery"), and does not undertake controlled combustion of the waste that is not treated biologically in a first step (unlike AMS-III.E "Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment"). Project activities that recover biogas from wastewater treatment shall use methodology AMS-III.H.	Not Applicable. Project does not recover or combust landfill gas and does not undertake controlled combustion of waste that is not treated biologically in a first step. Project does not claim carbon credits from the wastewater.
2	Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO2 equivalent annually.	Applicable Project is a small-scale activity with an annual emission reduction less than 60k tCO2.
3	The location and characteristics of the disposal site of the biomass used for digestion in the baseline condition shall	Applicable Methane emission reduction from plant

No	Applicability criteria	Applicability to the project
	be known, in such a way as to allow the estimation of its methane emissions. Guidelines in AMS-III.G, AMS-III.D, AMS-III.E (concerning stockpiles) and AMS-III.H (as the case may be) shall be followed in this regard. Project activities for co-digestion of animal manure shall also meet the requirements under paragraphs 1 and 2(c) of AMS-III.D. The following requirement shall be checked ex ante at the beginning of each crediting period:	residues (biomass) are not claimed. Therefore baseline emissions are not calculated. This is a conservative approach. "Project activities for co-digestion of animal manure shall also meet the requirements under paragraphs 1 and 2(c) of AMS-III.D." conditions are applicable.
AMS-III.D :1	Replacement or modification of existing anaerobic manure management systems in livestock farms, or treatment of manure collected from several farms in a centralized plant to achieve methane recovery and destruction by flaring/combustion or energetic use of the recovered methane. GHG destruction: GHG destruction and displacement of more- GHG -intensive service	Applicable. Baseline open anaerobic lagoon treatment system of cattle manure is replaced with controlled anaerobic digestion system and generated methane from anaerobic digestion is destructed but the combustion for generating renewable electricity which is supplied to the grid.
AMS-III.D: 2-c	This methodology covers project activities involving 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.	Applicable. Baseline open anaerobic lagoon treatment system of cattle manure is replaced with controlled anaerobic digestion system and generated methane from anaerobic digestion is destructed but the combustion for generating renewable electricity which is supplied to the grid.
3-a	Establish that identified landfill(s)/stockpile(s) can be expected to accommodate the waste to be used for the project activity for the duration of the	Applicable Non-hazardous food wastes, in the

No	Applicability criteria	Applicability to the project
	crediting period; or	baseline, were delivered to the SWDS and the same is valid during the crediting period,
3-b	Establish that it is common practice in the region to dispose off the waste in solid waste disposal site (landfill/stockpile).	Applicable It is a common practice activity to store the non-hazardous food wastes to the SWDs.
4	The project participants shall clearly define the geographical boundary of the region referred to in 3(b), and document it in the CDM-PDD. In defining the geographical boundary of the region, project participants should take into account the source of waste, i.e. if waste is transported up to 50 km, the region may cover a radius of 50 km around the project activity. In addition, it should also consider the distances to which the final product after digestion will be transported. In either case, the region should cover a reasonable radius around the project activity that can be justified with reference to the project circumstances but in no case it shall be more than 200 km. Once defined, the boundary should not be changed during the crediting period(s).	Applicable Radius of the project boundary is less than 200 km. Maximum distance from the where the food waste is transported is 186 km.
5	In case residual waste from the digestion is handled aerobically and submitted to soil application, the proper conditions and procedures (not resulting in methane emissions) for storage and transportation and soil application must be ensured.	Applicable Solid part is stored right after the mechanical separation on a concrete layer. Solid phase is taken away every second or third day by tractor, and goes to the field for composting to be later used as fertilizer. In autumn, this compost is spread to the field. Liquid part of the digestate flows to the open lagoon located in the vicinity of the project site through underground pipes. Lagoon is in rectangular shape and has a

No	Applicability criteria	Applicability to the project
		storage capacity of 28000 m3. Lagoon is covered with an impermeable polyethylene film which does not allow leakage of waste water down to the ground. Digestate stays at the lagoon until autumn. Every autumn it is taken from the lagoon with special machines. A tractor spreads it on the field about 15 cm in dept. In spring, it is cultivated to the farm fields as fertilizer.
6	In case residual waste from the digestion is treated thermally/mechanically, the provisions in AMS-III.E related to thermal/mechanical treatment shall be applied.	Not Applicable Residual waste from the digestion is not treated thermally/mechanically. Therefore AMS-III.E is not applicable.
7	In case residual waste from the digestion is stored under anaerobic conditions and/or delivered to a landfill, emissions from the residual waste shall to be taken into account and calculated as per the latest version of the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site".	Not Applicable Residual waste from the digestion is not stored under anaerobic conditions and/or delivered to a landfill.
8	In case the outflow from the digestion is discharged to a subsequent wastewater treatment system or to the natural water receiving body, relevant procedure in AMS-III.H shall be followed to estimate the resultant project emissions.	Not Applicable Outflow from digestion is used as fertilizer on the farm lands, not discharged to a subsequent wastewater treatment system or to the natural water receiving body.
9	Technical measures shall be used to ensure that all biogas captured from the digester is combusted/flared.	Applicable Biogas is collected in tanks where it is sent to the gensets for combustion. A flaring system is included in the project activity in case where biogas pressure exceeds safety limits. All biogas collected is combusted in the project.

No	Applicability criteria	Applicability to the project
10	All the applications to utilize the recovered biogas detailed in paragraph 3 of AMS-III.H are eligible for use under this methodology. The relevant procedure in AMS-III.H shall be followed in this regard.	Not Applicable The project entails the combustion of biogas for energy production. Therefore, the options instead of combustion listed in AMS-III.H are not applicable for this project activity.

AMS-I.D. Grid connected renewable electricity generation, Ver. 18.0.

No	Applicability criteria	Applicability to the project
1	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	This project activity produces electricity from biogas and supplies it to the Serbian EPS grid system. Satisfies the criteria.
2	Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is included in the appendix.	Project activity provides electricity to the Serbian EPS grid system. Therefore, AMS-I.D. is applicable. Satisfies the criteria.
	Applicability	
3	This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing	Project activity is a new Greenfield plant. Mramorak 1 and Mramorak 2 projects are newly installed at the project, not transported from another plance. They are brand new systems.

No	Applicability criteria	Applicability to the project
	plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	Satisfies the criteria.
4	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m2 ; (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2 .	Project activity is not a hydropower plant. Not Applicable.
5	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	Project activity has no non-renewable component and its total installation capacity is less than 15 MW. Satisfies the criteria.
6	Combined heat and power (gas engine) systems are not eligible under this category.	Project activity is a small scale project and generates electricity. Operation of electricity generation gas engines produce heat which is used to heat the digesters. Satisfies the criteria.
7	In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower	Project activity is a Greenfield renewable power plant. Not Applicable.

No	Applicability criteria	Applicability to the project
	than 15 MW and should be physically distinct from the existing units.	
8	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	Project activity is a Greenfield renewable power plant. Not Applicable.
9	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or gas engine other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology." AMS-I.D is used to calculate the baseline emission for the electricity component of the project activity.
10	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	Project does not use biomass sourced from dedicated plantations. Not Applicable.

Tool 04: Emissions from solid waste disposal site, Ver. 8.0.

No	Applicability criteria	Applicability to the project
1	Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g.	Not Applicable This condition is for CDM project activity mitigates methane emissions from a specific "existing SWDS". In the project activity, municipal waste is not disposed to

No	Applicability criteria	Applicability to the project
	"ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS);	SWDSs, instead its disposal is avoided.
2	Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions.	Applicable Mramorak1&2 project avoids disposal of municipal waste to SWDSs. Hence, it is applicable.
3	In the case that: (a) different types of residual waste are disposed or prevented from disposal; or that (b) both MSW and residual waste(s) are prevented from disposal, then the tool should be applied separately to each residual waste and to the MSW.	Not Applicable Project only treats wet based municipal solid waste. Hence, there is only one type of organic waste handled.

Tool 03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, Version 03.0

No	Applicability criteria	Applicability to the project
	This tool provides procedures to calculate project and/or leakage CO2 emissions from the combustion of fossil fuels. It can be used in cases where CO2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. Methodologies using this tool should specify to which combustion process j this tool is being applied.	Applicable. CO2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties

Tool 06: Project emissions from flaring, Version 04.0

No	Applicability criteria	Applicability to the project
1	This tool provides procedures to calculate project emissions from flaring of a residual gas. The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.	This tool is applied to calculate the project emissions from the flaring of the project activity. The flare system used in the project activity is open type flare system, which is indicated in this PDD. Applicable
2 This tool is applicable to the flaring of flammable greenhouse gases where:		
2a	Methane is the component with the highest concentration in the flammable residual gas; and	Methane is the highest component in the biogas produced by the project activity. Methane content of the project's biogas is 55%. Applicable
2b	The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	The source of the residual gas is from a biogenic source. Applicable
3	The tool is not applicable to the use	Project activity does not use auxiliary

No	Applicability criteria	Applicability to the project
1	This tool provides procedures to calculate project emissions from flaring of a residual gas. The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.	This tool is applied to calculate the project emissions from the flaring of the project activity. The flare system used in the project activity is open type flare system, which is indicated in this PDD. Applicable
	use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. In the case of an enclosed flare, there shall be operating specifications provided by the manufacturer of the flare and these shall be followed by the project participant	fuels; therefore the residual gas combusted in the flare is only the biogas generated by the project activity. Applicable.

Tool 07: Tool to calculate the emission factor for an electricity system, Ver. 7.0.

No	Applicability criteria	Applicability to the project
1	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	Applicable. Mramorak1&2 project supplies renewable electricity to the Serbian EPS grid.
2	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is	Applicable. Only grid connected power plants are used in the calculations. The emission factor for the project electricity system is calculated for grid power plants only.

No	Applicability criteria	Applicability to the project
	chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
3	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	Not Applicable Host country, Republic of Serbia, is not an Annex 1 country.
4	Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	Not Applicable Biofuels are not used in the project.

Tool 21: Demonstration of additionality of small-scale project activities, Ver. 13.1.

No	Applicability criteria	Justification
1	The use of the methodological tool "Demonstration of additionality of small-scale project activities" is not mandatory for project participants when proposing new methodologies. Project participants and coordinating/managing entities may propose alternative methods to demonstrate additionality for consideration by the Executive Board.	Project participant has not developed a new methodology
2	Project participants and coordinating/managing entities may also	Tool 19 is not applied, instead Tool 21 is applied to demonstrate additionality for the

No	Applicability criteria	Justification
	apply "TOOL19: Demonstration of additionality of microscale project activities" as applicable.	project activity.

Tool 01: Tool for the demonstration and assessment of additionality, Ver. 7.0.0.

No	Applicability criteria	Applicability to the project
1	The use of the "Tool for the demonstration and assessment of additionality" is not mandatory for project participants when proposing new methodologies. Project participants may propose alternative methods to demonstrate additionality for consideration by the Executive Board. They may also submit revisions to approved methodologies using the additionality tool.	Not Applicable Project participant has not developed a new methodology
2	Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	Applicable Both methodoloies applied to the project (AMS-III.AO and AMS-I.D) refers to the CDM 24 Attachment A of Appendix B. Foor additionality analysis, "AMS-III.AO Version 01 and AMS-I.D. Version 21" refer to the CDM Annex 24 "Attachment A of Appendix B". Financial analysis is applied as per this guideline. However this guideline does not refer to a specific CDM tool for additionality analysis. Since project is a small scale one, Tool 21 is applied. As per the Tool 21, investment barrier is analyzed for demonstration of additionality, and for investment barrier analysis, Tool 01 is applied.

Tool 27: Investment Analysis", Ver. 12.0.

No	Applicability criteria	Justification
1	This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", the guidelines "Non-binding best practice examples to demonstrate additionality for SSC project activities", or baseline and monitoring methodologies that use the investment analysis for the demonstration of additionality and/or the identification of the baseline scenario.	To assess the additionality of the project activity, "Tool 21: Demonstration of additionality for small-scale project activities" is used. Hence satisfied the criterion.
2	In case the applied approved baseline and monitoring methodology contains requirements for the investment analysis that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.	Applicable.

3.2 Project boundaries

3.2.1 Project area

As per the AMS-III.AO, project boundary is the physical, geographical site:

(a) Where the solid waste (including animal manure, where applicable) would have been disposed and the methane emission occurs in absence of the proposed project activity;

(b) In the case of projects co-digesting wastewater, where the wastewater would have been treated anaerobically in the absence of the project activity;

(c) Where the treatment of biomass or other organic matters through anaerobic digestion takes place; (d) Where the residual waste from biological treatment or products from those treatments, like slurry, are handled, disposed, submitted to soil application, or treated thermally/mechanically;

(e) Where biogas is burned/flared or gainfully used, including biogas sale points, if applicable;

(f) And the itineraries between them (a, b, c, d and e), where the transportation of waste, wastewater, where applicable manure, residual waste after digestion, or biogas occurs.

As per the AMS-I.D (v.18.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system (Serbian EPS grid system) that the CDM project power plant is connected to.

Within the project activity, Stari Tamis and Zlatar Mramorak farms are the sources of cattle manure. Stari Tamis is 18.5 km by road away from the central treatment plant (Mramorak 1&2). Mramorak farm is the location where the central treatment plants are located. Manure transported to the Mramorak1&2 central treatment plants are directly fed to the digester within the 24 hour. Hence, there is no manure storage tank at the project site. Non-hazardous food wastes come from various locations from Belgrade and nearby regions within the distance 186 km. All food wastes coming to the central treatment plants are directly fed to the biodigesters.

From the main-digesters, digestate comes to the post-digester units where remaining anaerobic digestion completed and remaining methane collected. After post digestion, effluent is separated into liquid and solid form. Liquid effluent through pipelines flows to the open lagoon nearby to the Mramorak1&2 central treatment plants. Solid effluent is transported to two locations on project owner's farm lands which are 1 km and 5 km away from the central treatment plants. Then solid digestate and liquid digestate are used as fertilizer and applied to farm lands by the project owner.

Produced biogas from digester and post digesters are collected and combusted in the gas engine unit and it produce electricity and heat. Electricity is supplied to the Serbia EPS grid system. Heat is used within the project boundary to heat the digesters.

Based on this process flow, the spatial extent of the project boundary encompasses cattle manure and food waste collection points, roads between these points and central treatment plants, trucks carrying manure and food waste from sources to the central treatment plants, Mramorak 1&2 central treatment plants, effluent digestate storages (solid digestate application lands and open lagoons for liquid digestate), the roads

between central treatment plants and digestate storage units, digestate land applications. In addition to that, all power plants connected physically to the Serbian EPS electricity grid system (grid) that the project plant is connected to are included.

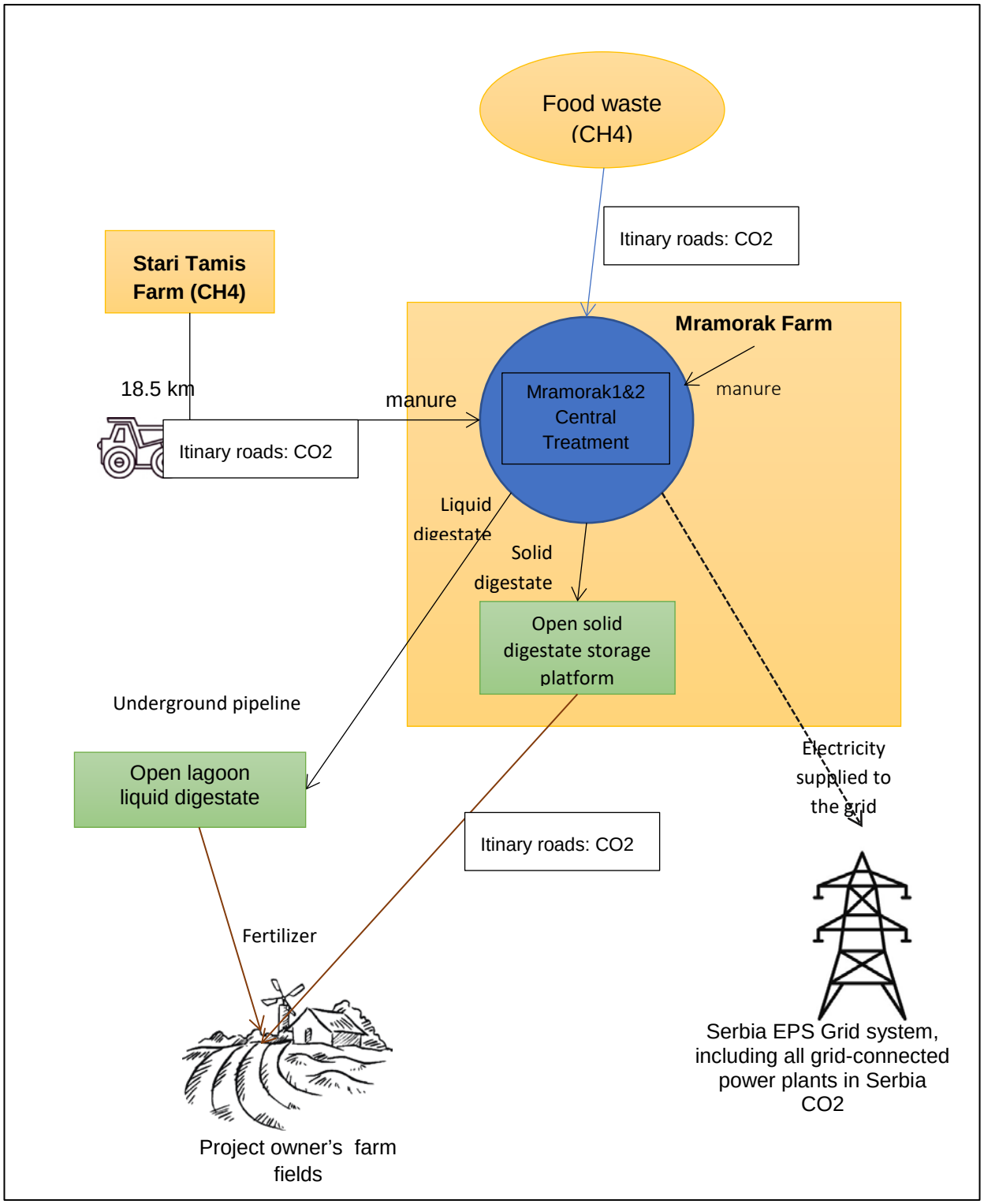

Figure 14 AMS-III.AO and AMS-I.D.-Graphical representation of the project boundary

3.2.2 Carbon reservoirs and GHG sources

	Source or reservoir	GHG	Included (Yes/No/Optional)	Justification
Baseline emission	**Direct emissions from the manure treatment processes (open anaerobic lagoons, BE_{manure})**	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted. Excluded for simplification.
		CH_4	Yes	Major source of emission in the baseline
		N_2O	No	There are no emissions of N2O from uncovered anaerobic lagoons according to the 2006 IPCCC Guidelines. Direct and indirect N2O emissions are not accounted in project's emission reduction calculations for simplification
	Direct emissions from SWDs (food waste, BE_{SWDS})	CO_2	No	Excluded for simplification. This is conservative.
		CH_4	Yes	Major source of emission in the baseline
		N_2O	No	Excluded for simplification. This is conservative.
	Emissions from electricity consumption /generation (AMS-I.D: BE_{electr})	CO_2	Yes	Major source of emission in the baseline, Serbian EPS grid system.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.

Project emission	**Emissions from onsite electricity use ($PE_{power,y}$)**	CO_2	Yes	Maybe an important emission source. Within the project activity, electricity is used from the gas engine units of the project activity.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Direct emissions from the Mramorak1&2 biodigesters ($PE_{phy\ leakage,y}$)	CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	Yes	Major source of emission. As per AMS-III.AO, biogas digesters methane leakage is 5%.
		N_2O	No	Direct and indirect N_2O emissions are not accounted, and emission reductions by N_2O are not claimed.
	Emissions from organic waste transportation ($PE_{transp,y}$)	CO_2	Yes	May be an important emission source.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Flare emissions $PE_{flare,y}$	CO_2	Yes	May be an important emission source.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.

3.2.3 Time limits and analysis of periods

Project start date

Project start date is 24.06.2020 when the Mramorak 1 started to operation.

Quantification period of the GHG emissions reduction

Quantification period for the project activity is 7 years renewable twice.

Project's first quantification period is 24.06.2020-23.06.2027 with both days inclusive, renewable twice.

Monitoring periods

Monitoring periods for the project activity are;

First monitoring period: 24/06/2020- 23/06/2024

Second monitoring period: 24/06/2024-23/06/2027.

3.3 Identification and description of baseline scenario

Mramorak 1&2 is a bundled Greenfield project activity, comprising two identical biogas power plants, implementing anaerobic treatment process to organic wastes to reduce Greenhouse gas (GHG) emissions through methane recovery and displace carbon intensive Serbian EPS grid electricity with renewable biogas energy.

Regarding EPS grid system, electricity consumption is projected as increasing significantly untill 2030. There is strong need to develop new power plants to meet those needs.[18]

[18] https://meemp-serbia.com/wp-content/uploads/2018/09/Legislative-Energy-Sector-Development-Strategy-of-the-Republic-of-Serbia-for-the-period-by-2025-with-projections-by-2030.pdf. P.40

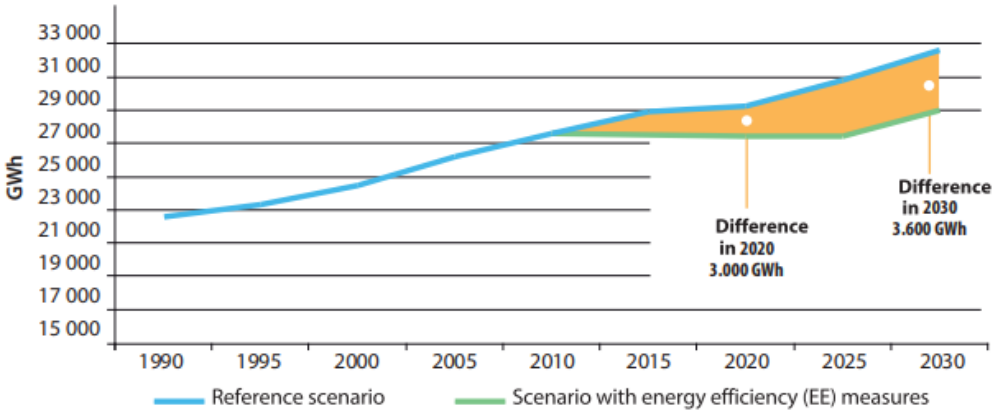

Figure 15 Projection of Electricity Consumption in Republic of Serbia[19]

Project activity has two components for GHG emission reductions:

1) Methane recovery through controlled anaerobic digestions of organic wastes (AMS-III.AO)
2) Generation of grid connected renewable electricity (AMS-I.D)

Baseline scenario as per the AMS-III.AO

As per the methodology, "The baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter (including manure where applicable) are left to decay within the project boundary and methane is emitted to the atmosphere. The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass and other organic matter. Baseline emissions shall exclude emissions of methane that would have to be captured, fueled or flared or gainfully used to comply with national or local safety requirement or legal regulations."

Project activity's baseline conditions are as described in the AMS-III.AO. All organic wastes treated in the biodigesters of Mramorak1&2 had been left to decay anaerobically. Cattle manure was discharged into the uncovered anaerobic lagoon where manure was left to decay anaerobically and methane was released in to the atmosphere. And uncovered anaerobic lagoon is one of the suggested methods by the

[19] https://meemp-serbia.com/wp-content/uploads/2018/09/Legislative-Energy-Sector-Development-Strategy-of-the-Republic-of-Serbia-for-the-period-by-2025-with-projections-by-2030.pdf. P.40

Serbian laws for AWMSs.[20] Food waste was disposed to SWDs areas where it was releasing methane to the atmosphere. Plant based wastes (starch wastes, liquid starch waste and CSL) were stored in open lagoons and left to decay anaerobically. Plant residues that includes slage corn and slage barley were used to feed the cattles at Stari Tamis and Zlatar cattle farms.

Baseline scenario as per the AMS-I.D.

Mramorak1&2 is a Greenfield project activity. As per the AMS-I.D., the baseline scenario is that "the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid."

Before the implementation of the Mramorak1&2, the amount of renewable electricity generated by the project activity would be utilized from the carbon intensive Serbian national EPS grid system which is dominated by fossil fuel based power plants. 2019, 2020 and 2021 electricity generation data of Serbia EPS grid system has shown that major source of electricity generation is from coal-fired power plants.[21]

Historic data regarding the baseline Serbian EPS grid system is provided through the calculation of the CEF_{grid} emission factor.

3.4 Additionality

AMS-III.AO Version 01 and AMS-I.D. both refer to the CDM Annex 24 "Attachment A of Appendix B[22]" for additionality analysis. Financial analysis is applied as this guideline states. However this guideline does not refer to a specific CDM tool for additionality analysis. Therefore, Tool 21: Demonstration of additionality of small-scale project activities." Given that Mramorak 1&2 is a small scale project, Tool 21 is the most appropriate additionality tool for the project activity. Financial investment analysis is conducted as per the Tool 27.

[20] Rules About the Requirements They Should Fulfill Facilities for Animal Waste and Processing Plants Animal Waste, Official Gazette of the RS, 94/17, October 19,2017. Articles 3. p.1, https://istocar.bg.ac.rs/wp-content/uploads/2018/04/ZAKON-O-STO%C4%8CARSTVU-izmene-2016.pdf.
[21] This source provide electricity generation data by the Serbian EPS grid system, data belongs years between 2011-2020.
https://www.aers.rs/Files/Izvestaji/Godisnji/Eng/AERS%20Annual%20Report%202020.pdf, p.17
[22] Annex 24, Attachment A of Appendix B, Version 08.,
https://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid05.pdf.

Project investment decision for both Mramorak 1 and Mramorak 2 biogas plants were taken on 26/07/2018.[23]

Tool 21 states that "project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:[24]

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Among these barriers, option (a) Investment barrier is chosen to demonstrate additionality. And according to the Tool 21, since project activity's installed capacity is smaller and does not fall into the category of Positive Lists (CDM Tool 32), "regular additionality procedure" will be applied.[25]

As per regular additionality procedure, Tool 01: Tool for the demonstration and assessment of additionality Version 07.0.0., is used to make investment analysis.

Compliance with national laws and regulations

Project also complies with the mandatory laws and regulations of Serbia.

1) The Law on Energy (Zakon O Energetici, "Sl. glasnik RS", br. 145/2014, 95/2018 - dr. zakon i 40/2021);[26]

[23] Investment decision is accepted by the project owners as the date when the Mramorak1 and 2 received license to be implemented from the Electrodistribution company of Republic of Serbia.
[24] CDM Tool 21: Demonstration of additionality of small-scale project activities, Version 13.1., p.4.
[25] CDM Tool 21: Demonstration of additionality of small-scale project activities, Version 13.1., p.5.
[26] https://mre.gov.rs/dokumenta/sektor-za-elektroenergetiku/zakoni.

2) Law on Energy Efficiency and Rational Use of Energy (Zakon o Efikasnom Korišćenju Energije, "Sl. glasnik RS", br. 25/2013 i 40/2021 - dr. zakon);[27]
3) Waste management law (Zakon o Upravljanju Otpadom, "Sl. glasnik RS", br. 36/2009 i 88/2010); [28]

As per the 1st and 2nd law, project received energy generation license. As per the 3rd law, project received environmental permission to store and process organic wastes. Please see Section 4 for more information.

Step 2 - Investment Analysis

For investment analysis, Step 2[29] of the CDM Tool 01 is applied; and it will analyze the financial attractiveness of the project without carbon revenue.

However, Step 2-Investment Analysis uses results from the Sub-step 1a, which defines alternatives to the project activity and acts as a precursor to Step 2 Investment analysis. Therefore, first Sub-step 1a, project alternatives, will be analyzed; then Step 2 investment analysis will be applied.

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

As per the tool 21, following 3 alternatives will be analyzed:

1) Proposed project activity undertaken without being registered as a CDM project activity;
2) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs or services with comparable quality, properties and application areas;
3) Continuation of the current situation (no project activity or other alternatives undertaken).

First alternative, as per the statement of the tool under this category, is having the Mramorak 1&2 project without being registered to the BioCarbon Registry program.

[27] https://mre.gov.rs/dokumenta/sektor-za-energetsku-efikasnost-i-toplane/zakoni.
[28] Serbian Biogas Association, Legal Frameworks, https://biogas.org.rs/en/legal-framework/, Visited on 13 July 2022.
[29] CDM Tool 01: Tool for the demonstration and assessment of additionality Version 07.0.0., Section 4.3., p.9.

However, this is not a financially attractive option due to that project IRR is below the benchmark IRR value (10.91%) without having carbon revenue.

Second alternative, regarding the renewable energy production component of the project activity, could be the implementation of a new power plant utilizing renewable resources, which would produce similar services with the project activity. These alternatives are wind, hydro and geothermal renewable power generations. However, implementing any of these alternatives is not realistic due to the geographical conditions of the project location. Regarding the waste management component of the project activity, there is no alternative. Controlled digestion of organic wastes by the project activity is the only option.

Third alternative, in case no project activity is taken that is the third alternative as suggested by the Tool 21. However, this alternative is the same with the baseline scenario.

Outcome of Sub-step 1a: The continuation of the current situation (no project activity or other alternatives under taken), which is in compliance with all mandatory applicable legal and regulatory requirements, is the most plausible scenario.

Investment analysis includes the application of the following steps:

- Determining the appropriate analysis method;
- Calculation and comparison of financial indicators;
- Sensitivity analysis.

Sub-step 2a - Determine Appropriate Analysis Method (First sub step of Step 2 Investment Analysis/Tool 21)

The “Tool for the Demonstration and Assessment of Additionality, Version 7.0.0”, offers three alternative methods for financial analysis:

- Option I: Simple cost analysis
- Option II: Investment comparison analysis
- Option III: Benchmark analysis.

Option I is only applicable if the project activity does not receive any revenue other than the sale of carbon credits. Project generates revenue from the sale of electricity. Therefore, this option is not applicable.

Option II is applicable if there are alternatives to the project activity. In this case, project activity does not have alternatives. Only viable alternative is the ‘No Activity’. Therefore, investment analysis is not applicable to this alternative.

As a result Option III (Benchmark Analysis) is applicable to the project.

Sub-step 2b - Option III-Apply Benchmark Analysis

The Tool 01 states the identification of financial/economic indicator, such as IRR, most suitable for the project type and decision context.

According to the CDM Tool 27: Investment Analysis, version 12.0[30], expected rate of return for waste handling and disposal projects for Republic of Serbia is given as 10.91%. This is used as the benchmark value for in investment analysis.

Sub-step 2c: Calculation and comparison of financial indicators

Project's IRR is calculated, as pre-tax Project IRR, on the basis of expected cash flows (investment, maintenance and operating costs, and revenues from electricity and fertilizer sale). These monetary values of these cash flows are taken in a conservative way.

Table 2 Financial Parameters Used in Financial Analysis[31]

Parameters[32]	**Unit**	**Value**
Annual expected electricity generation	MWh	15,500
Investment Cost (Civil works, electrical works, mechanical works, biogas equipment and system cost, energy transmission line, project development, unforeseen expenses)	€	10,833,933
Operating Cost (Employee cost, feedstock cost, internal electricity consumption cost, maintenance cost, general administration cost, insurance costs etc.)	€	1,792,700
Electricity Sale Price Feed in tariff for the first 12 years after tariff also assumed same as tariff	€ Cents/ kWh	18
Calculated IRR	**7.46%**	

[30] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v12.pdf.

[31] Since project is A2 type, some of the financial parameters are based on real expenditures, and some are based on assumptions which are very close to real value. Expenditure values used in IRR calculation were based on the time period of the investment decision taken, 2018.

[32] See the IRR excel sheet for details.

The pre-tax Project IRR for the project is calculated as 7.46% without any carbon revenue. IRR without tax is conservative approach. This value is much lower than the benchmark IRR given above, in the "sub-step 2b". Given that project does not use any ODA type financial development assistance or government incentive, from the private sector point, project activity is not financially attractive. Project needs for carbon revenue to be a feasible investment.

As a result, project financially is not attractive without carbon revenue.

Sub-step 2d: Sensitivity analysis (only applicable to Options II and III)

The sensitivity analysis is applied in order to show that investment decision, financially, is not the most attractive alternative.

For a range of ±10% fluctuation IRR calculations made for Investment Cost, Operating Cost, Electricity Production and Electricity Sales and manure sales revenue.

Following table shows the sensitivity analysis by having one parameter changing and the other three kept fixed. 0% fluctuation in the table provides reference point for comparison. Sensitivity analysis does not include carbon revenue.

Table 5 Sensitivity Analysis for the Project IRR Variation

Variable	Fluctuation		
	-10%	0%	10%
Investment Cost (IRR %)	8.76%	7.46%	6.35%
Operation Cost (IRR %)	9.49%	7.46%	5.32%
Electricity Price (IRR %)[33]	4.03%	7.46%	10.61%
Energy Production (IRR %)	4.18%	7.46%	10.49%

In every alternative scenario in sensitivity analysis, project's IRR value is still very low ranging from minimum 4.03% to maximum 10.49%.

Outcome of Step 2:

Investment analysis confirms that the proposed project is not attractive for investment. Even considering very high electricity price after tariff guarantee period the maximum

[33] Tariff price is 18 €cents/kWh. Electricity price will change after 10 years since the start date of the operation. But after tariff period of 10 years, electricity price 18 €cents/kWh is assumed. This is conservative approach.

IRR values calculated for the best-case scenario less than 10.91% benchmark. Thus, there is a strong need for additional revenues from carbon credits for the project activity.

As per the results of the investment analysis, project meets the conditions of additionality.

3.5 Management of Uncertainty

Project's emission reduction calculations are based on CDM methodologies, AMS-III.AO and AMS-I.D. As per these methodologies, emission reductions are calculated based on a conservative approach already. Parameters used to calculate the emission reductions are the monitoring parameters as per the AMS-III.AO and AMS-I.D. These monitoring parameters are described clearly in a way that what the origin of data, why that origin is chosen etc. These monitoring parameters are robustly investigated by the DoE during validation and verification periods.

The project owner keeps records of those parameters in its data management system as described in the Section 16.4. This section describes which paramters are recorded and archived by which department.

3.6 Leakage and non-permanence

As per the AMS-III.AO, "If the project technology is the equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage effects are to be considered (LEy)."

Project activity did not transfer any equipment from another activity, they are all brand newly constructed. Therefore, leakage emission is accepted as zero.

$$LE_y = 0$$

As per AMS-I.D. in Section 7 states that "The methodology is applicable to a programme of activities, no additional leakage estimations are necessary other than that indicated under leakage section above."

Project activity does not use biomass, and does not claim CO2 emission reduction from the plant residues; therefore leakage of the project activity is taken as zero as per AMS-I.D.

3.7 Mitigation results

Quantification of emission reductions of the project activity is calculated as per the AMS-III.AO and AMS-I.D. Following provides the details of the calculation formulations of emission reductions as per each methodology.

AMS-III.AO Version 1.0 states that

"The emission reductions achieved by the project activity will be determined ex post through direct measurement of the amount of biogas fueled, flared or gainfully used. It is possible that the project activity involves biomass treatment with higher methane conversion factor (MCF) than the MCF for the biomass which otherwise would have been left to decay in the baseline situation. Therefore the emission reductions achieved by the project activity is limited to the ex post calculated baseline emissions minus project and leakage emissions using the actual monitored data for the project activity (e.g. Qy, and fossil fuels/electricity used). The emission reductions achieved in any year are the lowest value of the following:"

$$ER_{y,ex\ post} = min\left[\begin{array}{l}(BE_{y,ex\ post} - PE_{y,ex\ post} - LE_{y,ex\ post}),(MD_y - PE_{y,power,ex\ post} - \\ PE_{y,transp,ex\ post} - PE_{y,res\ waste,ex\ post} - PE_{y,phy\ leakage,ex\ post} - LE_{y,ex\ post})\end{array}\right] \quad (4)$$

Where,

$ER_{y,\ ex\ post}$	Emission reductions achieved by the project activity based on monitored values for year y (tCO2e)
$BE_{y,\ ex\ post}$	Baseline emissions calculated using equation (1) using ex post monitored values (e.g. Qy) (tCO2e)
$PE_{y,\ ex\ post}$	Project emissions calculated using equation (2) using ex post monitored values (e.g. Qy, transport distances, the amount of electricity/fossil fuels used, emissions from anaerobic storage). This calculation shall include project emissions from physical leakage (tCO2e)
$LE_{y,\ ex\ post}$	Leakage emissions calculated using ex post monitored values (tCO2e)
MD_y	Methane captured and destroyed or used gainfully by the project

	activity in year y (tCO2e)
$PE_{y,transp,\ ex\ post}$	Emissions from incremental transportation based on monitored values in the year y (tCO2e)
$PE_{y,power,ex\ post}$	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (tCO2e)
$PE_{y,\ res\ waste,\ ex\ post}$	Methane emissions from the anaerobic decay/treatment of the residual waste/products based on monitored values in the year y (tCO2e)
$LE_{y,\ leakage,\ ex\ post}$	Methane emissions from physical leakages of the anaerobic digester based on monitored values in year y (tCO2e)

AMS-I.D. CO2 emission reduction calculation:

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

Where:

ERy = Emission reductions in year y (t CO2)

BEy = Baseline Emissions in year y (t CO2)

PEy = Project emissions in year y (t CO2)

LEy = Leakage emissions in year y (t CO2)

3.7.1 Eligible areas in the GHG project boundary (if applicable)

N/A

3.7.2 Stratification (if applicable)

N/A

3.7.3 GHG emission reductions in the baseline scenario

$$BE_{Mramorak1\&2,y} = BE_{SWDS,y} + BE_{manure,y} + BE_{elect,y}$$

In this formula, baseline emission as per the AMS-III.AO is indicated as "$BE_{SWDS,y}$ + $BE_{manure,y}$". Baseline emission that comes from AMS-I.D is indicated as $BE_{elect,y}$. Following parts of this section provides how this formula is derived from AMS-III.AO and AMS-I.D**.**

Baseline emission calculations are provided in the associated excel file (Mramorak1&2_ER_CalculationsRev.xls).

As per the AMS-III.AO methodology, baseline emission is as follows:

$BE_y = BE_{SWDS,y} + BE_{ww,y} + BE_{manure,y} - MD_{reg,y} \times GWP_{CH4}$ (Eq. 1)

Where,

$BE_{SWDS,y}$	Where applicable, yearly methane generation potential of the solid waste anaerobically digested by the project activity during the year x from the beginning of the project activity (x=1) up to the year y estimated as per the latest version of the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (tCO2e). The tool may be used with the factor "f=0.0" assuming that no biogas is captured, flared or used. With the definition of year x as the base year since the project activity started diverting wastes from the SWDS/landfill site. x runs from the first year of the crediting period (x=1) to the year for which emissions are calculated (x=y). Where applicable, baseline emission determination of digested waste that would otherwise have been disposed in stockpiles shall follow relevant procedures in AMS-III.E
$BE_{ww,y}$	Where applicable, baseline emissions from the wastewater co-digested, calculated as per the procedures of AMS-III.H
$BE_{manure,y}$	Where applicable, baseline emissions from the manure co-digested by the project activities, calculated as per the relevant procedures of AMS-III.D
$MD_{reg,y}$	Amount of methane that would have to be captured and combusted in the year y to comply with the prevailing regulations (ton)

GWP_{CH4} GWP for CH4

In Republic of Serbia, as per the laws, there is no regulation or legal enforcement to capture methane from manure treatment plants, wastewater treatment plants or SWDSs. Therefore $MD_{reg,y}$ is taken as zero in calculations.

GWP for CH4 is taken as 28 as per the IPCC Fifth Assessment Report.[34]

Project activity claims carbon emission reduction for manure ($BE_{manure,y}$) and municipal solid waste ($BE_{SWDS,y}$)

Hence the formula is simplified as;

$$\mathbf{BE_y = BE_{SWDS,y} + BE_{manure,y}}$$

Baseline Emission for Municipal Solid Waste ($BE_{SWDS,y}$)

AMS-III.AO ver 1.0. refers to the ""Emissions from solid waste disposal site" Version 8.0." for food waste baseline emission reductions. Project activity only uses organic municipal solid waste and they are wet based. Therefore equation 15 of the Tool 04 is used.

$$BE_{CH4,SWDS,y} = \varphi_y \times (1 - f_y) \times GWP_{CH4} \times \sum_{x=1}^{y} Default_{org,x} \times W_{org,x}$$

$BE_{CH4,SWDS,y}$ Baseline, project or leakage methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO2e/yr)

x Years in the time period in which waste is disposed at the SWDS,

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

	extending from the first year in the time period (x = 1) to year y (x = y)
y	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
φ_y	Model correction factor to account for model uncertainties for year y
$W_{j,x}$	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
f_y	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
GWP_{CH4}	Global Warming Potential of methane
$Default_{org,x}$	The value of $Default_{org,x}$ depends on the climate zone. These values were derived by an analysis of registered CDM projects with verified waste compositions, and the $Default_{org,x}$ values are selected to ensure conservativeness of the resulting baseline emissions (using 95% confidence and 10% precision)

Baseline Emission for Manure ($BE_{manure,y}$)

AMS-III.AO refers to the latest version of the AMS-III.D methodology.

AMS-III.D Methane recovery in animal manure management systems, Version 21.0.[35]

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. Baseline emissions (BEy) are calculated by using one of the following two options:

To calculate baseline emission by manure, Option a is chosen.

[35] https://cdm.unfccc.int/filestorage/1/A/W/1AWXEKHVTYF423LCN56Z9GIMQOS8JR/EB96_repan09_AMS-III.Dv21.pdf?t=NVJ8cmw2ZWJ2fDDIDQD4EosEc5RN5vtsLou .

$BE_{manure,y} = GWP_{CH4} \times D_{CH4} \times UF_b \Sigma(MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS_{\%Bl,j})$

Where,

$BE_{manure,y}$	Baseline emissions in year y (t CO2e)
GWP_{CH4}	Global Warming Potential (GWP) of CH4 applicable to the crediting period (t CO2e/t CH4)
D_{CH4}	CH4 density (0.00067 t/m3 at room temperature (20 ºC) and 1 atm pressure)
LT	Index for all types of livestock
j	Index for animal manure management system
UF_b	Model correction factor to account for model uncertainties (0.94)
MCF_j	Annual methane conversion factor (MCF) 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^3 CH_4/kg-dm)
$N_{LT,y}$	Annual average number of animals of type LT in year y (numbers)
$VS_{LT,y}$	Volatile solids production/excretion per animal of livestock LT in year y (on a dry matter weight basis, kg-dm/animal/year)
$MS_{\%Bl,j}$	Fraction of manure handled in baseline animal manure management system j

Annual temperature in the site where the anaerobic manure treatment facilities in the baseline existed, is 11.4°C[36], which is higher than 5°C.

[36] https://www.hidmet.gov.rs/data/klimatologija/eng/2021.pdf. P.2. Measured in 2021.

AMS-I.D. Baseline emission from renewable energy part of the project activity

$$BE_{elect,y}=EG_{pj,y} \times EF_{grid,y}$$

Where:

$BE_{elect,y}$	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 the CDM project activity in year *y* (MWh)
$EF_{grid,y}$	Combined margin CO2 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" (tCO2/MWh)

In the absence of the project activity, same amount of electricity would be used from the grid. CEF_{grid} should be calculated according to Tool 07 *"Tool to calculate the emission factor for an electricity system"*. Version 07.0 is the latest revision of the tool.

Estimation of CEFgrid Emission Factor for Serbian grid system

Tool 07 determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system.

This tool determines the following parameters to calculate CM value.

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	t CO2/MWh	Combined margin CO2 emission factor for the project electricity system in year y
$EF_{grid,BM,y}$	t CO2/MWh	Build margin CO2 emission factor for the project electricity system in year y
$EF_{grid,OM,y}$	t CO2/MWh	Operating margin CO2 emission factor for the project electricity system in year y

As per the Tool 07, following steps are applied to calculate CM emission factor for the Serbian national grid.

Step 1: Identify the relevant electricity systems;

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

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

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

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

Step 6: Calculate the combined margin (CM) emission factor.

Step 1: *Identify the relevant electricity systems:*

Project electricity system is the national Serbian grid system which is called as Electrical Power industry Serbia (EPS). There is only one power grid system in Republic of Serbia and all connected power plants are included in the project boundary.

Serbian EPS grid system is partially connected to the European grid. However, Republic of Serbia is not an Annex 1 country and project electricity is 100% sold to the Serbian EPS grid system.

As per the tool, Option I is applied to delineate the project electricity system.

In 2010, the "Initial National Communication (INC) for the Republic of Serbia" was adopted by the Government and submitted to the UNFCCC[37]. In 2017, "Second National Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change" was adopted by the Government and submitted to the UNFCCC.[38] However in both reports, there is no specific delineation of the Serbian EPS system as per the climate change efforts of the Serbia. Hence, current Serbian EPS grid system is determined as the project electricity system.

For determining CO_2 emission factor for net electricity import, option (a) is chosen and it is taken as 0 t CO_2/MWh.

[37] https://unfccc.int/resource/docs/natc/srbnc1.pdf.
[38] https://unfccc.int/sites/default/files/resource/SNC%20Eng_Serbia.pdf.

As per the tool, electricity exports are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors. Imports are treated as Low cost/must run (LCMR) resource.

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

Option I is chosen and only grid power plants are included.

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

As per the Tool, to calculate the OM emission factor, project developers can choose one of the following options depending on the data availability:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM

Among the options, Option (a) simple OM is chosen based on the availability of the data for each option as described in Figure 2 of the Tool 07.

First condition in the Figure 2 of the Tool 07 is the availability of hourly data from each power plant on power generation and fuel type and fuel consumption. In Republic of Serbia, hourly data is not publicly available. Therefore "Dispatch data analysis OM" is not applicable.[39]

Second condition, availability of annual data from each power plant on power generation, fuel type and fuel consumption. Data used in grid emission factor calculation are taken from the annual Environmental Reports prepared and published by the Public Enterprise Electric Power Industry of Serbia (Elektroprivreda Srbije company in Serbian language) which is the joint-stock electric utility power company fully owned by the Government of Serbia.

[39] https://www.eps.rs/cir. This is the web site of EPS and grid electricity hourly data is not available publicly. Only publicly available data are present in EPS annual reports called Environmental Report. In CM emission factor calculations, references are provided from these reports and references are available in the Mramorak1&2 Excel Calculation sheets.

This data is available for Serbian EPS system. Low-cost/must-run (LCMR) resources constitute less than 50 per cent of total grid generation (excluding electricity generated by off-grid power plants). This is a valid statement for Serbian EPS system. Hence option (a) is chosen for determining OM.[40]

Regarding the other options, Simple Adjusted OM is not also applicable due to that there is no operational data on maximum hourly load in the Serbian Grid or minimum hourly load in the grid. Average OM option is also not applicable due to that LCMR share for the recent 5 year period is less than 50% although annual aggregated data from the Serbian grid on power generation, fuel type and fuel consumption are available.

To determine the share of LCMR resources, Approach I is applied based on the availability of data from the Serbian EPS grid system.

$$\text{Share}_{LCMR} = \text{average}\left[\frac{EG_{LCMR_{y-4}}}{total_{y-4}}, \ldots, \frac{EG_{LCMR_y}}{total_y}\right]$$

Where,

Share_{LCMR} = Share of the low cost/must run resources (per cent)

EG_{LCMRy} = Electricity generation supplied to the project electricity system by the low cost/must run resources in year *y* (MWh)

$total_y$ = Total electricity generation supplied to the project electricity system in year *y* (MWh)

[40] Public Enterprise Electric Power Industry of Serbia, web site. https://www.eps.rs/eng/Pages/Sredina-izvestaji.aspx
http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf ,
http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202018.pdf;
http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202019.pdf;
https://www.eps.rs/eng/Documents/PE%20EPE%20Report%20on%20Environmental%20State%202020.pdf.
https://www.eps.rs/eng/Documents/energyEfficiency/PE%20EPS%20Environmental%20Report%202021.pdf. .

y = The most recent 5 years for which data is available

In Serbian EPS grid system, energy generation mix includes thermal power plants, hydro power plants, and wind power plants. As per the definition of the LCMRs, hydro and wind power plants are accepted as the LCMR sources. Imported electricity is also considered as LCMR resources. LCMR share for the recent 5 years that includes time frame from 2017 to 2021, given that project start date is 24/06/2020.

Table 7 LCMR share from 2017-2021[41, 42]

Year	Thermal and combined Heat Power Plants (MWh)	LCMRs Power Plants (hydro+winds+imports) (MWh)	Total Electricity Generation (MWh)	Share of LCMR %
2017	24,434,566	12,935,770	37,370,336	34.6
2018	23,192,700	15,819,700	39,012,400	40.6
2019	23,505,530	15,085,500	38,591,030	39.1
2020	24,523,720	14,834,080	39,357,800	37.7
2021	22,167,540	18,114,112	40,281,642	45.0
Average LCMR share				39.4

For the recent 5 years period from 2017 to 2021, share of the LCMR resources to the total electricity generation within the Serbian EPS grid system is 39.4% which is lower than 50%.

Since LCMR share for the recent 5 year period is less than 50%, simple OM can be used for determining OM emission factor for the project electricity system, which is the Serbian EPS grid system.

For simple OM calculation, 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.

[41] Public Enterprise Electric Power Industry of Serbia, web site. https://www.eps.rs/eng/Pages/Sredina-izvestaji.aspx.
[42] See the Mramorak1&2_ER_CalculationsRev1.1.xlsx.

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 can 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

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

Based on the availability of the data, Option A is chosen.

$EF_{grid,OMsimple,y} = (\Sigma_m EG_{m,y} \times FE_{EL,m,y}) / \Sigma_m EG_{m,y}$		
$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (t CO_2/MWh)	
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)	
$FE_{EL,m,y}$	CO_2 emission factor of power unit m in year y (t CO_2/MWh)	
	$FE_{EL,m,y} = (\Sigma_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}) / EG_{m,y}$	
	$FC_{i,m,y}$	Amount of fuel type i consumed by power unit m in year y (mass or volume unit)
	$NCV_{i,y}$	Net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)
	$EF_{CO2,i,y}$	CO_2 emission factor of fuel type i in year y (t CO_2/GJ)
	$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
	m	All power units serving the grid in year *y* except low-cost/must-run power u nits
	i	All fuel types combusted in power unit *m* in year *y*
	or	
	$FE_{EL,m,y} = (EF_{CO2,m,i,y} \times 3.6) / \eta_{m,y}$	
	$EF_{CO2,i,y}$	CO_2 emission factor of fuel type i in year y (t CO_2/GJ)
	$\eta_{m,y}$	Average net energy conversion efficiency of power unit m in year y (ratio)

	m	All power units serving the grid in year y except low-cost/must-run power units
	y	The relevant year as per the data vintage chosen in Step 3
	3.6	Conversion factor (GJ/MWh)
m	All power units serving the grid in year y except low-cost/must-run power units	
y	The relevant year as per the data vintage chosen in Step 3	

Off grid power plants $EG_{m,y}$ values are not included in $EF_{grid,OMsimple,y}$ calculations.

$EF_{grid,OMsimple,y}$ value for the Serbian EPS grid system has been estimated as 1.078674742 t CO_2/MWh.[43]

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

As per the Tool 07, based on the vintage of data, Option 1 is chosen for the first crediting period

ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation.[44]

Although Option 1 is chosen, data requirements for calculating build margin are not available. Electric Power Industry of Serbia Environmental Reports, which are the only publicly available documents, do not provide capacity additions and electricity generation of these added power units to the Serbian EPS grid system. When data

[43] See the Mramorak1&2_ER_Calculations.xlsx.
[44] Tool 07 Version 0.7.0, p.24. Option 1 applicability to the second and third crediting period is as follows: For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

requirements for calculating build margin is not available, as per the Figure 5 of the Tool 07, following conditions are followed:

Are data to determine OM available? YES, then;

Are data to determine BM available? NO, then,

Is grid located in LDC/SIDs/URC or is the grid an isolated system? NO. The Serbian EPS grid system is not located in LDC/SIDs/URC or the grid is not an isolated system. Then,

Simplified CM Based on default BM EF (Para 104).

Step 6: *Calculate the combined margin (CM) emission factor:*

Based on the conclusion of the assessment of the Figure 5 of the Tool 07, which is the "Simplified CM based on default BM EF",

"The simplified CM method (Option b, as described under 6.6.2 below) can only be used if the data requirements for the application of Step 5 above cannot be met."

As per the Simplified CM, "If the project activity is located in: (i) a Least Developed Country (LDC); or in (ii) a country with less than 10 registered CDM projects at the starting date of validation; or a Small Island Developing States (SIDS), the combined margin calculated using equation (16) above with the following conditions:

(a) $w_{BM} = 0$;

(b) $w_{OM} = 1$;

The weighting (w_{BM}) of the BM emission factor is determined to be 0, since the project activity is located in a country with less than 10 registered CDM projects at the starting date of validation.

Evidence: The proposed project activity is located at the Republic of Serbia with less than 10 registered CDM projects at the starting date of validation.

- The registered CDM projects at Republic of Serbia listed at the are listed at the UNFCCC CDM website: https://cdm.unfccc.int/Projects/projsearch.html. There are 7 projects listed.

- At Verra VCS registry, there are no projects listed from Serbia which have operating start date before 24/06/2020.[45]
- At Gold Standard, there is one project listed from Serbia which have operating start date before 24/06/2020.[46] The project is Vinca Landfill Gas and Energy from Waste facilities, which has an operation start date 30/09/2019, which is prior to the Mramorak project start date.
- At Global Carbon Council, there are no projects listed from Serbia which have operating start date before 24/06/2020.
- At BioCarbon[47] and International Carbon Registry[48], there are no projects listed from Serbia which have operating start date before 24/06/2020.

Hence, in total there are 8 CDM projects from Serbia, which is less than 10.

Based on this conclusion;

Weightage for OM is 100% and weightage for BM =0%.

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

$EF_{grid,,}$ =1.078674742 x 100% + $EF_{grid,BM,y}$ x 0%

$EF_{grid,CM,y}$ = 1.078674742 tCO2/MWh[49]

The grid emission factor (CEF_{grid}) is fixed ex-ante and will not be updated ex-post.

[45] https://registry.verra.org/.
[46] https://registry.goldstandard.org/projects?q=&page=1.
[47] https://biocarbonregistry.com/en/projects/
[48] https://carbonregistry.com/projects/.
[49] Mramorak1&2ERCalculations.xls

3.7.4 GHG emission reductions in the project- scenario

Project emissions of the project activity are estimated as per the AMS-III.AO and AMS-I.D methodologies and applicable tools as per these methodologies as provided below.

To estimate project emission reductions correctly, project owner has an robust data management system where it archives applicable parameters which are used in project emission calculations. Please see Section 16.1 to see the parameters required for project emission calculations, which are monitoring parameters at the same time. Monitoring parameters are already monitored in a conservative and provable way as per the AMS-III.AO and AMS-I.D.

As per the AMS-III.AO projects emission of the project activity is as follows:

$$PE_y = PE_{transp,y} + PE_{power,y} + PE_{res\ waste,y} + PE_{phy\ leakage,y} + PE_{flaring,y}$$

Where,

PE_y	Project activity emissions in the year y (tCO2e)
$PE_{transp,y}$	Emissions from incremental transportation in the year y (tCO2e)
$PE_{power,y}$	Emissions from electricity or fossil fuel consumption in the year y (tCO2e)
$PE_{res\ waste,y}$	In case residual wastes are subjected to anaerobic storage, or disposed in a landfill: methane emissions from storage/disposal/treatment of waste (tCO2e)
$PE_{phy\ leakage,y}$	Methane emissions from physical leakages of the anaerobic digester in year y (tCO2e)
$PE_{flaring,y}$	Methane emissions due to incomplete flaring in year y as per the "Tool to determine project emissions from flaring gases containing methane" (tCO2e)

$PE_{transp,y}$ Emissions

Project emissions due to incremental transport distances ($PE_{transp,\ y}$) are calculated based on the incremental distances between:

(i) The collection points of biomass and/or manure and the digestion site as compared to the baseline solid waste disposal site or manure treatment site;
(ii) (ii) When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site;
(iii) (iii) Treatment sites and the sites for soil application, landfilling and further treatment of the residual waste.

$PE_{transp,y} = (Q_y/CT_y) \times DAF_w \times EF_{CO2,transport} + (Q_{res\ waste,y} / CT_{res\ waste,y}) \times DAF_{res\ waste,y} \times EF_{CO2,transport}$

where,

Q_y	Quantity of raw waste/manure treated and/or wastewater co-digested in the year y (tonnes)
CT_y	Average truck capacity for transportation (tonnes/truck)
DAF_w	Average incremental distance for raw solid waste/manure and/or wastewater transportation (km/truck)
$EF_{CO2,transport}$	CO2 emission factor from fuel use due to transportation (kgCO2/km, IPCC default values or local values may be used)
$Q_{res\ waste,y}$	Quantity of residual waste produced in year y (tonnes)
$CT_{res\ waste,y}$	Average truck capacity for residual waste transportation (tonnes/truck)
$DAF_{res\ waste,y}$	Average distance for residual waste transportation (km/truck)

$PE_{power,y}$ Emissions

AMS-III.AO Version 1.0 states that

"if recovered biogas is used to power auxiliary equipment of the project it should be taken into account accordingly, using zero as its emission factor."

Within the project activity recovered biogas is used to power auxiliary equipment. Therefore;

$$\mathbf{PE_{power,y} = 0}$$

$PE_{res\ waste,y}$ Emissions

As per the AMS-III.AO, "methane emissions from anaerobic storage and/or disposal in a landfill of the residual waste from the digestion ($PE_{res\ waste,y}$) are calculated as per the latest version of the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"."

Within the project activity, residual wastes from the digesters are stored in open lagoon, and from there they are spread to the farm field as bio-fertilizer. Hence there is no anaerobic storage into a disposal site, therefore project emission from residual waste is accepted as zero.

$$PE_{res\ waste,y} = 0$$

$PE_{phy\ leakage,y}$ Emissions

As per the AMS-III.AO,

"Methane emissions due to physical leakages from the digester and recovery system ($PE_{phy\ leakage,\ y}$) shall be estimated using a default factor of 0.05 m^3 biogas leaked/m^3 biogas, y) shall be estimated using a default factor of 0.05 m^3 biogas leaked/m^3 biogas produced. For ex ante estimation the expected biogas production of the digester may be used, for ex post calculations the effectively recovered biogas amount shall be used for the calculation." Leakage calculations are provided in the associated excel file.

$PE_{flaring,y}$ Emissions

AMS-III.AO Ver. 1.0 refers to the "Tool to determine project emissions from flaring gases containing methane" for project flaring emission reduction. The latest version of this tool is "Tool 06: Project emissions from flaring" [50], version 04.0. According to the Tool 06, following steps applied to calculate project flaring emission.

a) STEP 1: Determination of the methane mass flow of the residual gas;
b) STEP 2: Determination of the flare efficiency;
c) STEP 3: Calculation of project emissions from flaring.

STEP 1: Determination of the methane mass flow of the residual gas;

[50] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v4.0.pdf.

STEP 1 refers to the „Tool 08: Tool to determine the mass flow of a greenhouse gas in a gaseous stream, Version 03.0"[51] for the determination of the methane mass flow.

As per the Tool 08, methane mass flow ($F_{CH4,t}$) is calculated by using the following formula:

$$F_{i,t} = V_{t,db} \times v_{i,t,db} \times \rho_{i,t}$$ [52]

where,

$F_{i,t}$	Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h). The same value ($F_{CH4,RG,y}$) stated in the $PE_{flare,y}$ equation
$V_{t,db}$	Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)
$v_{i,t,db}$ ($v_{CH4,t,db}$)	Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m^3 gas i/m^3 dry gas), i: CH4
$\rho_{i,t}$	Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/m^3 gas i),

$\rho_{i,t}$ value is taken as 0.716 kg/m3[53]

The formula is also present in the Tool 06 excel sheet, EB102_repan06_Tool06.xls[54].

As per the Tool 08, $V_{t,db}$ and $v_{i,t,db}$ are the monitoring parameters.

STEP 2: Determination of the flare efficiency;

Mramorak 1&1 plants' flare units are enclosed type. As per the Tool 06, to determine the flare efficiency, „Option A: Apply a default value for flare efficiency" option is chosen. As per this option A, flare efficiency is accepted as 0%.

[51] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v3.0.pdf.
[52] Tool 08, p.8 and EB102_repan06_Tool06.xls, Step 1 (b) sheet.
[53] EB102_repan06_Tool06.xls, "Constants Used in Equations" sheet.
https://cdm.unfccc.int/methodologies/PAmethodologies/EB102_repan06_Tool06.xlsx
[54] https://cdm.unfccc.int/methodologies/PAmethodologies/EB102_repan06_Tool06.xlsx

Project emissions from flaring, as per the Tool 06, is calculated by using the following formula:[55]

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

Where,

$PE_{flare,y}$	Project emissions from flaring of the residual gas in year y (tCO2e)
GWP_{CH4}	Global warming potential of methane valid for the commitment period (tCO2e/tCH4)
$F_{CH4,RG,y}$ ($F_{CH4,t}$)[56]	Mass flow of methane in the residual gas in the minute m (kg);
$\eta_{flare,m}$	Flare efficiency in the minute m

As a note, in the project activity, there is no flaring within the normal operation of the project. Flaring chamber is available, but it is only used in case of digesters goes through maintenance. Since it is only used for emergency purposes, for simplification and to be on the conservative side, $F_{CH4,RG,y}$ is accepted as the maximum combustion capacity of the flare chamber.

Hence, project emission of the project activity as per AMS-III.AO:

$$\mathbf{PE_y = PE_{transp,} + PE_{phy\ leakage,y} + PE_{flaring,y}}$$

For the project activity, there are no other sources of project emissions that will require the use of "Tool 03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion". Project activity's only source of CO2 emissionf rom fossil fuel combustion is transportation which is already calculated by the $PE_{transp,y}$ equation.

[55] Tool 06, p.13.
[56] $F_{CH4,t}$ is not a monitoring parameter as per the Tool 08.

As per the AMS-I.D projects emission of the project activity is as follows:

AMS-I.D. states that "For most renewable energy project activities, PEy = 0." Therefore, project emission that comes from renewable energy generation component of the project activity is taken as zero

Hence;

Mramorak1&2 project emissions as per AMS-III.AO and AMS-I.D:

$$PE_y = PE_{transp,} + PE_{phy\ leakage,y} + PE_{flaring,y}$$

Project emission calculations are provided in the associated excel file (Mramorak1&2_ER_Calculations.xls).

Quantification of Net Emission Reductions

Project net emission reduction is as follows:

Net GHG Emission Mitigations are calculated as follows:

$$EM_y = BE_y - PE_y - LE_y$$

where:

EM_y = Net GHG Emissions Mitigations in year y (tCO_2e)

BE_y = Baseline emissions in year y (tCO_2e)

PE_y = Project emissions in year y (tCO_2-e)

PL_y = Project leakage in year y (tCO_2-e).

BE_y, baseline emissions based on AMS-III.AO and AMS-I.D.

Emission reduction achieved by the project activity is as follows as per the AMS-III.AO:

To determine baseline emission, AMS-III.AO states to make ex-post calculation through direct measurement of the amount of biogas fueled, flared or gainfully used. "Therefore the emission reductions achieved by the project activity is limited to the ex post calculated baseline emissions minus project and leakage emissions using the actual monitored data for the project activity (e.g. Qy, and fossil fuels/electricity used). The emission reductions achieved in any year are the lowest value of the following:"

$$ER_{y,ex\ post} = min\left[\begin{array}{l}(BE_{y,ex\ post} - PE_{y,ex\ post} - LE_{y,ex\ post}),(MD_y - PE_{y,power,ex\ post} - \\ PE_{y,transp,ex\ post} - PE_{y,res\ waste,ex\ post} - PE_{y,phy\ leakage,ex\ post} - LE_{y,ex\ post})\end{array}\right]$$

As per this formula, baseline emission value will be taken the lowest one.

As it can be seen in the attached file (Mramoak1&2_ER_Calculations.xls), MD_y-$PE_{y,power,expost}$ is much higher than $BE_{y,ex\ post}$-$PE_{y,\ ex\ post}$-$LE_{ex,post}$,

Hence, finalized emission reduction calculation is deducted as follows (leakage is taken as zero as per the applicable methodologies):

$$\mathbf{EM_y = (BE_{SWDS,y} + BE_{manure,y} + BE_{elect,y}) - (PE_{transp,} + PE_{phy\ leakage,y} - PE_{flare,y})}$$

Emission reduction calculations are provided in the attached excel file (BCR_Mramorak1&2_ER_Calculations.xls).

Year	GHG emission reductions in the baseline scenario (tCO2e)	GHG emission reductions in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG Reduction (tCO_{2e})
24.06.2020-31.12.2020	7,447	1,309	0	6,138
2021	25,470	4,425	0	21,045
2022	29,108	5,001	0	24,107
2023	29,375	5,001	0	24,374
2024	29,568	5,001	0	24,567
2025	29,703	5,001	0	24,702
2026	29,800	5,001	0	24,799
01.01.2027-23.06.2027	14,238	2,383	0	11,855
Total	194,709	33,122	0	161,587

4 Compliance with applicable legislation

Mramorak1&2 project was implemented in accordance with the Serbian national laws and regulations. Project received all necessary permissions from the related governmental organizations.

Applicable laws and regulations to the project activity:

4) The Law on Energy (Zakon O Energetici, "Sl. glasnik RS", br. 145/2014, 95/2018 - dr. zakon i 40/2021);[57]
5) Law on Energy Efficiency and Rational Use of Energy (Zakon o Efikasnom Korišćenju Energije, "Sl. glasnik RS", br. 25/2013 i 40/2021 - dr. zakon);[58]
6) Waste management law (Zakon o Upravljanju Otpadom, "Sl. glasnik RS", br. 36/2009 i 88/2010); [59]

[57] https://mre.gov.rs/dokumenta/sektor-za-elektroenergetiku/zakoni.
[58] https://mre.gov.rs/dokumenta/sektor-za-energetsku-efikasnost-i-toplane/zakoni.

7) Environmental Protection Law (Zakon O Zaštiti Životne Sredine, "Sl. glasnik RS", br. 135/2004, 36/2009, 36/2009 - dr. zakon, 72/2009 - dr. zakon i 43/2011 - odluka US);[60]
8) Law on Use of Renewable Energy Sources (Zakon o Korišćenju Obnovljivih Izvora Energije.[61]

Based on these laws, project received the following permissions and licenses to establish and operate the Mramorak 1&2 project.

1) **For generating the electricity:** Project received electricity generation license from the Ministry of Mining and Energy of Serbia. Mramorak 1 received its license on 27/11/2018 with the number of 312-01-01059/2018-06 by the Zlatar Mramorak Doo. Mramorak 2 received its license on 04/12/2018 with the number of 312-01-01058/2018-06 by the BioGold Energy Doo.[62] Both companies are 100% owned by the parent company, Almex doo.[63]

   Electricity generation licenses were revised later. Mramorak 1's revised license is dated as 17/06/2020 with the number of 312-01-00353/2020-06 and Mramorak 2's revised license is dated as 05/03/2021 with the number of 312-01-00021/2021-06.[64]

2) **For the storage and treatment of non-hazardous wastes**: Permit (with the registration number 12) was issued to the project owner, "Zlatar", by the Kovin Municipal Administration-Department for Urban Planning and Housing Communal Affairs based on the Law on Waste Management ("Official Gazette of the RS", No. 36/09, 88/10, 14/16 and 95/18 - other laws).

   Evidences are provided in Appendix 501-56/2021-IV for Zlatar doo.

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[59] Serbian Biogas Association, Legal Frameworks, https://biogas.org.rs/en/legal-framework/, Visited on 13 July 2022.
[60] Serbian Biogas Association, Legal Frameworks, https://biogas.org.rs/en/legal-framework/, Visited on 13 July 2022.
[61] https://mre.gov.rs/dokumenta/sektor-za-zelenu-energiju/zakoni.
[62] Ministry of Mining and Energy, https://mre.gov.rs/sites/default/files/registri/RegistarPovlasPro12-8-2022.html.
[63] These licenses are provided as complementary document to the DOE.
[64] These licenses are provided as complementary document to the DOE.

For the storage and treatment of non-hazardous wastes: permit (with the registration number 13) was issued to the project owner, “Bio Gold Energy doo”, by the Kovin Municipal Administration-Department for Urban Planning and Housing Communal Affairs based on the Law on Waste Management ("Official Gazette of the RS", No. 36/09, 88/10, 14/16 and 95/18 - other laws). Permit number is 13. The validity of the permit was 10 years from 02.11.2021 to 02.11.2031. After 10 years, it will be renewed.

5 Carbon ownership and rights

5.1 Project holder

Individual or organization	**Zlatar Mramorak Doo**
Contact person	Milan Mitrović
Job position	General Director
Address	Zadružna 6; 26226 Mramorak, Serbia
Phone number	Mobile: 063-446173; Phone: 013-2753 230
Email	*milan.mitrovic@zlatarmramorak.rs*

5.2 Other project participants

Individual or organization	**Kilittaşı Mühendislik Müşavirlik İnşaat Tic. Ltd. Şti**
Contact person	Incigul Polat Erdogan
Job position	Environmental Engineer, Carbon Consultant
Address	Ceyhun Atuf Kansu Caddesi No.176/15 Cankaya/Ankara 06520 Turkey
Phone number	+90 538 327 5657
Email	*iperdogan@gmail.com*

5.3 Agreements related to carbon rights

Carbon ownership of the project activity is belonged to the project owner, which is the Zlatar Mramorak Doo. BioGold Energy Doo has transferred its carbon credit related rights to the Zlatar Mramorak Doo by the agreement dated as 05/04/2023. As a note, both BioGold Energy and Zlatar Mramorak Doo companies are belonged to the same parent company, Zlatar Doo.

5.4 Land tenure (if applicable)

N/A

6 Climate change adaptation

"The Republic of Serbia has been part of the United Framework Convention on Climate Change – UNFCCC (Convention) since 2001 and the Kyoto Protocol (Protocol) since 2008. The Ministry of Environmental Protection (MoEP) is responsible for climate change issues. The Republic of Serbia supported Copenhagen Accords and in 2012 identified 12 Nationally Appropriate Mitigation Actions (NAMA) actions, seeking support for their implementation."[65]

"In June 2015, the Government of the Republic of Serbia submitted "Intended nationally determined contributions" (INDCs) - a document that contains as well a section related to losses incurred by natural disasters and indicates the need for adaptation to impacts of climate change. In order to achieve the goals defined in INDCs and fulfill commitments under Paris Agreement, a number of activities were initiated in cooperation with relevant ministries." [66]

Republic of Serbia fully supports the implementation of climate change mitigation and adaptation projects.

Mramorak 1&2 project applies anaerobic treatment process to organic wastes to reduce Greenhouse gas (GHG) emissions through methane recovery and displace carbon intensive Serbian Electrical Power Supply (EPS) grid electricity with renewable biogas energy.

[65] https://unfccc.int/sites/default/files/resource/SNC%20Eng_Serbia.pdf, p. 13-14.
[66] https://unfccc.int/sites/default/files/resource/SNC%20Eng_Serbia.pdf, p. 13-14.

Implementation of the project activity creates many benefits to environment that includes reduction of methane and ammonia emissions from manure, reduction of nitrate wash-out into the ground water, organic fertilizer, and reduction of CO2 emission by substitution of fossil fuel resources. This is the contribution of the project to climate change adaptation.

7 Risk management

Project activity smoothly operates since the start date of its operation. In terms of organic waste input, project has no risk. Farms that provide manure to the project activity are owned by the project owner. Non-hazardous food wastes are abundantly generated in Belgrade; hence there is no problem to find out food waste from restaurants, shopping malls etc. In addition, transportation of food wastes from the sources to the project site is also not a problem for the project owner. Other sources including, silage corn, silage barley and starch waste, are generated by the project owner's business activities. Therefore, there is no issue for the continuation of the waste input to the biogas plants.

There is continous communication with the stakeholders, who can reach easily to the project owner through phone call. In addition to that, some of employees are local people, from Mramorak village. Stakeholders have no problem with the project activity as they present their positive comments during the stakeholder meetings. Therefore, there is no risk from the site of the stakeholders.

Project activity has no problem for hiring employees to operate the project activity.

However, project may be bound to a financial risk. Although it operates smoothly, since gas prices are very high in Serbia, about 1.5 USD for liter, it affects every stages of the project that increases the overall operation cost of the project activity. Therefore, project strongly needs financial income from the sale of the carbon credits that will ease the potential financial risk of the project activity.

7.1 Reversal risk management

Project's performane risk is condirably low in terms of managerial and regulatory aspects. There is no regulatory barrier in Serbia to operate biodigesters. From the institutional point of view, Zlatar doo company is a well established one, being operation since 1959. There is no problem regarding waste receivement, given that except food waste all the ones are generated by the project owner. Biodigester plants are operated as per the Waste Management Law of Serbia, and received all the necessary permits for waste management from the Kovin Municipality. Project has a

Operation Book which well defines all the operational activities of the biodigesters, and instructions in the Book clearly shows what to do in for smooth operation.

8 Environmental Aspects

There are no environmental and socio-economic impacts that can be counted as negative by the project activity. On the contrary project has more positive benefits to environment and society. Most important ones are the prevention of methane emissions to the atmosphere that would happen in the absence of the project activity.

As per the legal obligations of laws and regulations of Serbia, project complies with all the environmental and waste management regulations to prevent any potential negative impacts.

According to the Environmental Protection Law of Serbia, biogas power plants with an installed capacity of less than 1 MW are exempted from environmental impact analysis due to their minimal environmental impacts. In the project activity, each biogas plant has an installed capacity of 999 kWe which is less than 1 MW. Therefore, conducting environmental impact analysis was not required.

However, project activity comprises waste management function that includes collection of organic wastes from the sources, transportation of them to the Mramorak1&2 central treatment facility, anaerobic treatment through biodigester and production of organic fertilizer. According to the Waste Management Law of Serbia, project has to receive a permit from the related municipality to handle wastes within the project activity. Permit is only issued by the municipality as long as the project's operations are in compliance with all the applicable regulations and laws of Serbia.

For waste management, Mramorak1&2 project received the all required Permits from the Kovin Municipal Administration-Department for Urban Planning and Housing Communal Affairs based on the Law on Waste Management ("Official Gazette of the RS", No. 36/09, 88/10, 14/16 and 95/18 - other laws). Permits were received by the project owner for the facility Mramorak 1 and Mramorak 2 plants separately to manage the non-hazardous organic wastes. For Mramorak 1, Permit-12 was received on by the

Zlatar Mramorak Doo; for Mramorak 2, Permit-13 was received by the BioGold Energy Doo, which is 100% owned by the project owner.

Issuance of the Permit 12 and 13 proves that project activity takes all the measures to comply with the Waste Management Law; and its activities will not pollute air, soil and water environment. [67] Project owner has a written Work Plan document that is used for operating the facility properly as per the laws. Project received the Permit 12 and Permit 13 based on this Work Plan that ensures the protection of environment and worker safety and other related matters as per the laws. Current Work Plan is dated as February 2021 and it will be updated every three years as per the requirement of the Permit to reflect the changes in the procedures of waste management at the facility. [68] Mitigation measures to prevent potential negative environmental and social impact are based on this Work Plan.

Project, during its construction and operations, may cause some negative environmental impacts as stated in the following table.

Impact Area	**Potential negative impact**
Air environment	Project may release air pollutants to the atmosphere via combustion of biogas.
Soil environment	Project, through handling wastes, may pollute soil environment through possible leakages from the waste storage units (such as digesters, digestate effluent unit etc.) Project produce sanitary solid wastes by the personnel working at the site that needs for proper handling.
Water environment	Project produce sanitary waste water by the personnel working at the site that needs for proper handling.
Noise	Operation of the project may cause noise

However project's these potential negative environmental impacts are either negligible or accepted within the limits as per the applicable laws, or mitigated by the project owner.

[67] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.
[68] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.

Air Pollution

Project, in its routine operation, emits polluting substances into the air as a result of the combustion of the biogas in the gas engine unit. Although the predominant component of biogas is methane, it also contains other gases such as oxygen, nitrogen and hydrogen sulfide. However, the emission of pollutants from the gas engine plant is within the limits permitted by the Environmental Protection Law of Serbia. [69]

Therefore, there is no need for taking mitigation measures.

Wastewater and solid waste generation

There is no technological waste water used or produced in the operation of the project. Only sanitary waste water is produced and it is drained to a watertight septic tank on site, which is regularly emptied and maintained. Sanitary waste water, on a regular basis, is handed out to the JP "Kovinski Komunalac" Kovin.

For the disposal of the silage juice that is produced by silage of the overly moist silage mass, drainage and draining of the juice into a watertight tank of sufficient capacity was carried out. These waters are directed into the fermentation process. [70] Other than these wastes water, project activity does not produce any waste.

Effluent from the digester is not called as waste; on the contrary it is a very nutrient rich fertilizer. Effluent is separated to liquid and solid form which is dried under sun and used as fertilizer. Both liquid and solid digestate coming out from the digester are stored in impermeable storage units (liquid effluent is stored in impermeable open lagoon) hence there is no leakage to ground water. [71]

Therefore, there is no need for taking mitigation measures.

Noise

At the location in question, there is noise generated by gas engines for burning gas, a compressor, etc. The mentioned equipment is located in a closed facility of a technical

[69] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.
[70] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.
[71] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.

building that is sound-insulated. The noise generated during transport and storage is within the limit values.[72]

The closest settlement to the project activity is the Mramorak village. Houses at the boundary of the Mramorak village are about 250-300 m away from the Mramorak 1&2 project site.

Therefore, there is no need for taking mitigation measures.

Waste Management

Regarding the management of waste, project owner undertakes to sort, mark and store non-hazardous waste in a correctly marked place. In case of spillage of petroleum derivatives, hazardous waste may be generated, which is handled according to the Rulebook on the Storage, Packaging and Marking of Hazardous Waste ("Official Gazette of RS" No. 92/10).

The operator undertakes to carry out the process of waste management, i.e. storage and treatment of non-hazardous waste, in such a way that soil and groundwater will not be polluted as a result of the above activities.

All the digesters and lagoons in the project are imperbeable that prevents the leakage of waste-water into ground water.

As the requirements of the Permit 12 and 13, project owner will keep all the records of the waste management documentation.

9 Socio-economic aspects

Regarding the socio-economic impacts, project is welcomed by the community. Local community found the project as positive contribution to environment. Project employs 6 people, 2 of which are local people, hence providing contribution to local economy.

In regard the distance of the Project site from facilities that may be affected by the waste management operation of the project, there are no facilities in vicinity such as

[72] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.

schools, children's playground, sport and recreation ground etc. [73] Hence local people's life is not affected by the project activity in negative ways.

In addition to that, during the application process for Permit, Kovin Municipality coordinates with interested stakeholders to get their opinions about the project. Project was announced at the web site of the Kovin Municipality during the application process by the project owner, and no objection or suggestion was received from the public as per the project activity.

During the meeting with stakeholders and on-going face to face communication with stakeholders, they are informed that stakeholders can always contact with the project plant manager face-to-face and by phone anytime to express their grievances in the future. Also assured that a grievance register notebook was placed at the Mramorak village municipality office where stakeholder can register their complaints.

At the current stage, stakeholders can access to plant manager by phone and face-to face ways, as well they can also relay their complaints through the grievance notebook.

If stakeholders provides negative feedback, project plant manager will contact with the stakeholder and will the issue.

10 Consultation with interested parties (stakeholders)

Comments by local stakeholders have been invited through a stakeholder consultation event for the Mramorak1&2 project. Ten days ahead, participants were invited to the meeting through public notice invitations placed in locations where public can view it easily and frequently. The picture on the left was posted on the official public notice board of the municipality building. The picture on the right was posted on the board in the middle of the village where everyone passes.

Meeting was also announced by the local radio.

[73] Permit 12, issued by the Kovin Municipality to the Zlatar Doo LLC for waste management, 23.07.2021.

Figure 14 Stakeholder meeting announcements on public boards

On 22/08/2022, the meeting was held at the public community center in Mramorak. At the meeting, local participants were informed about how a biogas plant works, as well as its environmental benefits through transforming organic wastes into nutrient rich organic fertilizers. Participants were also informed about the project's potential contribution for climate change mitigations efforts through preventing methane emissions and producing renewable energy.

Figure 15 Stakeholder Meeting at the Community Center, 22/08/ 2022.

10.1 Summary of comments received

Participants written comments, translated into English, and participant list are provided in the Appendix I of this document.

10.2 Consideration of comments received

After the meeting, participants stated their positive comments to the project activity. They all stated that they are happy about the project because it does not give harm to environment and produce clean energy. In addition to the meeting, one to one verbal communications with villagers were also so positive. Project did not change their life, did not provide negative consequences, and on the contrary provided job opportunities to local people. In summary project is welcomed by the community.

Participants written comments, translated into English, are provided in the Appendix I of this document.

Participants were also informed to relay their comments that may arise in the future to the project owner. Project owner shared its communication information with them.

11 Sustainable Development Objectives (SDG)

Regarding the United Nations Sustainable Development Goals (SDGs)[74], Mramorak 1&2 project achieves the following SDGs:

SDG 7 Affordable and Clean Energy */ SDG 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix / SDG 7.2.1 Renewable energy share in the total final energy consumption:*

Project activity generates renewable energy, about 15.5 GWh annually, by capturing biogas from cattle manure, non-hazardous food wastes, plant wastes (starch waste, liquid starch wastes, CSL) and agricultural plant residues (slage corn and slage barley) via anaerobic digestion and supplies it to the fossil fuel dominated Serbian EPS grid system. Through this way, project contributes to the SDG 7.2. target, and the relevant indicator is SDG 7.2.1.

SDG Goal 8 Decent Work and Economic Growth */SDG 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value / 8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities*

Project created job opportunities during both construction and operation phases. During operation, project employs 6 people and 2 of them are from local villages.

SDG Goal 13 Climate Action*/ SDG 13.2 Integrate climate change measures into national policies, strategies and planning / SDG 13.2.2 Total greenhouse gas emissions per year:*

The project will naturally play an important role in global climate change mitigation activities through preventing emissions of methane that would otherwise be released to

[74] https://biocarbonregistry.com/en/sdg/.

the atmosphere in the baseline conditions. Project annually achieves 23,083 tCO2 emission reduction. Through this way, it contributes to SDG 13 goals of the UN.

12 REDD+ Safeguards (if applicable)

N/A

13 Special categories, related to co-benefits

N/A

14 Grouped Project (if applicable)

Mramorak 1&2 project is a bundled project by bundling two identical biogas power plant systems. It is not a grouped project as per the definition provided in the BioCarbon Registry Voluntary Carbon Market Standard, Version 2.0, Nov 2022.p.36.

15 Other GHG programs

Project did not receive and/or did not apply for any other GHG-related environmental crediting certifications.

Project has not been registered or is not seeking registration under any other GHG programs.

Host country attestation for the project activity has not obtained yet.

16 Monitoring plan

16.1 Data and parameters for quantifying emission reductions

Data and Parameters Remaining Constant

Data / Parameter	φ_y
Unit	Unitless

Description	Model correction factor to account for model uncertainties for year y
Origin of data	CDM Tool 04 Emissions from solid waste disposal, Version 08.0. Data will be archived electronically during project plus 5 years.
Value applied	0.85
Justification of choice of data or description of measurement methods and procedures applied	Suggested by the CDM Tool 04, Version 08.0. Data will be archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**GWP_{CH4}**
Unit	tCO2/tCH4
Description	Global Warming Potential (GWP) of CH4
Origin of data	IPCC 5th Assessment Report (AR5) Chapter 8, Table 8.7
Value applied	28
Justification of choice of data or description of measurement methods and	IPCC 5th Assessment Report (AR5) Chapter 8, Table 8.7 Data will be archive electronically during project plus 5 years.

procedures applied	
Purpose of Monitoring	☒ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**$Default_{org,x}$**
Unit	Unitless
Description	The value of $Default_{org,x}$ depends on the climate zone. These values were derived by an analysis of registered CDM projects with verified waste compositions, and the $Default_{org,x}$ values are selected to ensure conservativeness of the resulting baseline emissions (using 95% confidence and 10% precision)
Origin of data	CDM Tool 04, Version 8.0, Appendix Simplified Approaches, Reduced waste composition monitoring, p.23.
Value applied	Table 2. $Default_{org,x}$ values for simplified procedure: Tropical wet column.
Justification of choice of data or description of measurement methods and procedures applied	CDM Tool 04, Version 8.0, Appendix Simplified Approaches, Reduced waste composition monitoring. Data will be archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage

Comments	-

Data / Parameter	**D_{CH4}**
Unit	t/m^3
Description	CH4 density (0.00067 t/m^3 at room temperature (20 ºC) and 1 atm pressure)
Origin of data	AMS-III.D Version 21.0., p.7.
Value applied	0.00067
Justification of choice of data or description of measurement methods and procedures applied	This is a scientifically proven constant value. AMS-III.D Version 21.0., p.7. Data will be archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**UF_b**
Unit	Unitless

Description	Model correction factor to account for model uncertainties (0.94)
Origin of data	AMS-III.D Version 21.0, p.7
Value applied	0.94
Justification of choice of data or description of measurement methods and procedures applied	AMS-III.D Version 21.0, p.7 Data will be archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**$VS_{LT,y}$**
Unit	kg-dm/animal/day
Description	Volatile solids production/excretion per animal of livestock LT in year y
Origin of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10A-4.
Value applied	VSLT,y = 4.5 for dairy cows VSLT,y = 2.7 for other cattle
Justification of choice of data or description	Default value taken from IPCCC Guidelines.

of measurement methods and procedures applied	Data will be archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**MCF_j**
Unit	%
Description	Annual methane conversion factor (MCF) for the baseline animal manure management system j (j: anaerobic open lagoon)
Origin of data	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17.
Value applied	73%
Justification of choice of data or description of measurement methods and procedures applied	IPCC data. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17. As climate zone, project area is located in the Warm Temperature Moist zone. The justification for choosing the Warm Temperature Moist zone is based on the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 3, Figure 3A.5.2. For Belgrade average annual temperature is 13.7 ^{o}C (Long term annual average for Belgrade since 1951). In 2021, annual average temperature was measured as 11.4 ^{o}C. According to the figure, Belgrade is either Warm Temperature Moist or Warm Temperature Dry. To be on the

	conservative side, the lowest value is chosen which is 73%. Data will be archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**$B_{0,LT}$**
Unit	m^3CH4/kg-dm
Description	Maximum methane producing potential of the volatile solid generated for animal type LT
Origin of data	For dairy cow: 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.16A, p.10.67.
Value applied	For dairy cow: 0.24 For non-dairy cow: 0.17
Justification of choice of data or description of measurement methods and procedures applied	As per AMS-III.D, .where no country specific value is available, a default value is applied. Defaults values for Eastern Europe from 2006 IPCC Guidelines are applied as this is the location of the project activity. Data will be archived electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions

	☐ Calculation of leakage
Comments	-

Data / Parameter	**LF_{AD}**
Unit	Unitless
Description	Methane leakage from anaerobic digesters/ reactor
Origin of data	AMS-III.AO Verion 01., p.6. default value for methane leakage factor
Value applied	0.05
Justification of choice of data or description of measurement methods and procedures applied	AMS-III.AO Verion 01., p.6. default value for methane leakage factor Data will be archived electronically during project plus 5 years.
Purpose of Monitoring	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**CEF_{grid}**
Unit	tCO_2/MWh

Description	Carbon emissions factor for the grid in the project scenario (tCO2e/MWh)
Origin of data	Calculated value based on the official publications by the EPS- Electric Power of Industry.
Value applied	1.078674742 fixed ex-ante for the first crediting period.
Justification of choice of data or description of measurement methods and procedures applied	Official publications by the EPS- Electric Power of Industry. Calculations are provided in the Mramorak1&2ERCalculations.xls. Archive electronically during project plus 5 years.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	

Data / Parameter	**$FC_{i,m,y}$**
Unit	ton
Description	Amount of fuel type i consumed by power unit m in year y y: 2019, 2020 and 2021.
Origin of data	PE Electric Power Industry of Serbia, "2019 Environment Report", 2019, p.12-13. http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%202019.pdf. PE Electric Power Industry of Serbia, "2020 Environment Report", 2020, p.12-13. http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%202020.pdf. PE Electric Power Industry of Serbia, "2021 Environment Report", 2021,

	p.9-10.
Value applied	Mramorak1&2EFCalculations.xls Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Justification of choice of data or description of measurement methods and procedures applied	Official publications by the EPS- Electric Power of Industry. Archive electronically during project plus 5 years
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**$NCV_{i,y}$**
Unit	GJ/ton
Description	Net calorific value (energy content) of fuel type *i* in year *y* y: 2019, 2020 and 2021.
Origin of data	NCV_{coal}: The Ministry of Environment and Spatial Planning, "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change", Belgrade, 2010., p.134. https://unfccc.int/sites/default/files/resource/srbnc1.pdf $NCV_{HeavyFuelOil}$: 2006 IPCC Guidelines, Volume 2, Chapter 1., p.18-19. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf NCV_{Oil} : 2006 IPCC Guidelines, Volume 2, Chapter 1., p.18-19. https://www.ipcc-

	nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	NCV_{coal}= 6.00 GJ/ton $NCV_{HeavyFuelOil}$=39.8 GJ/ton NCV_{Oil}=41.4 GJ/ton Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Justification of choice of data or description of measurement methods and procedures applied	NCV value for coal is taken from the "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change". Other NVC values are taken from 2006 IPCC Guidelines. Archive electronically during project plus 5 years
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**$EF_{CO2,i,y}$**
Unit	tCO_2/GJ
Description	CO_2 emission factor of fuel type i in year y y: 2019, 2020 and 2021.

Origin of data	$EF_{CO2,coal,y}$: The Ministry of Environment and Spatial Planning, "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change", Belgrade, 2010., p.134. https://unfccc.int/sites/default/files/resource/srbnc1.pdf See Mramorak1&2ERCalculations.xls $EF_{CO2,HeavyFuelOil,y}$: 2006 IPCC Guidelines, Volume 2, Chapter 1., p.23. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf $EF_{CO2,oil,y}$: 2006 IPCC Guidelines, Volume 2, Chapter 1., p.23. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	$EF_{CO2,coal,y}$: 0.1132 tCO2/GJ $EF_{CO2,HeavyFuelOil,y}$: 75,500 kg CO2/TJ = 0.0755 tCO2/GJ $EF_{CO2,oil,y}$: 72,600 kg CO2/TJ = 0.0726 tCO2/GJ Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Justification of choice of data or description of measurement methods and procedures applied	Default values from credible sources, 2006 IPCC Guidelines and "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change". Archive electronically during project plus 5 years
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	$\eta_{m,y}$
Unit	ratio
Description	Average net energy conversion efficiency of power unit m in year y y: 2019, 2020 and 2021.
Origin of data	CDM Tool 09: Determining the baseline efficiency of thermal or electric energy generation systems, Version 03.0. Table 2.
Value applied	0.62 Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Justification of choice of data or description of measurement methods and procedures applied	Default value from the Tool 09. Archive electronically during project plus 5 years
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	$EG_{m,y}$
Unit	MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit m in year y

	y: 2019, 2020 and 2021
Origin of data	PE Electric Power Industry of Serbia, "2019 Environment Report", 2019, p.11-12. http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%202019.pdf. PE Electric Power Industry of Serbia, "2020 Environment Report", 2020, p.11-12. http://www.eps.rs/eng/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%202020.pdf. PE Electric Power Industry of Serbia, "2021 Environment Report", 2021, p.8.
Value applied	Mramorak1&ERCalculations.xls Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Justification of choice of data or description of measurement methods and procedures applied	Official publications by the EPS- Electric Power of Industry. Archive electronically during project plus 5 years
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**NCV_f**
Unit	TJ/kg

Description	Net calorific value of fuel type f (Diesel oil) in TJ per volume or mass units
Origin of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2, p.1.18.
Value applied	4.3×10^{-5}
Justification of choice of data or description of measurement methods and procedures applied	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2, p.1.18. Archive electronically during project plus 5 years
Purpose of Monitoring	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data / Parameter	**$EF_{CO2,f}$**
Unit	tCO2e/TJ
Description	CO2 emission factor of the fossil fuel type f (diesel) used in transportation vehicles,
Origin of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2, p.1.18
Value applied	74.1
Justification of choice of data or description of measurement methods and procedures applied	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2, p.1.18. Archive electronically during project plus 5 years

Purpose of Monitoring	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Comments	-

Data and Parameters Monitored

Data / Parameter	**f_y**
Unit	Unitless/fraction
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Origin of data	In Republic of Serbia, there is no regulation that enforces the combustion of methane released by the SWDSs.
Value applied	0 (zero)
Justification of choice of data or description of measurement methods and procedures applied	In Republic of Serbia, there is no regulation that enforces the combustion of methane released by the SWDSs. Therefore, this value is taken as zero.
Monitoring frequency	Annually
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions

	☐ Calculation of leakage
Quality assurance and control	Archive electronically during project plus 5 years.
Comments	-

Data / Parameter	$W_{j,x}$
Unit	Ton/year
Description	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
Origin of data	Project proponents log book records that show the municipal organic wastes accepted by the Mramorak1&2.
Value applied	3000 ton/year
Justification of choice of data or description of measurement methods and procedures applied	Measurements by project participants. Project proponents log book records that show the municipal organic wastes accepted by the Mramorak1&2. Project received one type of solid waste, which is the municipal food waste.
Monitoring frequency	Continuously, aggregated at least annually for year x
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Archive electronically during project plus 5 years.

Comments	-

Data / Parameter	**$N_{LT,y}$**
Unit	Number of cows/year
Description	Annual average number of animals of type LT in year y (numbers)
Origin of data	Project proponent farm records.
Value applied	At both Stari Tamis and Mramorak farms, in total: $N_{Dairy\ cow}$: 1340 for dairy cow (expected value) $N_{non\text{-}dairy\ cow}$: 2021 for non-dairy cow (expected value)
Justification of choice of data or description of measurement methods and procedures applied	Counting the number of cattle at the farms (Mramorak and Stari Tamis farms) is part of the business of the project owner. Project proponent has daily records of animal stocks.
Monitoring frequency	Annually, based on monthly records
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Counting animals at the farms is a mandatory business process of the project owner. Therefore, all data in correct way is available at the project proponent. Archive electronically during project plus 5 years.
Comments	Dead and discarded animals are discounted from the N_{LT}.

Data / Parameter	**$MS_{\%BI,j}$**
Unit	Unitless/fraction
Description	Fraction of manure handled in baseline animal manure management system j
Origin of data	Project proponent farm records and Mramorak1&2 project waste management records
Value applied	100%
Justification of choice of data or description of measurement methods and procedures applied	Project proponent farm records and Mramorak1&2 project waste management records. All manure from cattle farms is used in biogas digesters. All the relevant data are recorded by the project proponents.
Monitoring frequency	Annually, based on daily measurement and monthly aggregation
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$Q_{manure,y}$**
Unit	ton

Description	Quantity of raw waste/manure treated and/or wastewater co-digested in the year y (tonnes)
Origin of data	Project proponents' records. On-site data sheets recorded monthly using weigh bridge.
Value applied	12,775 ton/year
Justification of choice of data or description of measurement methods and procedures applied	Project proponents' records. On-site data sheets recorded monthly using weigh bridge.
Monitoring frequency	Monthly
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier. Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$Q_{SWDS,y}$**
Unit	ton
Description	Quantity of raw waste/manure treated and/or wastewater co-digested in the year y (tonnes)
Origin of data	Project proponents' records. On-site data sheets recorded monthly using

	weigh bridge.
Value applied	3000 ton/year
Justification of choice of data or description of measurement methods and procedures applied	Project proponents' records. On-site data sheets recorded monthly using weigh bridge.
Monitoring frequency	Monthly
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier. Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$Q_{res\ waste,y}$**
Unit	ton
Description	Quantity of residual waste produced in year y.
Origin of data	Project proponents' records. On-site data sheets recorded monthly using weigh bridge.
Value applied	1040 ton

Justification of choice of data or description of measurement methods and procedures applied	Project proponents' records.
Monitoring frequency	Monthly
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**CT_y**
Unit	Tons/truck
Description	Average truck capacity for transportation (tonnes/truck)
Origin of data	Project proponent's on-site measurement
Value applied	18.5 ton/truck for manure 10 ton/truck for food waste
Justification of choice of data or description of measurement methods and	Project proponent's on-site measurement

procedures applied	
Monitoring frequency	Annually
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$CT_{res\ waste,y}$**
Unit	Tons/truck
Description	Average truck capacity for residual transportation (tonnes/truck)
Origin of data	Project proponent's on-site measurement
Value applied	10 ton/truck
Justification of choice of data or description of measurement methods and procedures applied	Project proponent's on-site measurement
Monitoring frequency	Annually
Purpose of data	☐ Calculation of baseline emissions

	☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**DAF_w**
Unit	km/truck
Description	Average incremental distance for raw solid waste/manure and/or wastewater transportation
Origin of data	Project proponent's on-site measurement
Value applied	290 km/truck for food waste transportation 37 km/truck for manure transportation
Justification of choice of data or description of measurement methods and procedures applied	Project proponent's on-site measurement
Monitoring frequency	Monthly
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage

Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$DAF_{res\ waste,y}$**
Unit	km/truck
Description	Average distance for residual waste transportation
Origin of data	Project proponent's on-site measurement
Value applied	6.5 km/truck
Justification of choice of data or description of measurement methods and procedures applied	Project proponent's on-site measurement
Monitoring frequency	Frequency of monitoring. Please provide a chronological plan or determined dates
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$FC_{i,f}$**
Unit	kg/km
Description	Specific consumption of fuel type f in volume or mass units per km for vehicle type i
Origin of data	Project Proponent's project records. In the project activity, trucks use diesel oil for transporting the manure. According to the statement of the project owner, trucks consume 25 liter fuel per 100 km. Density of diesel oil is 0.85 kg/lt. Based on that trucks use 0.2125 kg/km diesel oil.
Value applied	0.2125
Justification of choice of data or description of measurement methods and procedures applied	Project proponent statement is the only source of the data.
Monitoring frequency	Annually
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**nd_y**

Unit	Days/year
Description	Number of days the central treatment plant was operational in year y
Origin of data	Project proponent. Incoming waste records, measured at the weight scale at the entrance of the project facility.
Value applied	365
Justification of choice of data or description of measurement methods and procedures applied	Project farms, which are Stari Tamis and Mramorak, are operational 365 days per year and accordingly manure management systems in both farms, which are uncovered anaerobic lagoons, are operational throughout this time.
Monitoring frequency	Monthly
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Data will be archived electronically during project plus 5 years.
Comments	-

Data / Parameter	**$FV_{RG,h}$**
Unit	m^3/hr
Description	Volumetric flow rate of the captured biogas in dry basis at normal conditions in hour h

<table>
<tr><td></td><td></td></tr>
<tr><td>Origin of data</td><td>At Mramorak 1 and Mramorak, Woodward brand, TecJet 110 mode flow meters are installed. These flow meters are an electronic gas metering valve for single point injection. It has integrated sensors and electronics, which provide the correct gas flow under all specified conditions</td></tr>
<tr><td>Value applied</td><td>511.2 m^3/hr for each biogas facility.
Hence 1022.4 m^3/hr in total (expected annual average value)</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>Biogas coming to the gas engine unit is continuously measured y flow meters and measured data is recorded by the Dia.ne xt4 software program. The data of this program is the only source to determine the gas flowrate parameter.
Archive electronically during project plus 5 years
<table><tr><td></td><td>Mramorak 1</td><td>Mramorak 2</td></tr><tr><td>Brand & Model</td><td>TecJet 110</td><td>TecJet 110</td></tr><tr><td>Serial number</td><td>22184210</td><td>21813660</td></tr></table></td></tr>
<tr><td>Monitoring frequency</td><td>Continuously by flow meter</td></tr>
<tr><td>Purpose of data</td><td>☐ Calculation of baseline emissions
☒ Calculation of project emissions
☐ Calculation of leakage</td></tr>
<tr><td>Quality assurance and control</td><td>Calibration and maintenance of flare and meters will be carried out periodically as per the technical specifications of manufacturer.</td></tr>
<tr><td>Comments</td><td>The project activity flare is in place for safety reasons only and is not expected to operate as the project has been designed to operate at its designated capacity.</td></tr>
</table>

Data / Parameter	**$fv_{CH4,RG,h}$**
Unit	Fraction
Description	Volumetric fraction of methane in the captured biogas on dry basis in hour *h*
Origin of data	Project Proponent. Biogas flow from both main and post digester units to the gas engine unit are continuously analyzed by the biogas analyzer. Biogas is analyzed by the Awite gas analyzer, type AwiFLEX Cool+, with a serial number of 2774. It measures values of methane, carbon-dioxide, oxygen and hydrogen-sulfide. Measured data is recorded by a software program, Dia.ne xt4.
Value applied	0.55 (expected value)
Justification of choice of data or description of measurement methods and procedures applied	This is project specific data, and the gas flow meters installed in the gas engine units are the only source of the data. Archive electronically during project plus 5 years
Monitoring frequency	Continuously by flow meter
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage

Quality assurance and control	Biogas analyzers are calibrated every 5 years. These meters are called "gas meters" in the line 11 in the regulation. The first calibration to biogas flow meter and biogas analyzers will be applied in 24/06/2025.[75]
Comments	-

Data / Parameter	**$EG_{pj,y}$**
Unit	MWh/year
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
Origin of data	Project Proponent invoices issued by the EPS Distribucija.
Value applied	15,500 MW
Justification of choice of data or description of measurement methods and procedures applied	***Gross electricity generation:*** Each plant approximately generates the following amount of gross electricity: Mramorak 1: 8250 MWh (expected Net electricity) Mramorak 2: 8250 MWh (expected Net electricity) ***Electricity consumed:*** Approximately 6% of the produced amount of gross electricity is consumed by the facility (gas engine unit etc) for its own consumption for the operation and management of Mramorak 1&2. In addition to that, Mramorak 1 and 2 in total approximately consumes 1000 MW/year electricity from the grid (ECpj,y data in ER excel sheet).

[75] http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2021/37/4.

Net electricity supplied to the grid: 16500-1000= 15,500 MW/year.

Electricity supplied to the grid:

Generated electricity is supplied to the power station of the Serbian national grid system which is about 0.1 km away from the Mramorak1&2. At the power station, there are two power meters operated by the government owned company, EPS Distribucija doo. Project owners have no control on these power meters; they are sealed and protected from possible interventions. EPS Distribucija doo makes remote reading to these power meters and every month send invoice to the project owner.

Net electricity

Monthly invoices for generation and consumption by EPS Distribucija doo are the sources of "net electricity" generation of the project.

Cross-check:

Project owner has also power meters installed within the gas engine units. The readings of these power meters can be used for cross-checking.

Power meters

At the substation connecting to the Serbian EPS grid system, the following power meter equiptment system with the following specifications: ST310FV(0.2) 3x58/100V 5-6A 15A23R55-SN00100 pbdqf kl.0.2 + GPRS/GSM modem CM23S-S2. Serial numbers of power meters at the subtstation:

Mramorak 1	Mramorak 2
25 63 21	25 63 23

Mramorak1&2 power meters within the gas engine unit are Landis+Gyr E650 branded with an accuracy class of 0.5/1.0. They are active reactive, bi-directional. Electricity generation is measured continously at the gas engine units.

	Mramorak 1	Mramorak 2
Brand & Model	Landis+Gyr E650	Landis+Gyr E650
Serial number	43 267 888	44 202 354

Archive electronically during project plus 5 years

Monitoring frequency	Continuous measurement, but recorded monthly
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Calibration and maintenance of the power meters located at the Serbian EPS substation to which the project electricity is supplied are the responsibility of the EPS Distribucija doo. Calibration and maintenance is done in accordance with the national regulation "The Rulebook on the types of measuring instruments that are subject to legal control".[76] Calibration frequency is 12 years as per this regulation.
Comments	-

Data / Parameter	**Average annual temperature of Belgrade**
Unit	^{o}C
Description	Average annual temperature for Belgrade
Origin of data	https://www.hidmet.gov.rs/data/klimatologija/eng/2021.pdf, p.2 anf p.16.
Value applied	13.7 ^{o}C (Long term annual average for Belgrade since 1951). In 2021, annual average temperature was measured as 11.4 ^{o}C

[76] Official Gazette of the Republic of Serbia No. 13/18 of 14 th February 2018 and enters into force on 22 nd February 2018. https://tehnis.privreda.gov.rs/en/news/Legislative_news/689/published-rulebook-on-types-of-measuring-instruments-that-are-subject-to-legal-control-.html.

Justification of choice of data or description of measurement methods and procedures applied	Official governmental data.
Monitoring frequency	Annually
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	-.
Comments	-

Data / Parameter	$V_{t,db}$
Unit	m^3 /min
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)
Origin of data	For mass flow of methane, the maximum combustion capacity of the flare units capacities will be used. This is a conservative approach.
Value applied	Maximum combustion capacities of each flare units are taken from the flare units technical specification documents; Mramorak1: 550 m3/hr Mramorak2: 550 m3/hr
Justification of choice of data or description of measurement	For mass flow of methane, the maximum value of the flare units

methods and procedures applied	capacities will be used. This is a conservative approach.
Monitoring frequency	Flare units maximum combustion capacity value is used.
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Since maximum combustion capacity of the flare unit will be used, there is no monitoring device installed.
Comments	-

Data / Parameter	$V_{i,t,db}$ ($V_{CH4,t,db}$)
Unit	m^3 / m^3
Description	Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m^3 gas i/m^3 dry gas); i: CH4
Origin of data	Project Proponent. Biogas flow from both main and post digester units to the gas engine unit are continuously analyzed by the biogas analyzer. Biogas is analyzed by the Awite gas analyzer, type AwiFLEX Cool+, with a serial number of 2774. It measures values of methane, carbon-dioxide, oxygen and hydrogen-sulfide. Measured data is recorded by a software program, Dia.ne xt4.
Value applied	0.55
Justification of choice of data or description of measurement methods and procedures applied	This is project specific data, and the gas flow meters installed in the gas engine units are the only source of the data. Archive electronically during project plus 5 years.

Monitoring frequency	Continuously. Values to be averaged on a minute basis
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Biogas analyzers are calibrated every 5 years. These meters are called "gas meters" in the line 11 in the regulation. The first calibration to biogas flow meter and biogas analyzers will be applied in 24/06/2025.[77]
Comments	-

Data / Parameter	η_{flare}
Unit	Unitless
Description	Flare efficiency in the minute m
Origin of data	CDM Tool 06: Project emissions from flaring
Value applied	0%
Justification of choice of data or description of measurement methods and procedures applied	Flare units are enclosed type. As per the Tool 06, option A is choosen as flare efficiency, which is a conservative approach.

[77] http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2021/37/4.

Monitoring frequency	Annually
Purpose of data	☐ Calculation of baseline emissions ☒ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	This is constant value taken from the Tool 06.
Comments	-

Data / Parameter	Number of employees working at the project activity
Unit	Number
Description	Number of employees working at the project activity
Origin of data	Project owner's employee records and social security records
Value applied	6 (expected value)
Justification of choice of data or description of measurement methods and procedures applied	Number of employees working at the project activity to be validated by the project owner's employee records and social security records.
Monitoring frequency	Annually
Purpose of data	SDG Goal 8 Decent Work and Economic Growth
Quality assurance and control	-

Comments	-

16.2 Additional information to determine the baseline or reference scenario

N/A

16.3 Information related to environmental impact assessment of GHG project activities

As per the legal obligations of laws and regulations of Serbia, project complies with all the environmental and waste management regulations to prevent any potential negative impacts.

According to the Environmental Protection Law of Serbia, biogas power plants with an installed capacity of less than 1 MW are exempted from environmental impact analysis due to their minimal environmental impacts. In the project activity, each biogas plant has an installed capacity of 999 kWe which is less than 1 MW. Therefore, conducting environmental impact analysis was not required.

16.4 Procedures established for the management of GHG emission reductions or removals and related to quality control

The purpose of the monitoring plan is to ensure continuous monitoring, recording and archiving of the monitoring parameters in a transparent and credible manner for estimating GHG emission reductions achieved by the project activity. Implementation of the monitoring is the responsibilit of the Zlatar Mramorak doo company, which is the project owner.

Monitoring will be implemented as per the AMS-III.AO and AMS-I.D. monitoring methodologies. Data parameters to be monitored are provided in Section 16.1. These parameters will be monitored transparently with meeting the basic quality control conditions.

Project Monitoring Organizational Structure

Project owner, Zlatar Mramorak doo, at the higher level has the following organization structural which will be the bases of the operational and management structure of the monitoring plan.

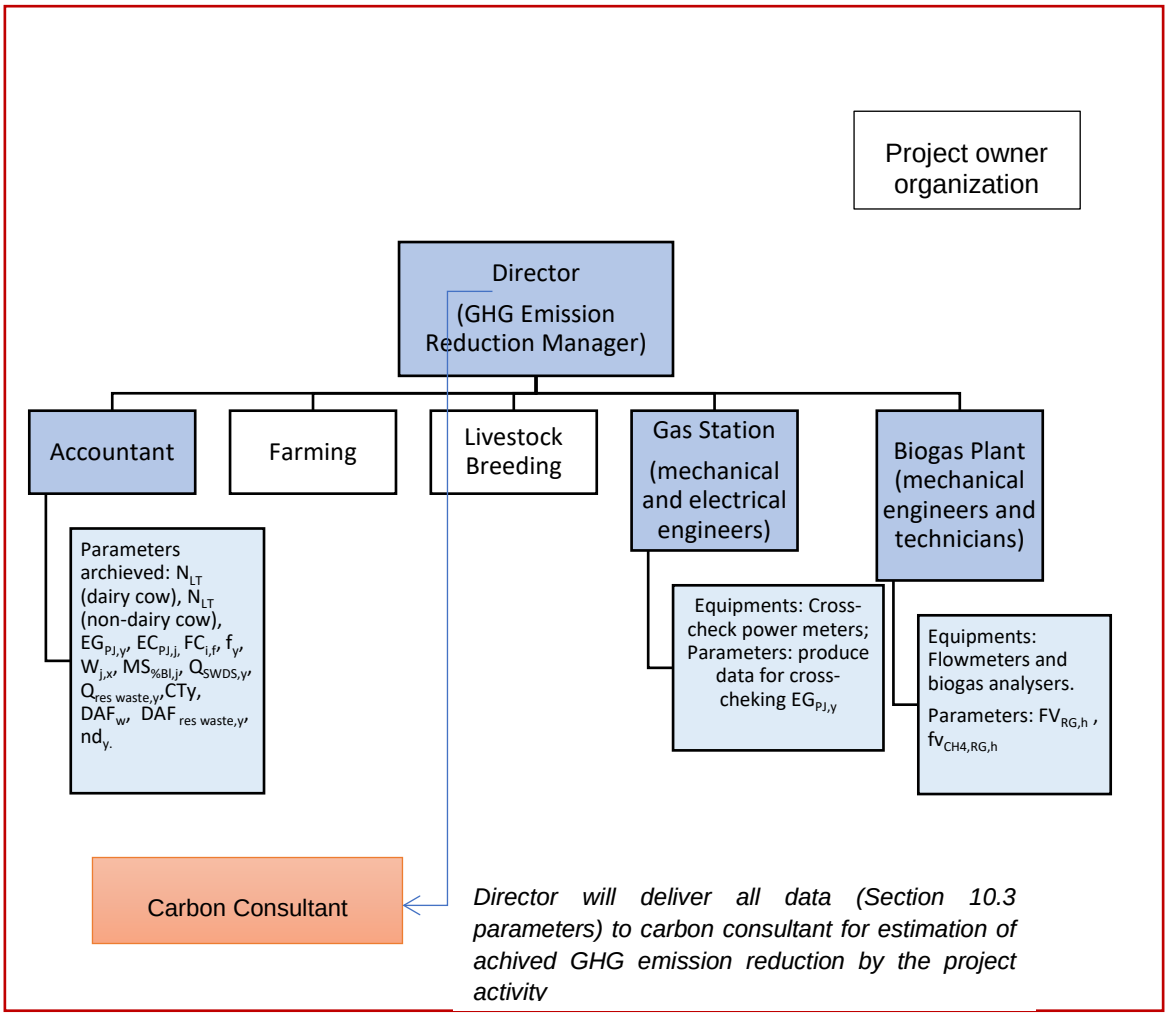


Figure 16 Project Monitoring Organizational Structure and archive of ex-post monitoring parameters

Within this structure, Director, which is the General Manager of the project owner, Zlatar Mramorak doo, is responsible for implementing the monitoring plan. Director will ensure proper monitoring, recording and archiving of the monitoring parameters. There is no need for monitoring ex-ante parameters which will be fixed during the validation process and will not revised during the first crediting period.

Accountant office is the natural identity that already archives some of the monitoring parameters as part of its business (Figure 16). Average number of animals for diary and non-dairy cows, nd_y value, electricity generation and consumption data, and fuel consumption by the trucks are archived at the accountant office. Volumetric flow rate of the captured biogas and volumetric fraction of methane in the captured biogas are monitored and recorded by the Biogas Plant department. At the Gas Station department, power meters installed within the gas engine units will produce auxiliary data will be used for cross-checking the electricity generation by the project activity. Power meters at the grid substation are not monitored by the project owner. These meters are controlled by the EPS Distribucija doo, which is the government company buying the electricity from the project owner. All calibration and control of these power meters at the grid substation are under the control of the EPS Distribucija doo.

All these ex-post parameters given in Section 16.1 are already measured and recorded on a routine base within the organizational process of the project owner.

Director will ensure the gathering of these recorded data, information and present to the DOE.

Carbon consultant of the project activity is responsible to estimate the emission reductions of the project activity.

All data for each monitoring parameters, both ex-post and ex-ante, will be archived during the project and will be kept for more 5 years following the end of the crediting period.

Metering devices

Biogas flow meters, electricity meters and biogas analyzers are subject to regular maintenance and testing according to technical specifications from the manufacturers to ensure accuracy.

Biogas analyzer

Gas is analyzed by the Awite gas analyzer, type AwiFLEX Cool+. It measures values of methane, carbon-dioxide, oxygen and hydrogen-sulfide. Serial number of the gas analyzer is 2774.

Biogas flowmeter

Woodward brand, TecJet 110 mode flow meters are installed to measure biogas flow rate.

	Mramorak 1	Mramorak 2
Serial number	22184210	21813660

Power meters:

Calibration of power meters are under the control of the EPS Distribucija doo, and project owner has not access to the power meters.

Mramorak1&2 power meters within the gas engine units are Landis+Gyr E650 branded with an accuracy class of 0.5/1.0. They are active reactive, bi-directional.

	Mramorak 1	Mramorak 2
Brand & Model	Landis+Gyr E650	Landis+Gyr E650
Serial number	43 267 888	44 202 354

Electricity generation is measured continously at the gas engine units.

At the substation connecting to the Serbian EPS grid system, the following power meter equiptment system with the following specifications: ST310FV(0.2) 3x58/100V 5-6A 15A23R55-SN00100 pbdqf kl.0.2 + GPRS/GSM modem CM23S-S2.

Serial numbers of power meters at the subtstation:

Mramorak 1	Mramorak 2
25 63 21	25 63 23

Electricity generation is measured continously at the substation.

Project owner has also power meters installed within the gas engine units. The readings of these power meters can be used for cross-checking.

$EG_{PJ,y}$ (net amount of electricity generation by the project activity) will be proved by the EPS Distribucija Doo. monthly invoices. For cross-check, project owner has its own power meters located in the gas engine units.

Calibration of monitoring equipments

Monitoring equipment installed at the project activity that includes power meters, biogas flow meters and biogas analyzers are already calibrated by the manufacturer before the installation. After the installation, calibrations are applied according the applicable national regulation, called as "Pravilnik o overavanju merila"[78] ("Serbian Rulebook on certification of benchmarks" in English).

As per the this regulation, power meters at the substation and project site are calibrated every 12 years. Please see the number 29 in the regulation, the line "for direct and semi-indirect connection". Power meter which are calibrated every 12 years are the ones installed at the subtation as per the regulation. For power meters installed at the project activity, located in the codigesters, there is no calibration requiprement by the law (please see the number 28 in the regulation). And since project start date is 24/06/2020, those power meters at the subtation operated by the EPS Distribucija Doo are not calibrated yet. The first calibration will be applied in 24/06/2030. Power meters located in the gas engine units are technical part of the congenerations and installed by the manufacturer company, Jenbacher, and are already calibrated before the installation. [79]

Flow meters (gas meters) and biogas analyzers are calibrated every 5 years. These meters are called "gas meters" in the line 11 in the regulation. The first calibration to biogas flow meter and biogas analyzers will be applied in 24/06/2025.[80]

Management of data quality

Mramorak Zlatar Doo. company, which is the project owner, and fully operates the biodigesters has a robust data management system. This system is a natural part of the business activities of the project owner; plus as per the governmental regulations,

[78] http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2021/37/4.
[79] http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2021/37/4.
[80] http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2021/37/4.

the company is obeyed to keep all the records from operation of cattle farms to the central treatment plants. Accountant offise has been archieving many of the monitoring parameters, the rest of the parameter that includes biogas flowrate and methane composition have been kept by the Biogas plant departments; electricity generation data by the biodigesters are kept by the Gas Station and Accountant office departments.

SDG contributions of the project activity

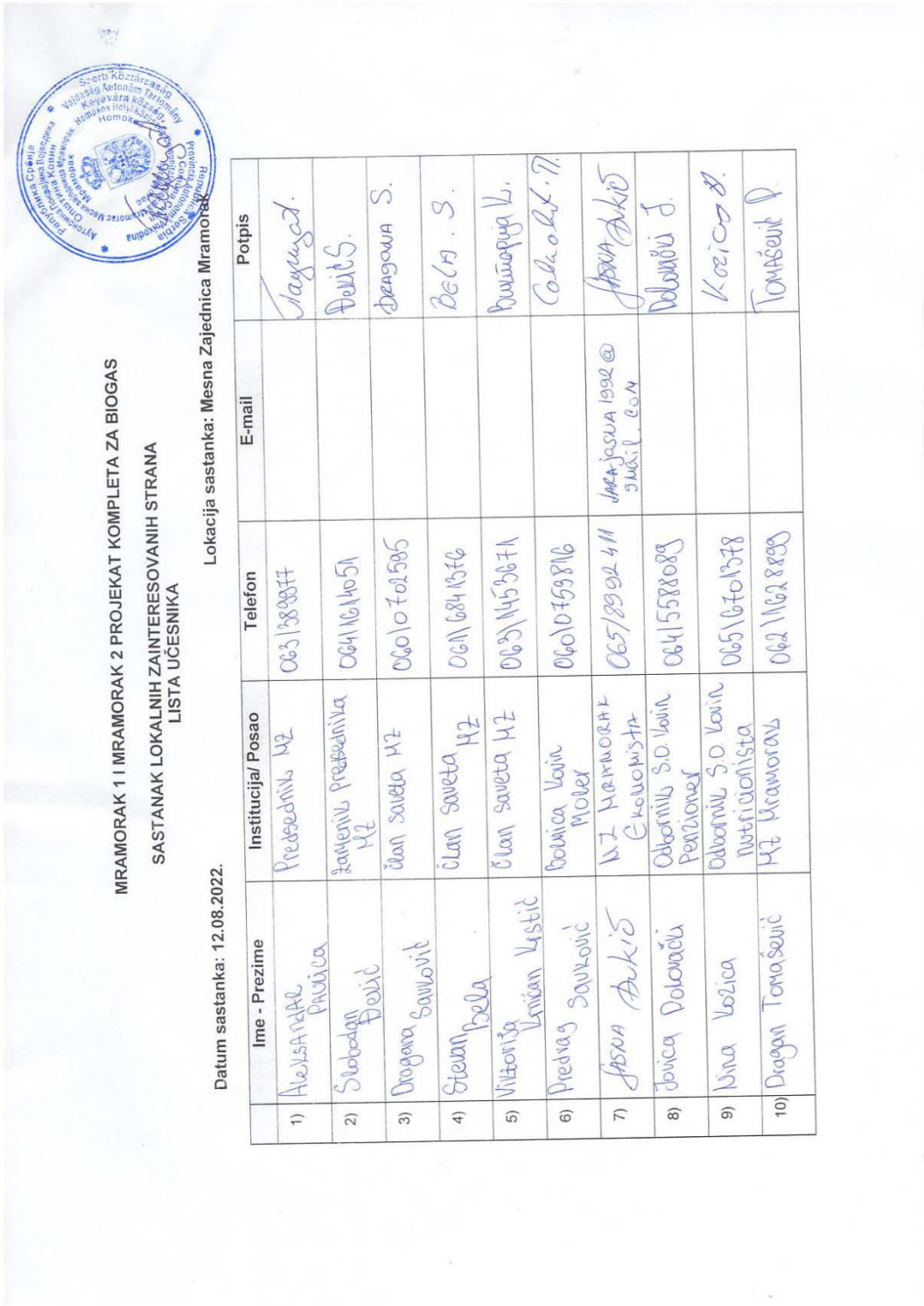
Regarding the United Nations Sustainable Development Goals (SDGs), Mramorak 1&2 project achieves the following SDGs:

SDG 7 Affordable and Clean Energy: Project activity generates renewable energy, about 15.5 GWh annually, by capturing biogas from cattle manure, non-hazardous food wastes, plant wastes (starch waste, liquid starch wastes, CSL) and agricultural plant residues (slage corn and slage barley) via anaerobic digestion and supplies it to the fossil fuel dominated Serbian EPS grid system. Through this way, project contributes to the SDG 7 goals of the United Nations (UN).

SDG Goal 8 Decent Work and Economic Growth: Project created job opportunities during both construction and operation phases. During operation, project employs 6 people and 2 of them are from local villages.

SDG Goal 13 Climate Action: The project will naturally play an important role in global climate change mitigation activities through preventing emissions of methane that would otherwise be released to the atmosphere in the baseline conditions. Project annually achieves approximately 23,083 tCO2 emission reduction. Through this way, it contributes to SDG 13 goals of the UN.

17 Appendix I: Stakeholder comments and participant list



MRAMORAK 1 I MRAMORAK 2 PROJEKAT KOMPLETA ZA BIOGAS

SASTANAK LOKALNIH ZAINTERESOVANIH STRANA

LISTA UČESNIKA

Datum sastanka: 12.08.2022. Lokacija sastanka: Mesna Zajednica Mramorak

	Ime - Prezime	Institucija/ Posao	Telefon	E-mail	Potpis
1)	Aleksandra Pavlica	Predsednik MZ	063/383877		
2)	Slobodan Đević	Zamenik Predsednika MZ	064/1641051		
3)	Dragana Savković	član saveta MZ	060/1702585		
4)	Stevan Bela	član saveta MZ	061/6841376		
5)	Viktorija Lucian Vistić	član saveta MZ	063/1463671		
6)	Predrag Savković	Domica Kovin Moler	060/1753816		
7)	Jasna Aukić	MZ Mramorak Ekonomista	065/2992411	jasnajasna1992@gmail.com	
8)	Jovica Dobrašči	Odbornik S.O Kovin Penzioner	064/1558089		
9)	Nina Kozica	Odbornik S.O Kovin Nutricionista	065/1701378		
10)	Dragan Tomašević	MZ Mramorak	062/1628899		

MRAMORAK 1 I MRAMORAK 2 PROJEKAT KOMPLETA ZA BIOGAS

SASTANAK LOKALNIH ZAINTERESOVANIH STRANA
LISTA UČESNIKA

Datum sastanka: 12.08.2022.

Lokacija sastanka: Mesna Zajednica Mramorak

	Ime - Prezime	Institucija/ Posao	Telefon	E-mail	Potpis
11)	Zoran Jovanov	Poljoprivrednik	065\2753320		Jovanov Z.
12)	Svetislav Grujić	Preduzetnik	060\5564499		Грујић С.
13)	Florinel Barbu	Poljoprivrednik	063\1603810		Барбу Ф.
14)	Božurel Barbu	Penzioner	064\0406300		Božurele B.
15)	Aleksandar Mihaj	Preduzetnik	062\339297		Mihaj A.
16)	Dragan Bundra	Finet	062\8548834		Bundra D.
17)	Slatan Majdak	Bolnica Kovin Med. teh.	061\8006803		Слатан М.
18)	Milan Domić	Bolnica Kovin Med. teh.	065\8926740		Милан Д.
19)	Milivoje Šaipov	Poljočuvar	060\1740344		Milivoje S.
20)	Rade Probnjak	Poljoprivrednik	062\489356		Пробњак Р.

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Stevan Bela
Institution/Job:	Board member of the Local Community Mramorak
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
Reduction of greenhouse effect is a global problem and I am glad that in our place there is project for reduction.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Viktoria Krničan Krstić
Institution/Job:	Board member of the Local Community Mramorak
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
I am happy to see that our local company is thinking about environment.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Predrag Savković
Institution/Job:	Hospital Kovin / Painter
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
In this presentation of the project I see that also is taking care about the cows because without the cows there is no milk and like this is reducing greenhouse effect.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Jasna Đukić
Institution/Job:	Local Community / Economist
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
This project is something new and I didn't know that is being done until now in Serbia. For me this is something that is future.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Jovica Dolovački
Institution/Job:	Member of the Kovin Municipal Assembly
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
For our Municipal this is very good and I am glad that is happening here.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Dragan Tomašević
Institution/Job:	Represent of Local Community Mramorak
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
I was impress with this project will really help for reduction of carbon dioxide from atmosphere.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Dragana Savković
Institution/Job:	Deputy President of the Local Community Mramorak
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
For me the positive aspect is that we have in our place something that is global thinking and local doing.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Aleksandar Paulica
Institution/Job:	President of the Local Community
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
Everything that I heard was good and it will give positive aspect for environment of Mramorak and local places near our place and globally.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Mina Kozić
Institution/Job:	Member of the Kovin Municipal Assembly
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
This project will give the contribution to save environment from greenhouse effect and I hope that will be more projects like this.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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PROJECT EVALUATION FORM

MRAMORAK 1
MRAMORAK 2

BUNDLE BIOGAS PLANT
LOCAL STAKEHOLDER MEETING

The Evaluator Name and Surname:	Dragana Savković
Institution/Job:	Board member of the Local Community Mramorak
Meeting Date:	12.08.2022.
Meeting Location:	Local Community Mramorak
What are the aspects that you find **positive** about the project?	
For me the positive aspect is that we have in our place something that is global thinking and local doing.	
What are the aspects that you find **negative** about the project?	
Non.	
Sign	

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