

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

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VERSION **v. 1.2**

RELATED SUPPORT

– **TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2**

This document contains the following Sections

Key Project Information

Section A – Description of project

Section B - Application of approved Gold Standard Methodology (ies) and/or demonstration of SDG Contributions

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KEY PROJECT INFORMATION

GS ID of Project	GS4238
Title of Project	"Methane Gas Capture and Electricity Production at Kubratovo Wastewater Treatment Plant, Sofia, Bulgaria"
Time of First Submission Date	14/05/2015
Date of Design Certification	01/04/2016
Version number of the PDD	06
Completion date of version	23/06/2021
Project Developer	Sofiyska voda AD
Project Representative	Sofiyska voda AD
Project Participants and any communities involved	Sofiyska voda AD
Host Country (ies)	Bulgaria
Activity Requirements applied	☒ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Scale of the project activity	☐ Micro scale ☒ Small Scale ☐ Large Scale
Other Requirements applied	-
Methodology (ies) applied and version number	Sectoral scope 01: Energy Industries; AMS-I.C./Version 21.0: Thermal energy production with or without electricity, dated 14 June 2019; Sectoral scope 01 and 13: Waste handling and disposal; AMS-III.H/Version 19.0: Methane recovery in wastewater treatment, dated 14 June 2019; Sectoral scope 01: Energy Industries; AMS-I.F/Version 03.0 "Renewable electricity generation for captive use and mini-grid", dated 28 November 2014
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Project Cycle:	☐ Regular ☒ Retroactive

Table 1 – Estimated Sustainable Development Contributions

Sustainable Development Goals Targeted	SDG Impact (defined in Error! Reference source not found.)	Estimated Annual Average	Units or Products
13 Climate Action	13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	66,424	tCO _{2e}
6 Clean water and sanitation	6.3.1 Impact on natural water patterns and flow	Outlet water COD -23.56+-2.35 BOD ₅ - 7.98+-1.88	mgO ₂ /l mgO ₂
11 Sustainable cities and communities	11.6: Release of pollutants	NOx Unit 1 - 189.5 mg/Nm ³ Unit 2 - 209 mg/Nm ³ Unit 3 - 211.5 mg/Nm ³	

SECTION A. DESCRIPTION OF PROJECT

A.1. Purpose and general description of project

The developer of the project Sofiyska Voda AD was established in October 2000 by a 25-year Concession Agreement¹. Under it the Municipality of Sofia granted to the Company the operation and maintenance of Sofia's WSS system. The shareholding capital is divided between the Municipality of Sofia (22.9 %) and the French company Veolia Water (77.1 %). Sofiyska Voda AD is not the owner, but rather the Concessionaire of the WSS assets – which are public state property. All new facilities constructed with the Company's funds are also the property of the City.

"Methane Gas Capture and Electricity Production at Kubratovo Wastewater Treatment Plant, Sofia, Bulgaria" applies for re-certification as a GS4GG Voluntary Emission Reduction (GS-VER) project. Due to its significant contribution to climate change mitigation and sustainable development in the region, this project is expected to fulfil the all present and future requirements of GS4GG rigorously.

The project is both a methane emissions reduction and energy production project. Methane produced in Kubratovo wastewater treatment plant is captured in common methane tanks serving as a buffer and then supplied to the installed CHP gas engines for electricity and heat production, which in turn substitutes both the plant's electricity purchases from the grid and fossil fuel usage. Excess electricity is supplied to the grid.

¹ <https://www.sofiyskavoda.bg/docs.aspx?docs=7>

The main purpose of the project is to transform the existing low tech sludge treatment process at Kubratovo that existed before implementation of the project into a modern advanced treatment process matching the best sludge treatment practice available in Western Europe. This transformation has a major effect on the environment through dramatically reducing the existing methane gas emissions at the plant while also reducing the volume of sludge (to as much as 50%) that needs to be transported, hence reducing GHG emissions from transportation as well (not included in GHG abatement calculations).

The overall objective of the project is to provide an environmentally friendly sludge treatment process reducing methane and carbon dioxide emissions that – under a business-as-usual scenario – would have continued.

Other objectives are:

- replace the traditional sludge drying beds and landfill options with mesophilic digestion of all primary and secondary sludge followed by mechanical dewatering in order to reduce GHG emissions;
- effectively mitigate odour problems from the existing treatment of sludge and sludge liquors through introduction of digestion;
- production of fertiliser by mechanical dewatering of the digested stabilised sludge;
- production of electricity from utilisation of the biogas in CHP gas engines thereby reducing GHG emissions from electricity production by the grid.

The project delivers the following key results:

- all primary and secondary sludge thickened and digested as per EU recommendations and guidelines;
- all biogas produced within the digestion process used for power and heat generation via CHP gas engines thus reducing on-site electricity purchases from the national grid; reduction in on-site fossil fuel usage as all site-heating requirements will be met by the CHP gas engines;
- excess gas is flared and destroyed by highly efficient closed flame flares;
- all sludge is stabilised and pathogen free.

Long term strategic reductions of GHG emissions include:

- reduction in open release of CH₄ from open anaerobic sludge tanks and drying beds;
- reduction in open release of CH₄ from landfill disposal site;
- reduction in CO₂ emissions due to replacement of electricity production from fossil fuels;
- reduction in CO₂ emissions due to replacement of heat generation from fossil fuels.

The project had been implemented in several stages:

- Erection of a new digester system consisting of 4 digesters, 7,000 m³ each, designed, supplied and erected by PASSAVANT ROEDIGER Anlagenbau (see Section A.5).

For destroying of the excess methane in case of emergency a flaring system have been implemented, consisting of 2 x DN150 flares, type ZA1-F2-0/N0 designed and manufactured by HEGWEIN GmbH, Germany.

- Erection of 3 new co-generation sets GE JMS 320 GS-B.LC with 1,063 kW electric capacity each and 1,088 kW thermal capacity, for generation of electric and thermal energy by combusting biogas from digesters;
- Implementation of CHP exhaust gasses heat recovery system in 2017. This system has not been accounted for during the first crediting period.

The 4 digesters were commissioned at the end of 2006 and started operation on 01 January 2007 but due to some technical problems in the adjustment of the

biological process the generation of biogas was interrupted in the end of June 2007 and resumed on 01 May 2008, so the first industrial quantities of biogas were registered in May, 2008.

- Erection of Digester # 5. Will be commissioned and will start operation in March, 2021.

The CHP was commissioned and started generating electricity and thermal energy for plant's needs in November, 2009.

The project was initially developed and registered as a Joint Implementation (JI) project and started operation in 2007. The project was determined positively by TUEV SUD with Determination Report No 743 691², dated 25 Jan 2006 and received a Letter of Approval by the Ministry of Environment and Water of Bulgaria dated 01 Aug 2007³.

Since 01 Jan 2007 the plant that was built under the project has been in regular operation. For the period until the end of the first Kyoto period (31 Dec 2012) the project has undertaken 4 verifications and been issued emission reductions equal to a total of 572,372 tCO₂e.

The JI crediting period of the project was as follows:

Start of the crediting period – 01/01/2007

End of the crediting period – 31/12/2012

On 24 June 2010 the project was registered under UNFCCC Track 1 procedure with project ID BG1000166⁴.

The first crediting period of the Kyoto Protocol ended on 31 Dec 2012 and the Doha amendment to the Kyoto Protocol still has not been signed into force. At 11 April 2014, 8 out of the required 144 instruments of acceptance had been submitted to the UNFCCC.

As a result, countries have not yet received Assigned Amount Units which make transaction under the JI mechanism possible. Existing JI projects can no longer receive JI carbon credits for their verified emission reductions.

That is why the project owner decided to pursue registration of the project under the Gold Standard (GS) in order to monetize the emission reductions from the installation.

As a result the project was registered retroactively by GS with registration ID GS4328. Starting date of the GS crediting period was fixed on 01/04/2014.

In the beginning of 2020 the project was successfully transitioned to GS4GG system.

A.1.1. Eligibility of the project under Gold Standard

The project demonstrated successfully its applicability under GS during the initial certification. Nevertheless we shall demonstrate that it is applicable under the new GS4GG standard.

The applicability of the project against the requirements of GS4GG – Principles and Requirements and Community Services Activity Requirements (version 1.2)⁵ is demonstrated in the table below.

² <http://ji.unfccc.int/UserManagement/FileStorage/AY829537NMFZCB0ROTQGXDIV1LE4PS>

³ <http://ji.unfccc.int/UserManagement/FileStorage/MTDX4KFZNGO7J2SI60WEHCY83VPL5Q>

⁴ <http://ji.unfccc.int/JIITLProject/DB/XJ4JK5GTVPT7EE9KERYMNS8SIHUMYS/details>

⁵ <https://www.goldstandard.org/project-developers/standard-documents>

Applicability condition	Compliance of the condition
GS4GG-Principles and Requirements: (a) ELIGIBLE PROJECT TYPES 4.1.3 A Project type is automatically eligible for Gold Standard Certification if there are Gold Standard approved Activity Requirements and/or Impact Quantification Methodologies associated with it or it's referenced in the Gold Standard Product Requirements. These are published to the Gold Standard website and shall be followed where provided for a given Project type .	The project covers the definition of a type, given in the GS4GG document Community Services and Requirements, v.1.2 – 3.1.1 Waste Management and Handling. 3.1.1 (a) Types of Project: Eligible projects shall include physical action/implementation on the ground. Pre-identified eligible project types are identified in the Eligibility Principles and Requirements section. The project generates biogas by anaerobic treatment of municipal wastewater sludge and destroys it by combustion to deliver thermal and electric energy for local use. Hence the project is pre-identified CSA type and is automatically eligible for GS4GG certification.

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

The project participant Sofiyska voda AD is the legal owner of the project and has the legal rights for the VER credits that will be issued under Gold Standard. The project owner owns full concession on water supply and wastewater treatment for the city of Sofia, Bulgaria as stated in Section A.1.

A.2. Location of project

The project is located near the city of Sofia.

The geographic coordinates of the project site are as follows:

Table 2: Geographic coordinates of the project.

Latitude	Longitude
42°45'13.25"N	23°22'11.15"E

Fig.1: Location of the project site.



Fig.2: Location of the city of Sofia in Bulgaria



A.3. Technologies and/or measures

The project destroys methane in the biogas generated by the bioreactors and supplies Kubratovo waste-water treatment plant with thermal and electrical energy. The project falls under CDM methodologies Type III - AMS-III.H: Methane recovery in wastewater treatment (Version 19.0) and Type I – AMS-I.C, "Thermal energy production with or without electricity", Version 21.0.

"Methane Gas Capture and Electricity Production at Kubratovo Wastewater Treatment Plant, Sofia, Bulgaria" project falls in GS4GG document Community Services and Requirements, v.1.2 – 3.1.1 Waste Management and Handling.

The following overall measures have been implemented by the project in order to achieve its goals:

- Digesters for anaerobic sludge treatment

The project activity aimed the erection of a new digester system consisting of 4 digesters, 7,000 m³ each, designed, supplied and erected by PASSAVANT ROEDIGER Anlagenbau.

The anaerobic sludge treatment plant stabilises the sludge anaerobically. With this procedure the organic part of the sludge is reduced which also effects a reduction on the dry solid mass of the total sludge. This process has a positive influence on the sizing of the sludge treatment units following digestion and also on the properties of sludge regarding the ability to dewater and elimination of odour nuisance. The goal of anaerobic digestion is the stabilization of the sewage sludge in order to prevent odour nuisance and improve dewatering.

After the process of digestion the sludge is dewatered and afterwards transported to the temporary pits and then transported for land use as fertiliser.

The maximal biogas generating capacity of the digesters is 1,816 Nm³/h.

Fig.3: Digesters and raw sludge pumping house



- Raw Sludge Pumping Station

As part of the project 5 new raw sludge pumps have been installed in the existing raw sludge pumping station.

- Sludge Circulation System

For heating up the raw sludge and maintaining the process temperature at mesophilic conditions (35°C), a new combined heating and sludge circulation system is provided within the basement of the new service building. 6 volute-casing pumps for dry-well installation have been installed, whereas 4 pumps are in operation and 2 are standby for emergency cases.

Fig.4: Dewatering house



- Combined Heat and Power Plant

The CHP comprises of 3 new co-generation sets GE JMS for generation of electric and thermal energy by combusting biogas from digesters. The electric energy generated is used to cover the plant's need of electricity and replaces the energy supplied from the grid in the baseline. The thermal energy generated by the CHP is also used for internal needs and replaces the thermal energy that would have been generated by the on-site fossil fuelled hot water boilers.

The CHP plant is equipped with exhaust gasses heat recovery system and is with the following unit technical parameters:

1. Module BHKW JMS 320 GS-B.LC
2. Electrical capacity (at Power factor=1) – 1,063 kW
3. Thermal capacity (at Power factor=1) – 1,088 kW
4. Fuel – biogas

- Additional anaerobic digester

In 2020 the construction of an additional 5th digester type PASSAVANT ROEDIGER Anlagenbau has started. Starting of operation is scheduled for March 2021.

The technical characteristics of the new digester are the same as of the existing ones, namely:

Working volume	7 000 m ³
Working regime	Parallel
Type of process	Mezophilic
Working temperature	33÷37 °C
Quantity of raw sludge	420÷480 m ³ /d
Biogas generated	6 750÷10 000 Nm ³ /d
Working pressure of the system	35 mbar
Parameters of the biogas generated	CH ₄ – 63÷68 %
Flowmeters	Magnetic-induction, DN 100
Flowmeters type	AVITE combined

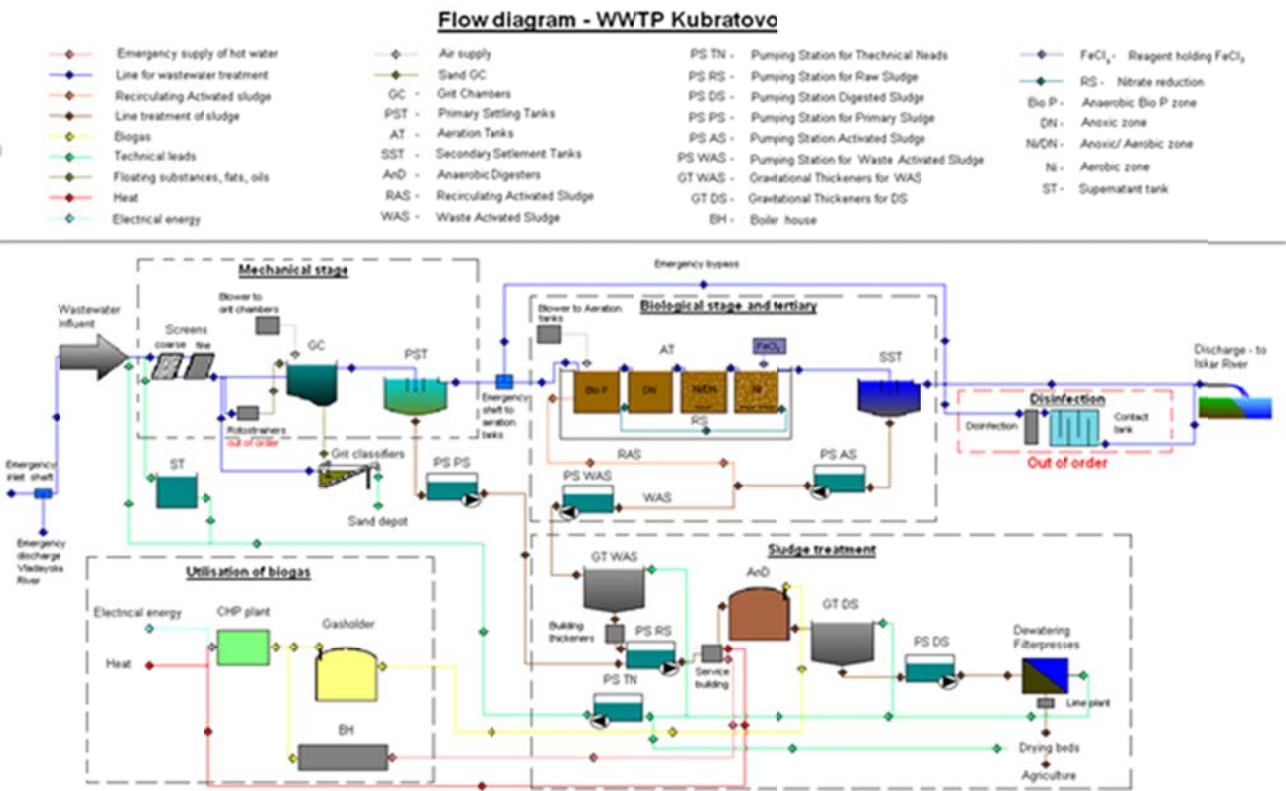
The purpose of this digester is to allow step by step stopping of the old digesters for overhauling after 2021. All 5 digesters will be operational until the end of 2020 feeding the biogas generated to the CHP plant and hot water boiler to the maximum capacity technically allowed by the existing equipment. The excess biogas will be destroyed by flaring.

Starting 2021 the existing digesters will be stopped one by one for one year period each and the system will operate with 4 digesters for the rest of the crediting period.

Preliminary time-table for overhauling of the digesters is placed below:

Equipment	Operation						
	2021	2022	2023	2024	2025	2026	2027
Digester #1							
Digester #2							
Digester #3							
Digester #4							
Digester #5							

The full up-to-date flow diagramme of the WwTP is listed below:



A.4. Scale of the project

The project can be classified for GS as “Small”, following the classification provided in CDM AMS-III.H⁶. The estimated total annual emission reductions relevant to AMS-III.H are less than 60,000 tCO_{2e}.

A.5. Funding sources of project

⁶ https://www.goldstandard.org/sites/default/files/documents/gs_gender_equality_guidelines_consultation.pdf

The project was financed and implemented by equity capital provided by the project owner Sofiyska voda AD.

Total financial expenses were as follows:

1st phase expenses	Eur	7,020,432
2nd phase investment costs	Eur	2,270,810
Design	Eur	12,026
Equipment	Eur	2,200,063
Construction works	Eur	58,721
Total project costs	Eur	9,291,242

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

For determination of the baseline, the methodology AMS-III.H: Methane recovery in wastewater treatment (Version 19.0⁷), AMS-I.C: Thermal energy production with or without electricity", {Version 21.0⁸) and AMS-I.F: "Renewable electricity generation for captive use and mini-grid" (Version 03.0)⁹, approved by the CDM Executive Board, are applied, using conservative options and data as presented in the following section.

The project has been approved as additional by VVB and GS.To demonstrate additionality during the initial certification in 2014, the official methodologies: "Guidelines on the Demonstration of Additionality of Small-scale Project Activities", Ver.09.0 (previously known as "Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities version 08") were used.

For the current re-certification process the additionality of the project will not be assessed.

In addition, the following methodological tools are applied in this PDD:

- "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", Version 03¹⁰;
- "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Version 03.0¹¹ ;
- "Emissions from solid waste disposal site", Version 08.0¹² ;
- "Project emissions from flaring", Version 03.0¹³ ;
- Tool to determine the remaining lifetime of equipment", Version 01¹⁴ ;
- "Project and leakage emissions from anaerobic digesters", Version 02.0¹⁵ ;

⁷ <https://cdm.unfccc.int/methodologies/DB/K7FDTJ4FL3432I1UKRNKLDUCUFAMBX7>

⁸ <https://cdm.unfccc.int/methodologies/DB/VJWCB0FBX89L3K73D4S1QPUP0UBXGC>

¹¹ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf/history_view

¹² https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.0.pdf/history_view

¹³ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-06-v3.0.pdf/history_view

¹⁴ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf/history_view

¹⁵ https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v2.pdf/history_view

- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”, Version 03.0.1¹⁶

The completion date of the baseline study is 31/01/2021

B.2. Applicability of methodology (ies)

The project uses approved CDM methodologies listed above in Section B.1. Their applicability is assessed for the process of re-certification of the project taking into consideration the latest available versions of the documents.

The key elements of the applied methodology AMS-III.H (version 19.0)¹⁷ which define its applicability are as follows:

2.1.Scope

2. This methodology comprises measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options:

- (a) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion.

The present project completely satisfies this condition because it is designed to treat the sludge that is contained in the wastewater generated by the Municipality of Sofia in anaerobic reactors with biogas recovery. The process is organised on the territory of Kubratovo waste-water treatment plant which is the only municipal wastewater treatment installation at the territory of Sofia Municipality. The content of the organic matter in the wastewater and the organic sludge is measured continuously by an accredited laboratory. The resulting protocols are archived by the project owner and are at disposal for inspection by DOE at any time.

Applicability conditions in the AMS-III.H. / Version 19.0	Compliance of the condition
1. The methodology is applied in general to projects for “Recovery of biogas resulting from anaerobic decay of organic matter in wastewater through introduction of an anaerobic treatment system for wastewater and/or sludge treatment with biogas recovery.	The project is aimed to replace the traditional sludge drying beds and landfill options with mesophilic digestion of all primary and secondary sludge followed by mechanical dewatering in order to reduce GHG emissions. The proposed project therefore complies with this applicability condition.
2. This methodology comprises measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options: (a) Substitution of aerobic wastewater or sludge treatment systems with anaerobic	The project activity satisfies the applicability condition (a) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion; The project is designed to:

¹⁶ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>

¹⁷ <https://cdm.unfccc.int/methodologies/DB/K7FDTJ4FL343211UKRNKLDUCUFAMBXZ>

systems with biogas recovery and combustion; (b) Introduction of anaerobic sludge treatment system with biogas recovery and combustion to a wastewater treatment plant without sludge treatment; (c) Introduction of biogas recovery and combustion to a sludge treatment system; (d) Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on-site industrial plant;¹⁸ (e) Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream; (f) Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).	• replace the traditional sludge drying beds and landfill options with mesophilic digestion of all primary and secondary sludge followed by mechanical dewatering in order to reduce GHG emissions; • effectively mitigate odour problems from the existing treatment of sludge and sludge liquors through introduction of digestion; • production of fertiliser by mechanical dewatering of the digested stabilised sludge;
3. In cases where baseline system is anaerobic lagoon the methodology is applicable if: (a) The lagoons are ponds with a depth greater than two meters, without aeration. The value for depth is obtained from engineering design documents, or through direct measurement, or by dividing the surface area by the total volume. If the lagoon filling level varies seasonally, the average of the highest and lowest levels	Not applicable. The baseline system does not apply anaerobic lagoons. The sludge in the baseline is stored in pits and after 1 year is transferred to a landfill.

¹⁸ Other technologies in Table 6.3 of Chapter 6: Wastewater Treatment and Discharge of 2006 IPCC Guidelines for National Greenhouse Gas Inventories are included.

may be taken; (b) Ambient temperature above 15°C, at least during part of the year, on a monthly average basis; (c) The minimum interval between two consecutive sludge removal events shall be 30 days.	
4. The recovered biogas from the above measures may also be utilised for the following applications instead of combustion/flaring: (a) Thermal or mechanical, electrical energy generation directly; (b) Thermal or mechanical, electrical energy generation after bottling of upgraded biogas, in this case additional guidance provided in Annex 1 shall be followed; or (c) Thermal or mechanical, electrical energy generation after upgrading and distribution, in this case additional guidance provided in Annex 1 shall be followed: (i) Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints; (ii) Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or (iii) Upgrading and transportation of biogas (e.g. by trucks) to distribution points for end users. (d) Hydrogen production; (e) Use as fuel in transportation applications after upgrading.	The project activity satisfies condition (a) Thermal or mechanical, electrical energy generation directly; The recovered biogas generated by the anaerobic digesters is directed for combined generation of thermal and electric energy in gas engines and for generation of peak thermal energy in boilers.
5. If the recovered biogas is used for project activities covered under paragraph 4 (a) of AMS-III.H, that component of the project activity can use a corresponding methodology under Type I.	The project activity satisfies condition 3(a) above. The component of the project that accounts for the activities under paragraph 3(a) of the methodology uses SSC methodology AMS- I.C.

	"Thermal energy production with or without electricity", Version 20 as stated in Section B.1
6. For project activities covered under paragraph 4 (b) of AMS-III.H, if bottles with upgraded biogas are sold outside the project boundary, the end-use of the biogas shall be ensured via a contract between the bottled biogas vendor and the end-user. No emission reductions may be claimed from the displacement of fuels from the end use of bottled biogas in such situations. If however the end use of the bottled biogas is included in the project boundary and is monitored during the crediting period CO ₂ emissions avoided by the displacement of fossil fuel can be claimed under the corresponding Type I methodology, e.g. AMS-I.C "Thermal energy production with or without electricity".	Not applicable. The project activity satisfies condition 3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal engines in co-generation units and for generation of peak thermal energy in boilers.
7. For project activities covered under paragraph 4 (c) (i) of AMS-III.H, emission reductions from the displacement of the use of natural gas are eligible under this methodology, provided the geographical extent of the natural gas distribution grid is within the host country boundaries.	Not applicable. The project activity satisfies condition 3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal energy in co-generation units and for generation of peak thermal energy in boilers.
8. For project activities covered under paragraph 4 (c) (ii) of AMS-III.H, emission reductions for the displacement of the use of fuels can be claimed following the provision in the corresponding Type I methodology, e.g. AMS-I.C.	Not applicable. The project activity satisfies condition 3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal engines in co-generation units and for generation of peak thermal energy in boilers.
9. In particular, for the case of 4 (b) and (c) (iii) of AMS-III.H, the physical leakage during storage and transportation of upgraded biogas, as well as the emissions from fossil fuel consumed by vehicles for transporting biogas shall be considered. Relevant procedures in paragraph 11 of Annex 1 of AMS-III.H "Methane recovery in wastewater treatment" shall be followed in this regard.	Not applicable. The project activity satisfies condition 3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal engines in co-generation units and for generation of peak thermal energy in boilers.
10. For project activities covered under paragraph 4 (b) and (c) of AMS-	Not applicable. The project activity satisfies condition

III.H, this methodology is applicable if the upgraded methane content of the biogas is in accordance with relevant national regulations (where these exist) or, in the absence of national regulations, a minimum of 96% (by volume).	3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal engines in co-generation units and for generation of peak thermal energy in boilers.
11.If the recovered biogas is utilized for the production of hydrogen (project activities covered under paragraph 4 (d)) of AMS-III.H, that component of the project activity shall use the corresponding methodology AMS-III.O "Hydrogen production using methane extracted from biogas".	Not applicable. The project activity satisfies condition 3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal engines in co-generation units and for generation of peak thermal energy in boilers.
12.If the recovered biogas is used for project activities covered under paragraph 4 (e) of AMS-III.H, that component of the project activity shall use corresponding methodology AMS-III.AQ "Introduction of Bio-CNG in road transportation".	Not applicable. The project activity satisfies condition 3(a) as mentioned above. The biogas generated will be used for cogeneration of electric and thermal engines in co-generation units and for generation of peak thermal energy in boilers.
13.New facilities (Greenfield projects) and project activities involving a change of equipment resulting in a capacity addition of the wastewater or sludge treatment system compared to the designed capacity of the baseline treatment system are only eligible to apply this methodology if they comply with the relevant requirements in the "General guidelines to SSC CDM methodologies". In addition the requirements for demonstrating the remaining lifetime of the equipment replaced, as described in the general guidelines shall be followed.	The project activity is an existing facility and is implemented in an existing plant for treatment of municipal wastewaters and affects the sludge treatment system only. The project replaces the baseline sludge drying beds and landfill options with mesophilic digestion of all primary and secondary sludge followed by mechanical dewatering in order to reduce GHG emissions. The waste-water treatment system is not affected hence the capacity of the primary waste-water treatment system remains the same as in the baseline and there is no capacity addition.
14.The location of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the PDD.	The exact location of the Wastewater treatment plant is given in Section A.2. The source of the wastewater is the complete Sofia Municipality which is evident from the Concession Agreement ¹⁹ between Sofiyska voda

¹⁹http://www.sofiyskavoda.bg/SVDocuments/Dogovor_za_Koncesia.pdf

	AD (owner of the Wastewater Treatment Plant in Kubratovo) and the Municipality of Sofia.
15. Measures are limited to those that result in aggregate emissions reductions of less than or equal to 60 kt CO ₂ equivalent annually from all Type III components of the project activity.	The emission reductions from the Type III components of the project activity are less than 60 kt CO ₂ as demonstrated further in the PDD.

For project activity related to the way of destruction of the biogas used in this project, methodology AMS-I.C (version 21.0): Thermal energy production with or without electricity²⁰ is applied, as recommended by AMS-III.H.

Applicability conditions in the AMS-I.C. / Version 21.0	Compliance of the condition
1. This methodology comprises renewable energy technologies that supply users ²¹ with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	The project activity supplies the waste-water treatment plant with electric energy that would be imported in the baseline from the National grid and with thermal energy that would be generated by local boilers using fossil fuel. The project utilises as fuel the bio-gas generated in anaerobic digesters by treatment of sludge which is considered a renewable energy source.
2. Biomass-based cogeneration and trigeneration systems are included in this category.	The proposed project is a biomass-based co-generation system because it generates thermal and electric energy by the use of 3 new co-generation sets GE JMS 320 GS-B.LC with 1,063 kW electric capacity each and 1,088 kW thermal capacity.
3. Emission reductions from a biomass cogeneration system can accrue from one of the following activities: (a) Electricity supply to a grid; (b) Electricity and/or thermal energy (steam or heat) production for on-site consumption or for consumption by other facilities; (c) Combination of (a) and (b).	The proposed project is a biomass-based co-generation system because it generates thermal and electric energy. The electric energy in the baseline has been imported from the grid. The thermal energy has been generated by on-site fossil-fuel boilers. In this particular project the activity is under (c).

²⁰ <https://cdm.unfccc.int/methodologies/DB/VJWCB0FBX89L3K73D4S1QPUP0UBXGC>

²¹ These are residential, industrial or commercial facilities.

4. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	Not applicable. The proposed project is an existing facility applying for GS recertification for a new crediting period facility.
5. In the case of new facilities (Greenfield projects) and project activities involving capacity additions the relevant requirements related to determination of baseline scenario provided in the "General guidelines for SSC CDM methodologies" for Type-II and Type-III Greenfield/capacity expansion project activities also apply.	The present part of the project activity falls under Type I - "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories – I.C. Thermal energy production with or without electricity".
6. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal (see paragraph 9 for the applicable limits for cogeneration and trigeneration project activities).	The project activity utilises 3 existing co-generation sets GE JMS 320 GS-B.LC with 1.063 kW electric capacity each (total 3.189 kWe) and 1,088 kW thermal capacity (total 3.264 kWth).
7. For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel, shall not exceed 45 MW thermal (see paragraph 9 for the applicable limits for cogeneration project activities).	Not applicable. The proposed project is not a co-fired system. The co-generators use gas-fuelled engines GE JMS 320. Light oil is used as fuel only in emergency cases when biogas is not generated. The eventual use of light oil for thermal energy generation in the back-up (peak) boilers is monitored on yearly basis and accounted for in the calculation of the project emissions.
8. The following capacity limits apply for biomass cogeneration and trigeneration units: (a) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e.	The total installed energy generation capacity (thermal and electrical) of the project activity is 6.453 kW which is far below the limit of 45 MW.

for renewable energy project activities, the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant); (b) If the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e. no emission reductions accrue from the electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal; (c) If the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e. no emission reductions accrue from the thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.	
9. The capacity limits specified in paragraphs 7 to 9 above apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 7 to 9, and should be physically distinct from the existing units.	The proposed project activity is an existing built to replace the energy supplied in the baseline by the grid and by the on-site fossil fuelled boilers. The installed capacity of the biomass boiler in the project is 6.453 MW (thermal+electric) as specified in Section A above and satisfies the capacity limits set by the methodology.
10. If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in the emissions reduction calculation.	Not applicable. The project uses biogas generated in anaerobic digesters that treat the sludge from the municipal wastewater.
11. Where the project participant is not the producer of the processed solid biomass fuel, the project participant and the producer are	Not applicable. The project activity does not use solid biomass.

bound by a contract that shall enable the project participant to monitor the source of the renewable biomass to account for any emissions associated with solid biomass fuel production. Such a contract shall also ensure that there is no double-counting of emission reductions.	
12.If electricity and/or steam/heat produced by the project activity is delivered to a third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into that ensures there is no double-counting of emission reductions.	The energy generated by the project activity is used by the project owner to supply its own waste-water treatment plant with thermal and electric energy. The excess electric energy is delivered to the National grid. In order to avoid any double-counting an adequate quantity of AAUs corresponding to the amount of emission reductions generated by the project by substitution of electric energy generated by the grid will be retired from Bulgarian National GHG Registry.
13.If the project activity recovers and utilizes biogas for power/heat production and applies this methodology on a stand-alone basis i.e. without using a Type III component of a SSC methodology, any incremental emissions occurring due to the implementation of the project activity (e.g. physical leakage of the anaerobic digester, emissions due to inefficiency of the flaring), shall be taken into account either as project or leakage emissions.	Not applicable. The project activity uses AMS-III.H methodology in order to account for baseline and project emissions due to the generation of biogas.
14.If project equipment contains refrigerants, then the refrigerant used in the project case shall have no ozone depleting potential (ODP).	Not applicable. The project activity is not a trigeneration installation and does not contain refrigerants.
15.Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided: (a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or (b) If charcoal is produced in kilns	Not applicable. The project activity does not use charcoal but directly combusts biogas.

not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g. source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature.	
16. In cases where the project activity utilizes biomass, sourced from dedicated plantations, applicability conditions prescribed in the tool "Project emissions from cultivation of biomass" shall apply.	Not applicable. The project activity utilises biogas.

The applicability of methodology AMS-I.F is assessed in the table below:

Applicability conditions in the AMS-I. / Version 03.0	Compliance of the condition
1. 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 plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The plant was a new one installed in a green field, Hence the methodology is applicable as per (a).
2. 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; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power	Not applicable. The plant combusts biogas to generate electric and thermal energy.

density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m ² ; (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/m ² .	
3.This methodology is applicable for project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition, (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement of (an) existing plant(s).	Condition (a) is applicable for this project, hence AMS-I.F is applicable.
4.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 than 15 MW and should be physically distinct from the existing units.	Not applicable.The project activity involves the installation of a new plant.
5.In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable.The project activity involves the installation of a new plant.
6.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.	Not applicable. The new units have no non-renewable components.
7.Combined heat and power (co-generation) systems are not eligible under this category.	Not applicable. AMS-I.C, (version 21.0):Thermal energy production with or without electricity explicitly refers to AMS-I.F for the definition of the grid emission factor. This methodology is used for that purpose only.
8.If electricity and/or steam/heat produced by the project activity is delivered to a third party, i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered that ensures that	Not applicable. The plant delivers electric and thermal energy for internal consumption.

there is no double counting of emission reductions.	
9. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply	Not applicable. The plant uses biogas as a fuel for generation of energy.

The applicability of AMS-I.F: "Renewable electricity generation for captive use and mini-grid" (Version 03.0) for the calculation of the grid emission factor is further discussed and justified in Section B.6.1 **Determination of emission factor for electricity.**

B.3. Project boundary

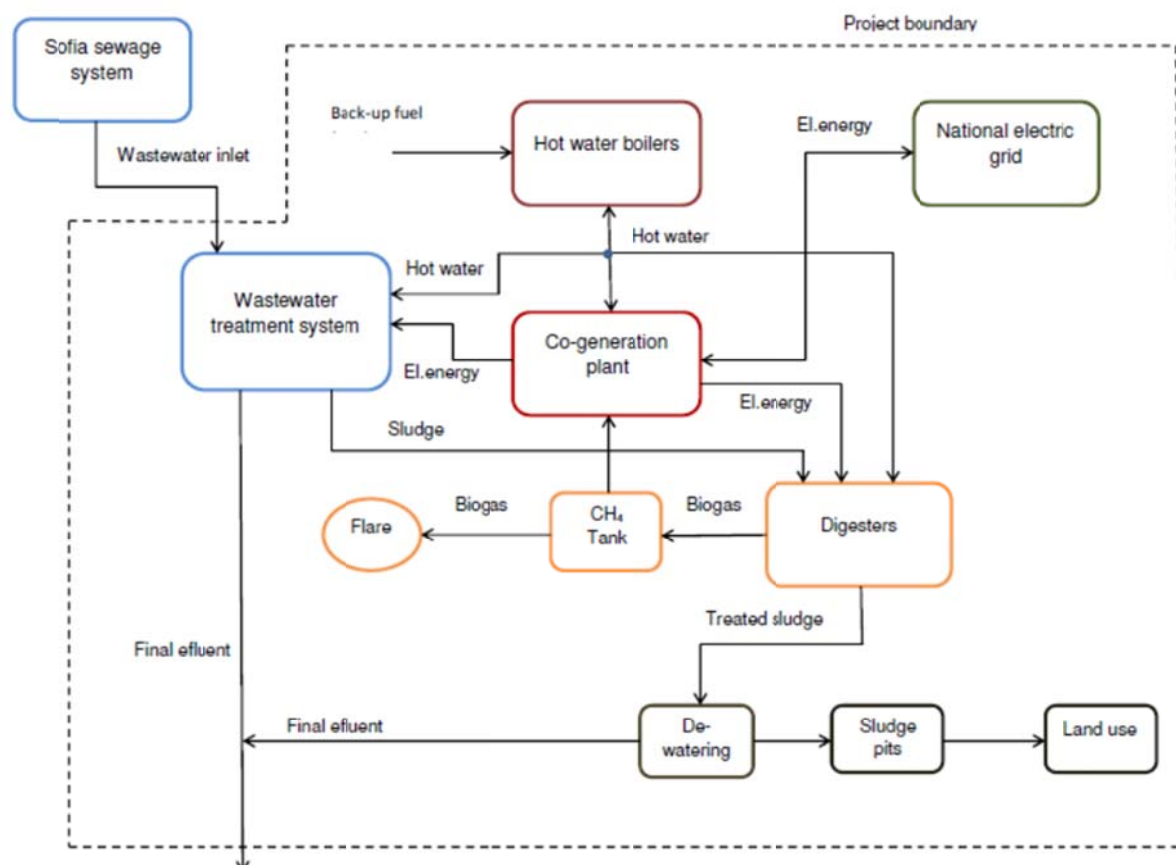
The project boundary is the physical, geographical site where the wastewater and sludge treatment takes place, in the baseline and project situations. It covers all facilities affected by the project activity including sites where processing, transportation and application or disposal of waste products as well as biogas takes place.

The project activity affects only the sludge-treatment system of the plant. The wastewater system is not affected by the project activity and operates in the project scenario under the same operational conditions as in the baseline scenario (e.g. wastewater inflow and COD content, temperature, retention time, etc.) It is described in the PDD, but the emissions from that section are not accounted for in the baseline and project emission calculations (since the same emissions would occur in both baseline and project scenarios). The assessment and identification of the systems affected by the project activity will be undertaken ex-ante, and the PDD justifies the exclusion of sections or components of the system.

The greenhouse gasses and emission sources are defined for the project activity and the baseline scenario.

As a result, the project boundary for "Methane Gas Capture and Electricity Production at Kubratovo Wastewater Treatment Plant, Sofia, Bulgaria" is as demonstrated in the figure below:

Fig.8: Project boundary



As per AMS-I.C which is used to account for the thermal and electric energy generated by the project the project boundary encompasses:

- All plants generating electricity and/or thermal energy located at the project site, whether fired with biomass, fossil fuels or a combination of both;
- All power plants connected physically to the electricity system (grid) that the project plant is connected to;
- Industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment affected by the project activity;
- The processing plant of biomass residues, for project activities using solid biomass fuel (e.g. briquette), unless all associated emissions are accounted for as leakage emissions or are part of an independently registered CDM project;
- The transportation itineraries, if the biomass is transported over distances greater than 200 kilometres, unless all associated emissions are accounted for as leakage emissions;
- The site of the anaerobic digester in the case of project activity that recovers and utilizes biogas for producing electricity and/or thermal energy and applies this methodology on a standalone basis, i.e. without using a Type III component of a SSC methodology.

Paragraphs (d) and (e) are not relevant to the project activity.

Based on the project boundary and operation of the project activity, the greenhouse gases and emission sources included in or excluded from the project boundary are shown in the table below:

Table 3: Emissions sources included in or excluded from the project boundary

Source	GHG Includes	Included?	Justification/Explanation
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Baseline scenario	Sludge treatment process	CO ₂	No	CO ₂ emissions from the decomposition of organic sludge are not accounted for.
		CH ₄	Yes	Major source of emissions in the baseline from sludge pits (decay of organic matter in anaerobic conditions)
		N ₂ O	No	Minor emission source and excluded by the methodology.
		...		
	Electricity consumption/ Electricity generation	CO ₂	Yes	AMS.I.C component: The project activity involves the installation of a new grid-connected renewable power unit, whereas the baseline scenario is the electricity delivered to / consumed from the grid that, in the absence of the project, would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		...		
	Thermal energy generation	CO ₂	Yes	AMS.I.C component: The thermal energy would have been generated by using light oil in the thermal boiler in the baseline scenario in the absence of a cogeneration plant and using biogas as a fuel.
		CH ₄	No	Excluded for simplification. This is conservative.
		N ₂ O	No	Excluded for simplification. This is conservative.
		...		
Project scenario	Sludge treatment process	CO ₂	No	Minor emission source and excluded by the methodology.
		CH ₄	Yes	Main source of emissions. The treatment of wastewater under the project activity may cause different emissions: (i) Fugitive emissions due to inefficiencies in capture systems (ii) Methane emissions from incomplete flaring
		N ₂ O	No	Minor emission source and excluded by the methodology.
		...		
	On-site electricity consumption	CO ₂	No	The biogas reactor uses electricity generated from the biogas fired gas engines and this is excluded.
		CH ₄	No	Minor emission source and excluded by the methodology.

On-site fossil fuel consumption	N ₂ O	No	Minor emission source and excluded by the methodology.
	...		
	CO ₂	Yes	Fossil fuel used in the dual-fuel boiler for thermal energy generation shall be monitored and considered in emission reduction calculations.
	CH ₄	No	Minor emission source and excluded by the methodology.
	N ₂ O	No	Minor emission source and excluded by the methodology.

B.4. Establishment and description of baseline scenario

According to the PDD validated by RINA (VR No 2015-BG-MD-02) and registered by GS in 2016 the baseline of the project in its type III component is described as follows:

The raw sludge is pumped for chemical conditioning followed by belt pressing with the resulting sludge cake being transported to the on-site drying beds and left for a period of 15 to 18 months to dry. The dry sludge cake is then transported some 18 km. to the landfill site, Kremikovtzi.

The main source of baseline CH₄ emissions is the sludge deposited in the sludge drying beds and the landfill to decompose in anaerobic conditions.

The baseline of the type I component of the initial project has also been described as "business as usual", i.e. generation of thermal energy in the on-site boilers using light oil as a fuel and import of electric energy from the grid. The project activity displaces thermal energy from the boilers and electric energy from the grid by using the biogas for combustion in co-generating modules.

The baselines both of the type I and type III components have been validated positively by RINA with Validation report .

The project applies for a renewal of the crediting period under the requirements of The Gold Standard Foundation so the Methodological Tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period", Version 03.0.1²² will be applied to demonstrate that the baseline of the project is still valid.

The Tool consists of two steps:

Step 1: The "Procedures for the renewal of the crediting period of a registered CDM project activity" approved by the CDM Executive Board require assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline. The validity of the current baseline is assessed using the following Sub-steps:

²² <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-11-v3.0.1.pdf>

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

As a member of the European Union Bulgaria is a subject to all EU legislation and has changed its local laws and regulations correspondingly. The major regulation adopted in Bulgaria in respect to the EU requirements is the "Regulation on the way of recovery of sludge from wastewater treatment through its use in agriculture" in force from 08.04.2011²³.

The Regulation transposes into Bulgarian legislation the requirement of Directive 86/278/EU all sludge from wastewater treatment to be treated prior to applying for agricultural use. The Regulation, as well as the Directive does not specify the type of treatment.

The way of treatment of the waste in Bulgaria is defined by the Law for Management of the Waste but this law is not applicable for sludge from domestic waste-water treatment plants. According to paragraph 43 (6) of the law the management of the sludge is defined by a special regulation issued by the Council of Ministers. Such Regulation however is not available still. In this respect the relevant European Directives could be regarded in order to assess the EU policy in the treatment of waste-water and sludge.

Another European Directive relevant to the treatment of wastewater is Directive 91/271²⁴ which sets the requirements for urban wastewater treatment. The latest available Report issued by the Bulgarian Ministry of Environment and Water for 2012 analysis the implementation of that Directive in Bulgaria. According to that Report Bulgaria continues the effort to comply with the requirements of the Directive while the quantities and types of final sludge utilization will be as given in the following table:

Table 4: Final sludge utilization in Bulgaria²⁵ (report on Article 16 – 2013, p.39, Table 13)

Utilization/ Neutralization year	Utilization of sludge		Neutralization of sludge		
	In agriculture	Other	At landfill	Burning	Other
	Tons dry matter	Tons dry matter	Tons dry matter	Tons dry matter	Tons dry matter
2012 (reported)	21,241	13,880	6,632	0	17,992
2014 (estimated)	54,148	0	43,316	10,830	0

²³

http://www.moew.government.bg/files/file/Water/Mineralnivodi/Zakonodatelstvo/NAREDBA_za_reda_i_nachina_za_opolzotvoryavane_na_utaiki_ot_prechistvaneto_na_otpadachni_vodi_chrez_upotrebata_im_v_zemedeliето.rtf

²⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31991L0271>

²⁵ <https://www.moew.government.bg/bg/vodi/opazvane-na-vodite-ot-zamursyavane/kanalizacionni-sistemi/dokladi/>

2015 (estimated)	62,488	0	49,984	12,498	0
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The table demonstrates that depositing of sludge at landfills will still be a legal option in the future.

Before the implementation of the project the de-watered sludge had been stabilised by depositing in sludge drying beds (pits) for 15 to 18 months and then transported to the nearby landfill at Kremikovtsi village in which the bio-active components decompose months in anaerobic conditions emitting CH₄ in the atmosphere.

Based on the above information it can be concluded that though rather low tech of sludge treatment existed before the implementation of the project it complied with all EU Directives and Bulgarian legislation and there were no legal barriers for the continuation of the baseline scenario in the future crediting period. Hence the original baseline validated prior the registration of the project as JI project is still valid and will be valid for the next crediting period.

The baseline of the type I component of the project activity also complies with the current laws and regulations in the area of energy generation. The main law that regulates the energy generation in Bulgaria is the Energy Act²⁶, in force from 09.12.2003. The Act does not prohibit the use of fossil fuels (light fuel or natural gas in particular) for the generation of thermal and electric energy. From the other hand the National electric grid of Bulgaria is highly developed and with large capacity so there is no problem whatsoever to supply the wastewater treatment plant with electric energy for indefinite future. The Act does not oblige the investors to implement co-generating units and that is left on project owners to decide based on the economic effectiveness of the installations.

The conclusion is that the baseline of the type I component of the project activity complies and will continue to comply with the laws and regulations in the sector for the next crediting period.

Step 1.2: Assess the impact of circumstances.

The present circumstances do not influence the calculation of the current baseline emissions from anaerobic decomposition of the sludge compared to the initial baseline emissions. The emissions from decomposition of the final stabilized sludge in the landfill have not been taken into account in the calculation of the baseline emissions which is conservative.

The quantity of sludge treated depends on the quantity of wastewater generated by the city of Sofia and the content of biological degradable substances and do not depend much on circumstances.

The quantities of sludge have been monitored and recorded constantly on monthly and yearly bases.

²⁶http://dker.bg/files/DOWNLOAD/energy_act_en.pdf

The yearly quantities of raw sludge are demonstrated in the table below. The data are taken from the periodical Monitoring reports verified so far.

Table 5: Yearly quantities of raw sludge generated in Kubratovo WwTP

Year	2015	2016	2017	2018	2019	2020
Quantity of sludge, t	648,860	673,720	703,620	731,187	642,008	714,487

Source: Monitoring reports for those periods

It can be seen that the quantity of sludge generated is more or less steady throughout the years.

As the quantity of electric and thermal energy consumed by the plant depends mainly on the quantity of wastewater and sludge treated it can be concluded that the emissions related to the displacement of thermal and electric energy generated using fossil fuel will not vary considerably in the future and during the new crediting period respectively.

It can be concluded that the conditions used to determine the baseline emissions in the previous crediting period are still valid.

As the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment theTool requires an assessment of the changes in market conditions.

The main income for covering the cost of Sofia's wastewater treatment comes from taxes for the service paid by the citizens and determined by the State Energy and Water Regulatory Commission (SEWRC)²⁷. The taxes do not depend on the market hence it is not possible to determine correctly the market influence on the operation of the wastewater treatment plant. So far the prices of services connected to the wastewater treatment are artificially kept low which strongly hinders the investment programme of the concessioner Sofiyska voda.

The same circumstances are valid for the price of electric energy. That is also regulated and determined by SEWRC. There is no indication that the electricity market in Bulgaria will go free in the near future which could eventually lead to decrease or at least determine energy prices on market principles.

Sub-step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

The project activity uses the same auxiliary equipment as in the baseline. There is no change in the process of sludge pumping and de-watering. The same drying beds that have been used in the baseline scenario for stabilizing of the sludge are used for storage of the final sludge after treatment in bioreactors. All that

²⁷<http://dker.bg/pagebg.php?P=401&SP=405>

equipment is auxiliary and do not require substantial investment apart from routine maintenance.

The on-site boilers have been put in operation in 1980. According to the “Tool to determine the remaining lifetime of equipment”, Version 1²⁸, the default lifetime of the boilers is 25 years which means that the on-site boilers had to be refurbished or replaced in the year 2005. In the absence of the project activity the project proponent would have to make an investment for the refurbishment or replacement of the boilers before the end of the crediting period which means that the baseline for the generation of thermal energy have to be updated for the new crediting period correspondingly.

From the other hand the only change of technology or fuel that could affect the baseline generation of thermal energy is the fuel change from light fuel oil to natural gas. That option is quite possible due to the fact that the natural gas supply system in the region of Sofia is well developed and it would present no problem to organize the supply of the Wastewater treatment plant with natural gas. In fact the boilers have been refurbished in 2009 during the implementation of the project activity in order to be used for covering of peak loads and back-up. New dual-fuel burners have been installed for combustion of biogas and light oil.

The main equipment and source of greenhouse gasses (CH₄) are the drying beds and they do not require any investment for maintenance or would ever need replacement. There is no problem whatsoever of the baseline scenario to continue operating without any investment until the end of the new crediting period eventually in 2028.

Step 1.4: Assessment of the validity of the data and parameters

The original baseline has been validated in 2016 and the parameters not monitored had been fixed based on the data available at that time and need to be updated.

The emission factors and values for the calculation of the baseline emissions have been determined for the whole crediting period and not monitored and also need to be updated.

The initial baseline for the displacement of electricity used the grid emission factor of the Bulgarian grid developed by the National electric Company which was valid until the end of 2012.

In general the baseline of the type I and type III components needs to be updated in respect of data and parameters validity. A new grid emission factor of the Bulgarian grid will be defined for the new crediting period.

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

Step 2.1: Update the current baseline

As demonstrated in the assessment above the baseline of the type III component of the project remains the same and does not need to be updated. The baseline emissions are due to decomposition of the final sludge stored in the drying beds and emissions of CH₄ in the atmosphere.

²⁸http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf/history_view

The methodology for calculation of the emission reductions from the project activity is CDM SSC AMS-III.H, version 19.0. According to paragraph 5 of that methodology: "If the recovered biogas is used for project activities covered under paragraph 4 (a), that component of the project activity can use a corresponding methodology under Type I.

The biogas generated by the project is used for thermal and electrical energy generation directly which falls exactly under the definition in paragraph 4(a) so the baseline of the type I components will be updated following the requirements of the CDM SSC Methodology AMS-I.C, version 21.0. This methodology will also be used for the calculation of the CO₂ emissions due to the displacement of fossil fuel with renewable fuel (biogas) and for the displacement of electricity from the grid.

According to paragraph 29 of the methodology AMS-I.C applied:

Project activities producing both electricity and thermal energy shall use one of the following baseline scenarios:

- (a) Electricity is imported from a grid and thermal energy is produced using fossil fuel;
- (b) Electricity is produced in an on-site captive power plant using fossil fuel (with a possibility of export to the grid) and thermal energy is produced using fossil fuel;
- (c) A combination of (a) and (b);
- (d) Electricity and thermal energy are produced in a cogeneration or trigeneration unit using fossil fuel (with a possibility of export of electricity to a grid/other facilities and/or thermal energy to other facilities);
- (e) Electricity is imported from a grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export to the grid); thermal energy is produced using biomass;
- (f) Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to a grid) and/or imported from a grid; thermal energy is produced using fossil fuel;
- (g) Electricity and thermal energy are produced in a biomass fired cogeneration or trigeneration unit (without a possibility of export of electricity either to a grid or to other facilities and without a possibility of export of thermal energy to other facilities);
- (h) Electricity and/or thermal energy produced in a co-fired system;
- (i) Electricity is imported from a grid and/or produced in a biomass fired cogeneration or trigeneration unit (without a possibility of export of electricity either to the grid or to other facilities); thermal energy is produced in a biomass fired cogeneration or trigeneration unit and/or a biomass fired boiler (without a possibility of export of thermal energy to other facilities);
- (j) Electricity is imported from a grid and/or produced in an on-site captive power plant using fossil fuel and thermal energy is produced using electricity.

Prior to the implementation of the project activity the thermal energy has been generated by on-site fossil fuel (natural gas for the new crediting period) boilers and the electric energy has been imported from the National grid.

That means that the type I of the project activity falls under paragraph 29(a) of the methodology.

As discussed in Step 1.3 the conclusion of this assessment is that in the baseline the on-site boilers would be replaced/refurbished before the start of the new crediting period. In order to follow a conservative approach the emission reductions due to the generation of thermal energy by the on-site boilers will not be taken into account but the combustion of biogas and fossil fuel will be monitored and recorded.

The PDD assumes that the baseline fuel for the new crediting period will be natural gas.

Step 2.2: Update the data and parameters.

All data and parameters not monitored will be revised below and up-dated following the requirements of the latest version of the CDM SSC methodology AMS-III.H, version 19.0 and AMS-I.C, version 21.0.

According to the methodology AMS-III.H, ver.19.0 which is used by the project, wastewater and treatment systems equipped with a biogas recovery facility in the baseline shall be excluded from the baseline emission calculations. Prior to the implementation of the project activity Kubratovo Wastewater Treatment Plant did not possess any systems for generation and recovery of biogas. The sludge resulting from the wastewater treatment system has been dewatered and deposited in special sludge drying beds to stabilise for 15 to 18 months period and after that has been deposited to a landfill.

The project activity is designed to replace the traditional sludge drying beds and landfill options with mesophilic digestion of all primary and secondary sludge followed by mechanical dewatering, in order to reduce GHG emissions that have been generated by the anaerobic decomposition of the organic components of the sludge in the drying beds. The biogas produced and recovered by the project activity is used to generate thermal and electric energy and to replace the electricity imported from the grid and the combustion of fossil fuel (light oil) to generate thermal energy. The project activity affects only the treatment of the sludge while the wastewater treatment system remains the same as in the baseline.

According to paragraph 2 of methodology AMS-III.H, version 19.0:

1. This methodology comprises measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options:

- (a) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion;
- (b) Introduction of anaerobic sludge treatment system with biogas recovery and combustion to a wastewater treatment plant without sludge treatment;
- (c) Introduction of biogas recovery and combustion to a sludge treatment system;
- (d) Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on site industrial plant;

- (e) Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream;
- (f) Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).

The project activity is related to the aerobic sludge treatment system which existed in the plant prior to the implementation of the project, hence it falls under the definition of paragraph 2 (a): Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion.

Also the project activity is classified as per the definition of paragraph 4(a) of the methodology:

The recovered biogas from the above measures may also be utilised for the following applications instead of combustion/flaring: Thermal or mechanical, electrical energy generation directly

According to paragraph 25:

Baseline emissions for the systems affected by the project activity may consist of:

- (a) Emissions on account of electricity or fossil fuel used ($BE_{power,y}$);
- (b) Methane emissions from baseline wastewater treatment systems ($BE_{ww,treatment,y}$);
- (c) Methane emissions from baseline sludge treatment systems ($BE_{s,treatment,y}$);
- (d) Methane emissions on account of inefficiencies in the baseline wastewater treatment systems and presence of degradable organic carbon in the treated wastewater discharged into river/lake/sea ($BE_{ww,discharge,y}$);
- (e) Methane emissions from the decay of the final sludge generated by the baseline treatment systems ($BE_{s,final,y}$).

$$BE_y = \{BE_{power,y} + BE_{ww,treatment,y} + BE_{s,treatment,y} + BE_{ww,discharge,y} + BE_{s,final,y}\} \quad (1)$$

Where:

BE_y Baseline emissions in year y (tCO₂e)

$BE_{power,y}$ Baseline emissions from electricity or fuel consumption in year y (tCO₂e)

Will be calculated following the requirements of AMS-I.C, version 21.0.

$BE_{ww,treatment,y}$ Baseline emissions of the wastewater treatment systems affected by the project activity in year y (tCO₂e)

These emissions will not be taken into account because the project activity does not concern the wastewater treatment system.

$BE_{s,treatment,y}$ Baseline emissions of the sludge treatment systems affected by the

project activity in year y (tCO_2e)

These emissions will not be taken into account because the project activity does not concern this part of the sludge treatment system

$BE_{ww,discharge,y}$ Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake in year y (tCO_2e). The value of this term is zero for the case 2 (b)

These source of baseline emissions will not be accounted for simplicity and conservativeness

$BE_{s,final,y}$ Baseline methane emissions from anaerobic decay of the final sludge produced in year y (tCO_2e). This emission source is the main in the baseline. The dewatered sludge is stored for 15 to 18 months in drying beds and then transported to a landfill without biogas recovery. The emissions from the landfill are not taken into account for simplicity and conservativeness.

Applied to the baseline defined, formula (1) is reduced to the following:

$$BE_y = BE_{power,y} + BE_{s,treatment,y} \quad (2)$$

Where:

BE_y Baseline emissions in year y (tCO_2e)

$BE_{power,y}$ Baseline emissions from electricity or fuel consumption in year y (tCO_2e)

$BE_{s,treatment,y}$ Baseline methane emissions from anaerobic decay of the treated sludge produced in year y (tCO_2e)

B.5. Demonstration of additionality

The additionality of the project was demonstrated in the PDD presented for the first certification by GS in 2016 and was positively validated by VVB RINA with Validation report No 2015-BG-MD-02.

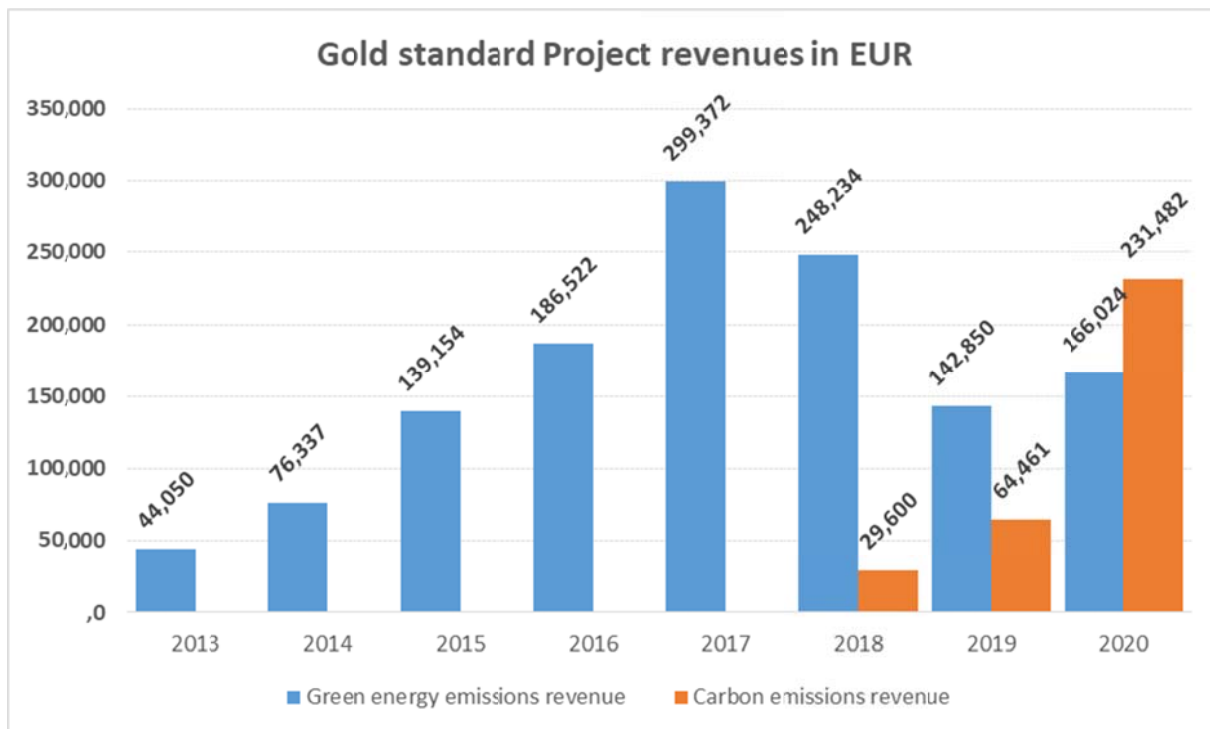
B.5.1. Prior Consideration

N/A The project applies for re-certification for next crediting period

B.5.2. Ongoing Financial Need

As a result of the project additional revenues from selling GS VERs amounting to EUR 325,543 were generated for the period from 2018 to 2020. The total revenue from selling of green energy and VERs for the period 2013-2020 amounts to EUR 1,939,250.

The chart below represents the annual revenues generated from sale of green energy and VER for the period 2013-2020:



Investment projects for green energy implemented in WWTP Kubratovo 2013-2020	EUR
Overhaul of co-generators	1 601 497
Gasholder	298 743
Digestor/Methane tank-new	2 564 087
Total	4 464 326

This additional income from the project boosted the internal projects and company investments for improvement of the processes in WWTP Kubratovo aiming highest level and quality of municipal waste-water treatment for the capital of Bulgaria.

Eventual future revenue from selling of VERs will considerably back Sofiyska voda AD re-novation program to increase plant capacity and quality of effluent water.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Sustainable Development Goals Targeted	Most relevant SDG Target	SDG Impact Indicator (Proposed or SDG Indicator)
13 Climate Action	13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all	GHG emission reductions generated

6 Clean water and sanitation	6.3.1 Proportion of Safely Treated Domestic Wastewater Flows	1.COD (Chemical Oxygen Demand) of the inlet wastewater;
	Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	1a.BOD5 (Biochemical Oxygen Demand for 5 days) of the inlet wastewater; 2.COD (Chemical Oxygen Demand) of the effluent water; 2a.BOD5 (Biochemical Oxygen Demand for 5 days) of the effluent water;
		Quantity of sludge treated
11 Sustainable cities and communities	Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Emissions of NO _x in the co-generator units stack exhaust gas.
		Quantity of waste oil disposed safely.

B.6.1. Explanation of methodological choices/approaches for estimating the SDG Impact

SDG 13: Climate action

Baseline emissions

The project activity applies for re-certification for a new crediting period under the requirements of GS4GG and was certified for GS starting 01/04/2014. Substantial and detailed information and data for the operation of the project have been recorded for that time and is available at the plant. For the calculation of the baseline emissions for the new crediting period the procedure described in paragraph 36 of AMS-III.H, ver. 19.0 will be used.

According that paragraph "In determining baseline emissions using equation 1, historical records of at least one year prior to the project implementation shall be used". This shall include for example the COD removal efficiency of the wastewater treatment systems, the amount of dry matter in sludge, power and electricity consumption per m³ of wastewater treated, the amount of final sludge generated per tonne of COD removed, and all other parameters required for determination of baseline emissions.

The new crediting period is expected to start from 01/04/2021 so the data collected for the year 2020 will be used for the calculation of the baseline emissions.

Default values of parameters from AMS-III.H and other applicable tools will also be used for that purpose.

The type I component of the project will be accounted as stated above according to the requirements of AMS-I.C, version 21.0. Paragraph 26 states that for project activities implemented in existing facilities, baseline calculations shall be based on operational data on energy use (e.g. electricity, fossil fuel) and plant output (e.g. thermal and/or electrical energy) using:

- (a) Most recent three years operational data immediately prior to the start date of the project activity in case of existing facilities which has more than three years of operation history;
- (b) A minimum of most recent one year data in case of existing facilities which has more than three years of operation history but do not have three years operational data; or
- (c) A performance test/measurement campaign carried out prior to the implementation of the project activity in case of existing facilities which has more than three years of operation history but do not have operational data/information such as efficiency, energy consumption and output or the available data is not reliable due to various factors such as the use of imprecise or non-calibrated measuring equipment. The project proponent may follow the relevant provisions from the "Tool to determine baseline efficiency of thermal and electricity systems".

Option (a) will be used to calculate ex-ante the baseline emissions of the project due to thermal and electric energy from fossil fuel used in the plant displacement.

Methane emissions component

According to AMS-III.H, version 19.0, para.35:

Methane emissions from anaerobic decay of the final sludge produced are determined as follows:

$$BE_{final,s,y} = \sum_j S_{j,BL,y} \times MCF_{s,final,BL,j} \times DOC_s \times UF_{BL} \times DOC_F \times F \times 16/12 \times GWP_{CH_4}$$

(3)

Where:

$S_{j,BL,y}$ Amount of dry matter in the treated sludge.

The baseline wastewater treating system is not different from the project system so no correction of the monitored amount of dry matter in the treated sludge generated is required. In this case $j=final$ and $S_{final,BL,y} = S_{final, PJ,y}$

$MCF_{s,final,BL,j}$ 0.4-Methane correction factor of the disposal site that receives the sludge in the baseline situation, estimated as per the procedures described in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site, ver.08.0", para.6.4. This is necessary because in the baseline the sludge generated is separated, dewatered and deposited in sludge pits for long period of time (~18 months) before transported to waste disposal site.

DOC_s	Degradable organic content of the untreated sludge generated in the year y (fraction, dry basis). Default values of 0.5 for domestic sludge shall be used. (AMS-III.H,ver.19.0, para.30)
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5); (AMS-III.H,ver.19.0, para.30)
F	Fraction of CH_4 in biogas (IPCC default of 0.5);(AMS-III.H,ver.19.0, para.30)
UF_{BL}	Model correction factor to account for model uncertainties (0.89); (AMS-III.H,ver.19.0, para.30)
GWP_{CH_4}	Global Warming Potential for methane (value of 28)
j	Index for baseline sludge treatment system. In this case $j=1$ because the treating system is only one.

Thermal and electricity displacement component

As discussed in Section B.4, Step 2.1 above the project activity falls under paragraph 29(a) of the methodology AMS-I.C, version 21.0:

Electricity is imported from a grid and thermal energy is produced using fossil fuel.

Baseline emissions for electricity production

Baseline emissions for supply of electricity to and/or displacement of electricity from a grid shall be calculated as follows:

$$BE_{grid,y} = EG_{grid,y} \times EF_{grid,y} \quad (4)$$

Where:

$BE_{grid,y}$	Baseline emissions for the grid electricity displaced by the project in year y (t CO _{2e})
$EG_{grid,y}$	Amount of grid electricity displaced by project in year y (MWh)
$EF_{grid,y}$	Emission factor of the grid (tCO _{2e} /MWh)

According to paragraph 35 of the methodology for cases 28(a), (b) and (c), baseline emissions shall be calculated as the sum of emissions from the production of electricity and thermal energy considering most recent historical records (average of the data from a minimum of the three most recent years excluding abnormal years is required).

Determination of emission factor for electricity

As per paragraph 37 of AMS-I.C, ver.21 for project activities that do not displace captive electricity generated by an existing plant but displace grid electricity import and/or supply electricity to a grid, the emission factor of the grid shall be calculated as per the procedures detailed in "AMS-I.D: Grid connected renewable electricity generation" or "AMS-I.F: Renewable electricity generation for captive use and mini-grid".

For the purpose of this document the emission factor of the grid will be defined as per the requirements of AMS-I.F, ver.03.0²⁹ which is the latest version of this methodology.

According to Table 3, i.2 of the methodology:

If "Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)" methodology AMS-I.F is applicable.

According to para.19 the "Emission factor for captive electricity generation shall be calculated as per the procedures described in the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"³⁰

According to this tool:

5. If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption:

(a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer;

(b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or

(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.

This project falls under the requirements of (a) Scenario A because before implementation of the project electric energy was purchased from the grid only.

For the purpose of this project the emission factor of the electricity grid is defined according para.20, Option A2 (b):

A value of 0.400 tCO_{2e}/MWh for electricity grids where hydro power plants constitute less than 50% of total grid generation in 1) average of the five most recent years.

The data regarding the hydro power plants and total energy generation in Bulgaria is given below:

²⁹<https://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

³⁰https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf/history_view

Table 6: Percentage of electric energy generated by hydro power plants in Bulgaria

Source	Unit	2015	2016	2017	2018	2019
Hydro PP	MWh	6 147 000	4 568 000	3 493 000	5 423 000	3 383 000
Total generation - net	MWh	43 934 000	40 281 000	40 723 000	41 705 000	40 296 000
% RES	%	13.99	11.34	8.58	13.00	8.40

Source: <https://www.iea.org/data-and-statistics?country=BULGARIA&fuel=Energy%20supply&indicator=TPESbySource>

Baseline emissions for heat production

As per paragraph 33 of AMS-I.C, version 21:

For thermal energy produced using fossil fuels and/or grid electricity the baseline emissions are calculated as follows:

$$BE_{thermal,CO_2,y} = \left(\frac{EG_{thermal,y}}{\eta_{BL,thermal}} \right) \times EF_{FF,CO_2} \quad (5)$$

Where:

$BE_{thermal,CO_2,y}$	Baseline emissions from thermal energy displaced by the project activity during the year y (t CO ₂)
$EG_{thermal,y}$	Net quantity of thermal energy supplied by the project activity during the year y (TJ)
EF_{FF,CO_2}	CO ₂ emission factor of the fossil fuel that would have been used in the baseline plant obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used (t CO ₂ /TJ)
$\eta_{BL,thermal}$	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity determined as per paragraph 42 (c) – 100% default value

the data from a minimum of the three most recent years excluding abnormal years is required).

Project emissions

According to AMS-III.H, Version 19, para.39 the project emissions from the systems affected by the project activity are:

- CO₂ emissions from electricity and fuel used by the project facilities ($PE_{power,y}$);
- Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project scenario ($PE_{ww,treatment,y}$);

- (c) Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{s,treatment,y}$);
- (d) Methane emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater ($PE_{ww,discharge,y}$);
- (e) Methane emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$);
- (f) Methane fugitive emissions due to inefficiencies in capture systems ($PE_{fugitive,y}$);
- (g) Methane emissions due to incomplete flaring ($PE_{flaring,y}$);
- (h) Methane emissions from biomass stored under anaerobic conditions which would not have occurred in the baseline situation ($PE_{biomass,y}$).

$$PE_y = \left\{ \begin{array}{l} PE_{power,y} + PE_{ww,treatment,y} + PE_{s,treatment,y} + PE_{ww,discharge,y} + PE_{s,final,y} + \\ PE_{fugitive,y} + PE_{biomass,y} + PE_{flaring,y} \end{array} \right\}$$

(6)

Where

PE_y	Project activity emissions in the year y , (tCO ₂ e)
$PE_{power,y}$	Emissions from electricity or fuel consumption in the year y , (tCO ₂ e).
$PE_{ww,treatment,y}$	Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery, in year y , (tCO ₂ e).
$PE_{s,treatment,y}$	Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery, in year y , (tCO ₂ e).
$PE_{ww,discharge,y}$	Methane emissions from degradable organic carbon in treated wastewater in year y , (tCO ₂ e).
$PE_{s,final,y}$	Methane emissions from anaerobic decay of the final sludge produced in year y , (tCO ₂ e).
$PE_{fugitive,y}$	Methane emissions from biogas release in capture systems in year y , calculated as per paragraph 40 of the AMS-III.H, version 19 (tCO ₂ e)
$PE_{flaring,y}$	Methane emissions due to incomplete flaring in year y , (tCO ₂ e).
$PE_{biomass,y}$	Methane emissions from biomass stored under anaerobic conditions.

The project activity involves some project emissions as below:

$PE_{power,y}$ Project emissions from combustion of fossil fuel (naphta) in case of emergency will be accounted ex- post for the calculation of the project emissions. According to the methodology «Tool to calculate baseline, project and/or leakage emissions from electricity consumption», version 03, page 2 which is applied for calculation of project emissions³¹: «This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage.». As this is the case with the discussed project no project emissions from eventual consumption of grid electricity are accounted.

$PE_{fugitive,y}$ Methane emissions from the capturing systems will be accounted for in the proposed project as the project activity involves capture of biogas for power generation.

$PE_{flaring,y}$ Methane emissions due to incomplete flaring will be accounted for in the proposed project as flaring will occur in case of emergency.

The project activity does not involve the sources of project emissions listed below:

$PE_{s,treatment,y}$ Methane emissions from sludge treatment systems will not be accounted for the project because the project activity involves methane recovery for energy generation. The escape methane emissions from the system will be treated as fugitive emissions.

$PE_{ww,treatment,y}$ Methane emissions from wastewater treatment systems will not be accounted for in the proposed project as the project activity does not involve the wastewater treatment system.

$PE_{ww, discharge,y}$ Methane emissions from degradable organic carbon in treated wastewater will not be accounted for the project because the treated wastewater in the project activity is the same as in the baseline.

$PE_{s,final,y}$ Methane emissions from anaerobic decay of the final sludge will not be accounted for the project because the final sludge from sludge treatment system will be used as fertilizer.

$PE_{biomass,y}$ Methane emissions from biomass stored will not be accounted for the project because the project activity does not involve the storing of biomass.

The project emissions calculation is shown below.

Project Emission from power (thermal energy) consumption

As per the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion", (Version 02) CO₂ emissions from fossil fuel combustion in process j

³¹<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf>

are calculated based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} \times COEF_{i,y} \quad (7)$$

Where:

$PE_{FC,j,y}$	Are the CO ₂ emissions from fossil fuel combustion in process j during the year y (tCO ₂ /yr);
$FC_{i,j,y}$	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	Is the CO ₂ emission coefficient of fuel type i in year y (tCO ₂ /mass or volume unit)
i	Are the fuel types combusted in process j during the year y

For the purpose of this project for the calculation of the project emissions from fossil fuel combustion the CO₂ emission coefficient $COEF_{i,y}$ is determined using Option B of the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion":

Option B: The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ emission factor of the fuel type i, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (8)$$

Where:

$COEF_{i,y}$	Is the CO ₂ emission coefficient of fuel type i in year y, (tCO ₂ /mass or volume unit)
$NCV_{i,y}$	Is the weighted average net calorific value of the fuel type i in year y, (GJ/mass or volume unit)
$EF_{CO2,i,y}$	Is the weighted average CO ₂ emission factor of fuel type i in year y, (tCO ₂ /GJ)
i	Are the fuel types combusted in process j during the year y

The project activity uses only light oil (naphta) as an emergency fuel. The emergency consumption of fossil fuel will be monitored ex-post and accounted for in the calculation of the project emissions.

Methane emissions from biogas release in capture system

As per paragraph 39 of the AMS-III.H, version 19 fugitive emissions from the capture system are estimated in this component.

$$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y} \quad (9)$$

Where,

$PE_{fugitive,y}$ Emissions from biogas release in capture system in year y , (tCO₂e)

$PE_{fugitive,ww,y}$ Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment system in the year y , (tCO₂e)

$PE_{fugitive,s,y}$ Fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in the year y , (tCO₂e)

Since there will be no anaerobic wastewater treatment,

$$PE_{fugitive,y} = PE_{fugitive,s,y} \quad (10)$$

The fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in the year y will be determined as per paragraph 40 (b) of AMS-III.H: a default value of 0.05 m³ biogas leaked/m³ biogas produced will be used as an alternative.

Emissions due to incomplete flaring

For ex-ante calculations, baseline emission calculation for sludge treatment (equation 3 of this document) will be used but without the consideration of GWP for CH₄ (as per AMS-III.H, paragraph 40).

For ex-post calculations the tool "Project emissions from flaring", ver.3.0 by using actual monitored data will be applied.

An enclosed flare is used in project activity, therefore the abovementioned tool is applicable.

The calculation procedure in this tool determines the project emissions from flaring the residual gas ($PE_{flare,y}$) based on the flare efficiency ($\eta_{flare,m}$) and the mass flow of methane to the flare ($F_{CH_4,RG,m}$). The flare efficiency is determined for each minute m of year y based either on monitored data or default values.

The project emissions calculation procedure is given in the following steps:

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

STEP 2: Determination of the flare efficiency;

STEP 3: Calculation of project emissions from flaring.

Step 1: Determination of the methane mass flow in the residual gas

The "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", version 03.0³² will be used to determine the following parameter:

³²https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v3.0.pdf/history_view

Parameter	SI unit	Description
$F_{CH_4,m}$	kg	Mass flow of methane in the residual gaseous stream in the minute m

$F_{CH_4,m}$, which is calculated as the mass flow during minute m , shall then be used to determine the mass of methane in kilograms fed to the flare in minute m ($F_{CH_4,m}$). Option 2 and Option A are used for determination of this parameter (i.e. the gaseous stream is considered dry). This is a conservative approach because the methodology is used for calculation of the project emissions.

For simplification equation (17) from the above tool will be used:

As per Option 2:

$$m_{H_2O,t,db,sat} = 0 \quad \text{Saturation absolute humidity in time interval } t \text{ on a dry basis (kg H}_2\text{O/kg dry gas)}$$

The gaseous stream can be considered dry because the temperature at the point of measurement is $\sim 36^\circ\text{C}$. The temperature of the sludge inside the bioreactors is maintained at about 37°C to provide mesophilic conditions.

As per Option A:

The mass flow of greenhouse gas (in this case CH_4) ($F_{CH_4,m}$) is determined as follows:

$$F_{CH_4,m} = V_{t,db} * v * \rho \quad (11)$$

Where

$$F_{CH_4,m} = \text{Mass flow of CH}_4 \text{ (kg/y)}$$

$$V_{t,db} = \text{Volumetric flow of CH}_4 \text{ (m}^3\text{/y)}$$

$$v = \text{Volumetric fraction of CH}_4 \text{ (m}^3\text{/m}^3\text{)}$$

$$\rho = D_{CH_4} = 0.00067 \text{ Density of CH}_4 \text{ (t/m}^3\text{) as per ACM 0010}$$

Step 2: Determination of flare efficiency (enclosed flare)

For the determination of the flare efficiency Option A of the "Tool to determine project emissions from flaring", version 03.0 will be applied:

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

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

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

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

For conservativeness the default efficiency of the flare is adjusted downwards to 80%.

Step 3: Calculation of project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions for each minute m in year y , based on the methane mass flow in the residual gas ($F_{\text{CH}_4,\text{RG},m}$) and the flare efficiency ($\eta_{\text{flare},m}$), as follows:

$$PE_{\text{flare},y} = \text{GWP}_{\text{CH}_4} \times \sum_{m=1}^{525600} F_{\text{CH}_4,\text{RG},m} \times (1 - \eta_{\text{flare},m}) \times 10^{-3} \quad (12)$$

Where:

$PE_{\text{flare},y}$ Project emissions from flaring of the residual gas in year y (tCO₂e)

GWP_{CH_4} 28, Global warming potential of methane valid for the commitment period (tCO₂e/tCH₄)

$F_{\text{CH}_4,m}$ Mass flow of methane in the gas flared in the minute m (kg)

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

Leakage

There is no leakage from the project activity. There is no equipment transferred from another activity.

Emission reductions

The emission reductions will be estimated ex ante in the PDD using the equations provided in the baseline, project and leakage emissions sections above. Emission reductions will be estimated ex ante as follows:

$$ER_{y,\text{ex ante}} = BE_{y,\text{ex ante}} - (PE_{y,\text{ex ante}} + LE_{y,\text{ex ante}}) \quad (13)$$

Where:

$ER_{y,\text{ex ante}}$ Ex ante emission reduction in year y (tCO₂e)

$LE_{y,\text{ex ante}} = 0$, Ex ante leakage emission in year y (tCO₂e). There are no leakage emissions from the project.

$PE_{y,\text{ex ante}}$ Ex ante project emission in year y (tCO₂e)

$BE_{y,\text{ex ante}}$ Ex ante baseline emission in year y (tCO₂e)

The project activity is classified under paragraph 2(a) of AMS-III.H so the ex post calculation of the emission reductions will be performed as per paragraph 46 of the methodology.

The emission reduction achieved by the project activity (*ex post*) will be the difference between the baseline emissions and the project emissions.

$$ER_{y,ex\ post} = BE_{y,ex\ post} - PE_{y,ex\ post} \quad (14)$$

The historical records of electricity and fuel consumption and the quantity of sludge produced by the replaced units will be used for the baseline calculation. Project emissions from fugitive emissions and incomplete flaring ($PE_{fugitive,y}$, $PE_{flaring,y}$) will also be considered in the calculation of the emission reductions, however the emissions from the wastewater outflow and final sludge ($PE_{ww,discharge,y}$, $PE_{s,final,y}$) will be disregarded.

SDG 11: Sustainable cities and communities

The project is related to Target 11.6 - By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

The quality of the air in cities is of main priority of the European Union and radical measures have been taken to decrease the emissions of harmful gaseous pollutants.

The production of electricity from biogas replaces the use of fossil fuels thus reducing other air pollutants such as NO_x , SO_2 , CO , CH_4 . These emissions are concerning stack flue gas and are monitored regularly. The project has major positive effect on the air quality through dramatically reducing the existing methane gas emissions at the plant.

Another big problem is waste management .

In this respect the project follows the highest standards in the European Union.

The company owner of the project is certified in ISO 14001:2015 standard and has all necessary permissions from the Ministry of Environment and Water to handle the waste products generated by the project, like waste oil and waste water.

The quantification of the targets of the project is achieved by continuous monitoring and measuring are described in details in Section B.7.1 – Data and parameters monitored.

The parameters monitored are:

- Harmful gasses - NO_x

SDG 6: Clean water and sanitation

The project is related to Target 6.3.1. - Proportion of wastewater safely treated

The project reduces in a considerable extent the risk of contaminating the natural water resources in the area and abroad. The water effluent released by the wastewater treatment plant is delivered to the Iskar river which flows into the Danube river and further into the Black sea.

Providing deepest purification of the water effluent is the main target achieved by the project.

In the absence of the plant and related project will allow contaminated municipal wastewater to go directly into the river and compromise all life in it and the quality of water sources used for drinking and irrigation.

The project helps to improve the access to safe and affordable drinking water for local population;

By stimulating investments in widening and perfection of the sewage system of the city of Sofia the project helps providing access to adequate and equitable sanitation and hygiene for all local citizens;

The project helps improving water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, considerably decreases the proportion of untreated wastewater and substantially increases recycling and safe reuse in the local community;

The project owner holds the concession of Sofia city water supply and sewage so the project helps implement integrated water resources management at all levels in the capital city and surrounding area;

The project helps to protect and restore water-related ecosystems, rivers, aquifers and lakes;

The project owner is the French company Veolia operating internationally so the implementation of the project expands international cooperation and capacity-building support in water- and sanitation-related activities and programmes, including water harvesting, water efficiency, wastewater treatment, recycling and reuse technologies;

The project supports and strengthens the participation of local communities in improving water and sanitation management.

Bulgaria is a Member State of the European Union, and as such is subject to EU legislation and guidance on the precautionary principle, including:

- The Treaty on the Functioning of the European Union (Article 191)
- Communication from the European Commission of 2 February 2000 on the precautionary principle [COM(2000) 1]

The process of waste water treatment itself is a prerequisite and leads to the restoration and maintenance of diversity of species along the Iskar river. Apart from this, "Sofiyska voda" AD carries out numerous environmental initiatives aimed at afforestation, cleaning of tourist areas and others.

Sofiyska Voda has its policy on environmental protection and reports its achievements in this field by means of annual ecological reports. Company's activities affects the environment and therefore it is committed to:

- effectively preserving and protecting the environment from pollution;
- working in compliance with the laws, ordinances and standards on environmental protection;
- effectively and efficiently using natural resources, incl. energy for the sake of their preservation.

Sofiyska Voda has a Certificate in Environmental Management under the international standard ISO 14001:2015 by Tuev Nord and has certificate No 44 104 087290. The Waste-water Treatment plant (WwTP) is also certified under OHSAS

18001:2007 with certificate No 44 116087290, and ISO 45001:2018. The introducing and the supporting of an environmental management system ensures the passing of continuous process which reduces the level of risk pollution and other unfavorable environmental impacts, the effective use of the resources to enhance the Company's activities and to create a positive image of Sofiyska Voda among the society, the regulator and the control bodies, all stakeholders.

The company is performing self-monitoring on the following environmental elements:

- Wastes;
- Air emissions;
- Technological processes;
- Treated wastewaters;
- Used underground waters;
- Industrial enterprises;

The project is a major part of waste-water treatment of the whole city of Sofia which takes place in the Waste-water treatment plant operated by Sofiyska voda. That means to collect and treat the waste-waters of more than 1,5 mln. people living in the area. The effluent of the project is of quality that allows its delivery to the river Iskar.

The plant possesses Permission for deposition of the effluent outlet water into the Iskar river No 1295/14.04.2014, issued by the Ministry of Environment and Water. The Permission defines the quantity of inlet and outlet water and the quality of the effluent water. The quality of the effluent water and heavy metals content is monitored and measured according to the plan and frequency part of the Permission.

No depletion or contamination of local reservoirs/ aquifers occurs.

The quality of the water is monitored by the accredited laboratory part of Kubratovo Wastewater Treatment Plant. The results of the monitoring are issued in routine Protocols, available for inspection in the plant.

The quantification of the targets of the project is achieved by continuous monitoring and measuring of the biochemical and chemical content and characteristics of the inlet and effluent water described in Section B.7.1 – Data and parameters monitored.

B.6.2. Data and parameters fixed ex ante

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Table 7

Data/parameter	$EF_{EL,y}$
Unit	tCO _{2e} /MWh

Description	Emission factor of the national power grid of Bulgaria
Source of data	Default value
Value(s) applied	0.400
Choice of data or Measurement methods and procedures	According to "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" This project falls under the requirements of (a) Scenario A because before implementation of the project electric energy was purchased from the grid only. For the purpose of this project the emission factor of the electricity grid is defined according para.20, Option A2 (b): A value of 0.4 t CO₂e/MWh for electricity grids where hydro power plants constitute less than 50% of total grid generation in 1) average of the five most recent years.
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter has been fixed ex-ante for the whole crediting period.

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Table 8

Data/parameter	$MCF_{s,BL,treatment}$
Unit	-
Description	Methane correction factor of the disposal site that receives the treated sludge in the baseline situation,
Source of data	IPCC 2006 Guidelines for national Greenhouse Gas Inventories
Value(s) applied	0.4
Choice of data or Measurement methods and procedures	CDM Tool "Emissions from solid waste disposal sites", Version 08
Purpose of data	Calculation of baseline emissions
Additional comment	

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Table 9

Data/parameter	DOC _s
Unit	
Description	Degradable organic content of the untreated sludge generated in the year y (fraction, dry basis)
Source of data	IPCC 2006 Guidelines for national Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value from AMS-III.H
Purpose of data	Calculation of baseline emissions
Additional comment	

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Table 10

Data/parameter	DOC _F
Unit	-
Description	Fraction of DOC dissimilated to biogas
Source of data	IPCC 2006 Guidelines for national Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value from AMS-III.H
Purpose of data	Calculation of baseline emissions
Additional comment	

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Table 11

Data/parameter	F
Unit	-
Description	Fraction of CH ₄ in biogas
Source of data	IPCC 2006 Guidelines for national Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value from AMS-III.H
Purpose of data	Calculation of baseline emissions
Additional comment	

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Table 12

Data/parameter	UFB _L
Unit	-
Description	Model correction factor to account for model uncertainties
Source of data	AMS-III.H
Value(s) applied	0.89
Choice of data or Measurement methods and procedures	Default value from AMS-III.H
Purpose of data	Calculation of baseline emissions
Additional comment	

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Table 13

Data/parameter	GWP _{CH4}
Unit	-
Description	Global Warming Potential for methane
Source of data	IPCC
Value(s) applied	28
Choice of data or Measurement methods and procedures	Default value from 5th IPCC Assessment Report is used as per the recommendations of GS33
Purpose of data	Baseline/project emissions calculation
Additional comment	

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Table 14

Data/parameter	η_{flare}
Unit	%
Description	Flare efficiency
Source of data	"Project emissions from flaring" , Version 03.0.0
Value(s) applied	80%
Choice of data or Measurement methods and procedures	Default value from "Project emissions from flaring" , Version 03.0.0. The flare efficiency for the minute m ($\eta_{\text{flare},m}$) is 90%

³³ <https://globalgoals.goldstandard.org/applicability-of-global-warming-potential-for-gold-standard-for-the-global-goals-projects/>

	when the following two conditions are met to demonstrate that the flare is operating: (1) The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m; and (2) The flame is detected in minute m ($F_{lame,m}$). Otherwise $\eta_{flare,m}$ is 0%.
Purpose of data	Project emissions calculation
Additional comment	The value is 10% less the default value for conservativeness.

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Table 15

Data/parameter	$\eta_{BL,thermal}$
Unit	%
Description	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity determined as per paragraph 39 or 40
Source of data	AMS-I.C, version 21 – default value
Value(s) applied	100%
Choice of data or Measurement methods and procedures	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity determined as per paragraph 42 (c) of AMS-I.C, version 21 – 100% default value
Purpose of data	Baseline emissions calculation
Additional comment	The baseline fuel is changed from light oil to natural gas.

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Table 16

Data/parameter	EF_{FF,CO_2}
Unit	tCO _{2e} /TJ
Description	CO ₂ emission factor of the fossil fuel that would have been used in the baseline plant obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used
Source of data	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 2.2 Stationary Combustion, Table 2.2
Value(s) applied	54.30
Choice of data or Measurement methods and procedures	Lower value at 95% confidence interval for natural gas
Purpose of data	Baseline emissions calculation
Additional comment	The baseline fuel is changed from light oil (naphta) to natural gas

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Table 17

Data/parameter	$NCV_{i,y}$
Unit	GJ/t
Description	Net calorific value of the light oil used for emergency cases in year y
Source of data	2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	46.50
Choice of data or Measurement methods and procedures	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Purpose of data	Project emissions calculation
Additional comment	

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Table 18

Data/parameter	$EF_{CO_2,i,y}$
Unit	tCO _{2e} /GJ
Description	CO ₂ emission factor of the light oil (naphta) used for emergency cases in year y
Source of data	2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	76.30
Choice of data or Measurement methods and procedures	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Purpose of data	Project emissions calculation
Additional comment	

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Table 19

Data/parameter	$PE_{fugitive,s,y}$
Unit	Nm ³ leaked/Nm ³ produced
Description	Portion of methane leaked from the system
Source of data	AMS-III.H, paragraph 40(b)
Value(s) applied	0.05
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Project emissions calculation
Additional comment	

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Table 20

Data/parameter	D_{CH_4}
Unit	t/m ³
Description	Density of methane
Source of data	Methane density calculator ³⁴ and CDM ACM 0010 (v8.0), p.30
Value(s) applied	0.00067
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Project emissions calculation including emissions from incomplete flaring.
Additional comment	

There are no parameters fixed ex-ante for SDG 6 & SDG 11.

B.6.3. Ex ante estimation of SDG Impact

SDG 13: Take climate action

Baseline emissions

The baseline emissions are calculated according to formula (2):

$$BE_y = BE_{power,y} + BE_{s,final,y}$$

Methane emissions from anaerobic decay of the sludge at digesters inlet are determined as per formula (3):

$$BE_{final,s,y} = \sum_j S_{j,BL,y} \times MCF_{s,final,BL,j} \times DOC_s \times UF_{BL} \times DOC_F \times F \times 16/12 \times GWP_{CH_4}$$

The data used for the calculation is taken from plants records for the last 3 years (2018,2019 & 2020) before start of the new crediting period, and is presented in the following table:

³⁴ https://www.engineeringtoolbox.com/methane-density-specific-weight-temperature-pressure-d_2020.html?vA=20°ree=C&pressure=1bar#

Table 21: Quantity of sludge and dry matter in the sludge generated in 2018,2019 & 2020

Month/Year	Quantity of sludge entering the digesters	Quantity of dry substance in the sludge
	Q_DGs_inlet	Sfinal,PJ,y
	[m3]	[t]
Jan 2018	60,760.00	3,385.41
Feb 2018	54,880.00	3,395.70
Mar 2018	60,760.00	4,241.54
Apr 2018	58,700.00	3,436.00
May 2018	60,760.00	3,714.69
Jun 2018	58,400.00	3,851.44
July 2018	58,640.00	3,191.45
Aug 2018	58,240.00	3,122.49
Sep 2018	55,200.00	3,226.44
Oct 2018	57,820.00	2,816.27
Nov 2018	47,452.00	2,407.78
Dec 2018	38,815.00	2,005.81
Total 2018	670,427.00	38,795.03
Jan 2019	38,703.00	1,839.04
Feb 2019	41,310.00	2,199.44
Mar 2019	55,210.00	2,780.06
Apr 2019	57,975.00	2,807.38
May 2019	60,760.00	3,142.57
Jun 2019	55,970.00	3,327.98
July 2019	56,720.00	3,248.49
Aug 2019	43,300.00	2,283.04
Sep 2019	54,720.00	2,550.35
Oct 2019	58,220.00	2,809.46
Nov 2019	58,360.00	2,845.25
Dec 2019	60,760.00	3,060.25
Total 2019	642,008.00	32,893.29

Jan 2020	61,440.00	2,796.19
Feb 2020	57,000.00	3,080.70
Mar 2020	62,000.00	3,433.50
Apr 2020	60,040.00	2,767.51
May 2020	64,360.00	2,848.19
Jun 2020	61,880.00	3,389.90
July 2020	59,020.00	3,299.04
Aug 2020	54,840.00	2,362.84
Sep 2020	61,440.00	2,370.98
Oct 2020	54,640.00	2,893.13
Nov 2020	59,520.00	2,531.34
Dec 2020	58,800.00	3,112.99
Total 2020	714 487.00	34,886.31
Total 3 years	2,026,922.00	106,574.63
Annual average (3 years basis)	675,640.67	35,524.87
Capacity addition by Digester #5 for 1 year (25% of annual average over 7 years period)	24,130	1,269.77
Estimated quantity for the new crediting period	699,770.67	36,794.64
Average density of dry matter in the sludge [t/m ³]		0.052581

Source: Plant records / Periodical Monitoring reports

The re-certification of the project includes an additional digester that will start operation in March, 2021 (see Section A.5). The plant will operate with 5 digesters for 1 year and after that the old units will be shut one by one for overhauling.

For the purpose of the PDD it is assumed that after 2021 and till the end of the crediting period the plant will operate with the same capacity as during the first GS crediting period.

The baseline emission reductions are as follows:

$$BE_{s,treatment,y} = 36,794.64 * 0.4 * 0.5 * 0.89 * 0.5 * 0.5 * (16/12) * 28 = 61,128 \text{ tCO}_{2e}/y$$

Baseline emissions are calculated in the excel sheet name: Sofiyska_voda_VER_Calculation_ver.05_23.03.2021_GS_recertification , attached to this PDD.

Baseline emissions for supply of electricity to and/or displacement of electricity from a grid shall be calculated as per formula (4):

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

The electric energy generated by the CHP and displaced from the grid is taken from plants records for years 2010, 2011 and 2012 and is presented in the following table:

Table 22: Electric energy displaced from the grid and thermal energy supplied to the project in the last 3 years (2018,2019 & 2020) before start of the new crediting period

Month/year	El. energy generated (net)	Thermal energy generated
	EGgrid	EGthermal
	[MWhel]	[TJ]
Jan 2018	2,100.06	9.03
Feb 2018	1,912.62	8.37
Mar 2018	2,126.46	9.20
Apr 2018	2,071.83	9.14
May 2018	2,235.34	9.75
Jun 2018	2,075.29	8.60
July 2018	1,663.72	7.27
Aug 2018	1,568.80	6.85
Sep 2018	1,483.65	5.48
Oct 2018	2,048.16	7.56
Nov 2018	1,787.60	6.61
Dec 2018	1,186.13	6.13
Total 2018	22,259.65	93.99
Jan 2019	695.07	7.14

Feb 2019	887.87	5.92
Mar 2019	1,660.12	6.13
Apr 2019	1,562.94	5.76
May 2019	1,650.86	6.09
Jun 2019	2,075.34	7.66
July 2019	2,002.70	7.39
Aug 2019	1,475.13	5.46
Sep 2019	1,888.44	6.97
Oct 2019	2,161.44	7.98
Nov 2019	2,197.26	8.11
Dec 2019	2,111.31	7.79
Total 2019	20,368.49	82.39
Jan 2020	2,043.30	7.532
Feb 2020	2,097.82	7.733
Mar 2020	2,274.89	8.386
Apr 2020	1,968.26	7.256
May 2020	2,011.75	7.416
Jun 2020	2,051.01	7.561
July 2020	1,954.82	7.206
Aug 2020	1,652.01	6.090
Sep 2020	1,902.30	7.013
Oct 2020	2,040.87	7.523
Nov 2020	2,054.18	7.573
Dec 2020	1,972.47	7.271
Total 2020	24,023.68	88.56
Total 3 years	66,651.82	264.91
Annual average (3 years basis)	22,217.27	88.30

Source: Plant records/Periodical Monitoring reports

The conservative assumption is that the CHP had operated at optimal conditions during that historical period. The biogas from the new Digester #5 will not contribute significantly to the generation of electric and thermal energy throughout the new crediting period.

$$BE_{grid,y} = 22,217.27 * 0.400 = 8,886 \text{ tCO}_{2e}/y$$

Baseline emissions are calculated in the excel sheet name: Sofiyska_voda_VER_Calculation_ver.05_23.03.2021_GS_recertification , attached to this PDD.

For thermal energy produced using fossil fuels and/or grid electricity the baseline emissions are calculated as per formula (5):

$$BE_{thermal,CO2,y} = \left(\frac{EG_{thermal,y}}{\eta_{BL,thermal}} \right) \times EF_{FF,CO2}$$

$$BE_{thermal, CO2,y} = ((88.30 / 1.0) * 54.3) / 1000 = 4,794 \text{ tCO}_{2e}/y$$

Baseline emissions are calculated in the excel sheet name: Sofiyska_voda_VER_Calculation_ver.04_25.02.2021_GS_recertification , attached to this PDD.

The total baseline emissions estimated for the project are:

$$BE_y = 61,128 + 8,886 + 4,794 = 74,808 \text{ tCO}_{2e}/y$$

Total baseline emissions are calculated in the excel sheet name: Sofiyska_voda_VER_Calculation_ver.05_23.03.2021_GS_recertification , attached to this PDD.

Project emissions

The project emissions are estimated ex-ante according to the adjusted formula (6):

$$PE_y = PE_{power,y} + PE_{fugitive,y} + PE_{flare,y}$$

For the ex-ante calculations the Project emissions from emergency fossil fuel combustion is estimated as zero because usually there is no need of using emergency fuel:

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

The fugitive project emissions are estimated for the needs of the ex-ante calculations at 0.05 of the total methane content in the average annual quantity of biogas generated by the anaerobic digesters in the years 2018, 2019 & 2020 before start of the new crediting period:

The production of biogas and the methane content in it (at normal conditions) is taken from the plant's records and is presented in Table 20 below:

Table 23: Generation of biogas and methane content for 2018, 2019 & 2020:

Month/year	Biogas captured and combusted	CH ₄ concentration	CH ₄ content in the biogas	Density of CH ₄	CH ₄ captured and combusted
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	BG _{burnt,y}	W _{CH4}	CH ₄ burnt,y	D _{CH4}	CH ₄ burnt,y
	[m ³]	[%]	[m ³]	[kg/m ³]	[t]
Jan 2018	1 084,516.94	63.00	683,245.67	0.670	457.77
Feb 2018	903,600.00	62.55	565,201.80	0.670	378.69
Mar 2018	973,211.30	62.68	610,026.28	0.670	408.72
Apr 2018	923,240.00	64.22	592,886.76	0.670	397.23
May 2018	977,994.29	67.86	663,686.57	0.670	444.67
Jun 2018	907,142.00	68.69	623,105.62	0.670	417.48
July 2018	751,430.00	67.12	504,387.57	0.670	337.94
Aug 2018	786,020.00	69.13	543,395.46	0.670	364.07
Sep 2018	766,020.00	70.04	536,489.14	0.670	359.45
Oct 2018	984,220.00	65.54	645,083.22	0.670	432.21
Nov 2018	805,270.00	60.35	485,962.37	0.670	325.59
Dec 2018	602,920.00	60.87	367,012.09	0.670	245.90
Total 2018	10,465,584.53		6,820,482.55		4 569.72
Jan 2019	478,280.00	61.62	294,701.39	0.670	197.45
Feb 2019	478,220.00	61.34	293,319.01	0.670	196.52
Mar 2019	685,410.00	59.00	404,391.90	0.670	270.94
Apr 2019	634,550.00	60.00	380,730.00	0.670	255.09
May 2019	675,520.00	59.94	404,924.90	0.670	271.30
Jun 2019	853,240.00	61.00	520,476.40	0.670	348.72
July 2019	879,580.00	61.00	536,543.80	0.670	359.48
Aug 2019	667,600.00	60.00	400,560.00	0.670	268.38
Sep 2019	827,500.00	62.00	513,050.00	0.670	343.74
Oct 2019	927,300.00	62.60	580,462.24	0.670	388.91
Nov 2019	921,200.00	66.35	611,183.82	0.670	409.49
Dec 2019	922,300.00	67.00	617,941.00	0.670	414.02
Total 2019	8,950,700.00		5,558,284.46		3 724.05
Jan 2020	923,100.00	67.43	622,430.80	0.670	417.03
Feb 2020	932,400.00	66.00	615,384.00	0.670	412.31
Mar 2020	1 018,000.00	65.86	670,454.80	0.670	449.20

Apr 2020	848,800.00	68.00	577,184.00	0.670	386.71
May 2020	856,300.00	66.00	565,158.00	0.670	378.66
Jun 2020	869,300.00	63.00	547,659.00	0.670	366.93
July 2020	825,200.00	62.00	511,624.00	0.670	342.79
Aug 2020	699,500.00	64.22	449,231.60	0.670	300.99
Sep 2020	813,100.00	63.74	518,238.11	0.670	347.22
Oct 2020	890,400.00	66.00	587,664.00	0.670	393.73
Nov 2020	901,700.00	64.00	577,088.00	0.670	386.65
Dec 2020	871,400.00	60.26	525,090.97	0.670	351.81
Total 2020	10,449,200.00		6,767,207.28		4 534.03
Annual average (3 years basis)	9,955,161.51	64.107	6,381,991.43		4 275.93
Capacity addition by Digester #5 for 1 year (25% of annual average over 7 years period)	355,541.5		227,890.95		152.71
Estimated quantity for the new crediting period	10,310,703.01		6,609,882.38		4,428.62

The re-certification of the project includes an additional digester that will start operation in March, 2021 (see Section A.5). The plant will operate with 5 digesters for 1 year and after that the old units will be shut one by one for overhauling.

For the purpose of the PDD it is assumed that after 2021 and till the end of the crediting period the plant will operate with the same capacity as during the first GS crediting period.

$$PE_{\text{fugitive},y} = 4,428.62 * 0.05 * 28 = 6,201 \text{ tCO}_{2e}$$

The Project emissions from un-efficient flares are calculated ex ante according to formula (3) omitting the factor GWP_{CH_4} .

$$PE_{\text{flare},y} = 36,794.64 * 0.4 * 0.5 * 0.89 * 0.5 * 0.5 * (16/12) = 2,183 \text{ tCO}_{2e}/y$$

The total project emissions estimated ex ante are:

$$PE_y = 6,201 + 2,183 = 8,384 \text{ tCO}_{2e}/y$$

Project emissions are calculated in the excel sheet name: Sofiyska_voda_VER_Calculation_ver.05_23.03.2021_GS_recertification , attached to this PDD.

Leakage emissions

$$LE_y = 0$$

Emission reductions

$$ER_y = 74,808 - 8,384 = 66,424 \text{ tCO}_{2e}/\text{year}$$

Emission reductions are calculated in the excel sheet name: Sofiyska_voda_VER_Calculation_ver.05_23.03.2021_GS_recertification , attached to this PDD.

SDG 11: Sustainable cities and communities

The project is related to Target 11.6 - By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

The parameters monitored are:

Harmful gasses:

- NO_x;

The values measured for this parameter in the last 2 years period (2018 & 2020) are presented in the following table³⁵:

Date of measurment	CHP unit 1	CHP unit 2	CHP unit 3
Unit	Mg/Nm ³	Mg/Nm ³	Mg/Nm ³
20.11.2018	181	197	214
09.11.2020	198	221	209
Average	189.5	209	211.5

Baseline is the acceptable value by the law³⁶:

$$NO_x \leq 500 \text{ mg/Nm}^3$$

The main goal is to keep this parameter below the values permitted by the relevant laws and regulations.

SDG 6: Clean water and sanitation

³⁵Measurement protocols available for inspection with the VVB

³⁶[https://www.moew.government.bg/wp-](https://www.moew.government.bg/wp-content/uploads/filebase/Air/Naredbi_GGI_IProcesi/NAREDBA_1_GGI_IP_or_27062005.doc)

[content/uploads/filebase/Air/Naredbi_GGI_IProcesi/NAREDBA_1_GGI_IP_or_27062005.doc](https://www.moew.government.bg/wp-content/uploads/filebase/Air/Naredbi_GGI_IProcesi/NAREDBA_1_GGI_IP_or_27062005.doc)

The quality of the effluent water is monitored by the accredited laboratory part of Kubratovo Wastewater Treatment Plant. The results of the monitoring are issued in routine Protocols, available for inspection in the plant.

The estimated ex-ante values of the monitored parameters are based on latest available data for 3 years prior the start of the new crediting period on 01/04/2021.

The values of Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) measured in 2018, 2019 and 2020 are given in Table 24 below:

Table 24: Chemical and biochemical oxygen demand of inlet wastewater and effluent water³⁷.

Period	COD inlet [mgO ₂ /l]	BOD inlet [mgO ₂ /l]	COD effluent [mgO ₂ /l]	BOD effluent [mgO ₂ /l]
2018	308.12+- 35.37	136.98+- 21.43	26.14+- 2.21	8.68+- 1.50
2019	339.59+- 33.38	145.07+- 37.12	22.65+- 2.25	7.82+- 2.03
2020	310.32+- 32.55	140.75+- 41.32	21.90+- 2.61	7.42+- 2.10
Average for 3 years	319.32+- 32.55	14.93+- 33.29	23.56+- 2.35	7.98+- 1.88

In details data are presented in the excel file named Sofiyska_voda_VER_Calculation_ver.04_25.02.2021_GS_recertification attached to this PDD.

The baseline of this parameter are the acceptable values by the standard (effluent water) as of Regulation No 6/9.11.200038:³⁷

$$\text{COD} \leq 125 \text{ mgO}_2/\text{l}$$

$$\text{BOD}_5 \leq 25.0 \text{ mgO}_2/\text{l}$$

The outcome of SDG 11 is to provide effluent from the treatment of the municipal waste-water with highest possible quality lower than the allowed by the country's regulations in order to avoid pollution of the river systems affected by the project.

B.6.4. Summary of ex ante estimates of each SDG Impact

³⁷Source protocols available with VVB for inspection

³⁸http://www.5.moew.government.bg/wp-content/uploads/filebase/Legislation/Naredbi/vodi/N6_opasni_v-va.pdf

SDG13 Climate action

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

GHG Emission reductions [tCO_{2e}]

Year	Baseline estimate	Project estimate	Net benefit
2021 (from 01.04)	56,107	6,485	49,622
2022	74,808	8,384	66,424
2023	74,808	8,384	66,424
2024	74,808	8,384	66,424
2025	74,808	8,384	66,424
2026	74,808	8,384	66,424
2027	74,808	8,384	66,424
2028 (till 31.03)	18,701	2,162	16,539
Total	523,656	58,952	464,704
Total number of crediting years	7 years 0 months		
Annual average over the crediting period	74,808	8,384	66,424

SDG 11 Sustainable cities and communities

11.6: Release of pollutants

The quality of the air in cities is of main priority of the European Union and radical measures have been taken to decrease the emissions of harmful gaseous pollutants.

The production of electricity from biogas replaces the use of fossil fuels thus reducing other air pollutants such as NO_x. These emissions are concerning stack flue gas and are monitored regularly. The project has major positive effect on the air quality through dramatically reducing the existing methane gas emissions at the plant.

SDG 6 Clean water and sanitation

6.3.1 Impact on natural water patterns and flow

The project reduces in a considerable extent the risk of contaminating the natural water resources in the area and abroad. The water effluent released by the wastewater treatment plant is delivered to the Iskar river which flows into the Danube river and further into the Black sea.

Providing deepest purification of the water effluent is the main target achieved by the project.

In the absence of the plant and related project will allow contaminated municipal wastewater to go directly into the river and compromise all life in it and the quality of water sources used for drinking and irrigation.

The project helps to improve the access to safe and affordable drinking water for local population;

By stimulating investments in widening and perfection of the sewage system of the city of Sofia the project helps providing access to adequate and equitable sanitation and hygiene for all local citizens;

The project helps improving water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, considerably decreases the proportion of untreated wastewater and substantially increases recycling and safe reuse in the local community;

The project owner holds the concession of Sofia city water supply and sewage so the project helps implement integrated water resources management at all levels in the capital city and surrounding area;

The project helps to protect and restore water-related ecosystems, rivers, aquifers and lakes;

The project owner is the French company Veolia operating internationally so the implementation of the project expands international cooperation and capacity-building support in water- and sanitation-related activities and programmes, including water harvesting, water efficiency, wastewater treatment, recycling and reuse technologies;

The project supports and strengthens the participation of local communities in improving water and sanitation management.

The quantification of the targets of the project is achieved by continuous monitoring and measuring of the biochemical and chemical content and characteristics of the inlet and effluent water

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 25

Data / Parameter	$S_{final,PJ,y}$
Unit	t/y
Description	Amount of dry matter in the sludge in the year y

Source of data	Plant records. Data from Table 21 for ex-ante calculations.
Value(s) applied	36,794.64
Measurement methods and procedures	Samples taken every hour by the laboratory
Monitoring frequency	Measured hourly. Recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Calculation of baseline emissions
Additional comment	The quantity of sludge delivered to the digesters is equal to the quantity of sludge delivered for dewatering in the baseline.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 26

Data / Parameter	$EG_{\text{thermal},y}$
Unit	TJ/y
Description	The net quantity of heat supplied by the project activity in the year y
Source of data	Plant records. Data from Table 22 for ex-ante calculations.
Value(s) applied	88.300
Measurement methods and procedures	Measured by digital thermal energy meters
Monitoring frequency	Measured continuously. Recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007, ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors.

	QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Calculation of baseline emissions
Additional comment	

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 27

Data / Parameter	$EG_{grid,y}$
Unit	MWh/y
Description	Electricity generated by the CHP in the year y
Source of data	Plant records. Data from Table 22 for ex-ante calculations.
Value(s) applied	22,217.27
Measurement methods and procedures	Measured by digital electric energy meters
Monitoring frequency	Measured continuously. Recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007, ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Calculation of baseline emissions
Additional comment	In case records are missing due to meters failure or replacement the electricity consumption for that period and that part of the installation will be estimated by multiplying the installed capacity of the electric motors and devices involved times the working hours of the installation as per plant's records.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 28

Data / Parameter	$BG_{\text{burnt},y}$
Unit	Nm^3/y
Description	Quantity of biogas generated by the anaerobic digesters in the year y
Source of data	Plant records. Data from Table 23 for ex-ante calculations.
Value(s) applied	10,310,703.01
Measurement methods and procedures	Measured by digital combined flowmeters
Monitoring frequency	Measured continuously. Recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007, ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Project emissions calculation including emissions from incomplete flaring
Additional comment	The analyser takes into consideration the pressure and temperature of the biogas. The final result is normalized.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 29

Data / Parameter	$\text{CH}_{4,\text{burnt},y}$
Unit	m^3/y
Description	Quantity of methane generated by the anaerobic digesters in the year y
Source of data	Plant records. Data from Table 23 for ex-ante

	calculations.
Value(s) applied	6,609,882.38
Measurement methods and procedures	Calculated based on the quantity of bio-gas generated and specific content of methane in the bio-gas WCH ₄
Monitoring frequency	Measured continuously. Recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007, ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Project emissions calculation including emissions from incomplete flaring
Additional comment	The analyser takes into consideration the pressure and temperature of the biogas. The final result is normalized.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 30

Data / Parameter	CH ₄ ,burnt,y
Unit	t/y
Description	Quantity of methane generated by the anaerobic digesters in the year y
Source of data	Plant records. Data from Table 23 for ex-ante calculations.
Value(s) applied	4,428.62
Measurement methods and procedures	Calculated based on the quantity of bio-gas generated, specific content of methane in the bio-gas WCH ₄ and density of methane.
Monitoring frequency	Measured continuously. Recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007, ISO 45001:2018 and the internal quality procedures implemented. This will ensure that

	all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Project emissions calculation including emissions from incomplete flaring
Additional comment	The analyser takes into consideration the pressure and temperature of the biogas. The final result is normalized.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 31

Data / Parameter	$Q_{DG_{s_inlet,y}}$
Unit	m ³ /y
Description	Quantity of sludge entering the anaerobic digesters in the year y.
Source of data	Plant records. Data from Table 21 for ex-ante calculations.
Value(s) applied	699,770.67
Measurement methods and procedures	Measured by digital flowmeters
Monitoring frequency	Measured continuously. Results are integrated hourly, recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007. ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Baseline emissions calculation.
Additional comment	

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 32

Data / Parameter	ρ_{sludge}
Unit	t/m ³
Description	Dry substance content in the sludge
Source of data	Plant records. Data from Table 21 for ex-ante calculations.
Value(s) applied	0.05258
Measurement methods and procedures	The tests are made by an accredited laboratory on-site the plant.
Monitoring frequency	Samples taken by laboratory
QA/QC procedures	Laboratory samples taken every hour. Results are recorded hourly, monthly and yearly
Purpose of data	The activities outlined here are undertaken under the OHSAS 18001:2007. ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Additional comment	Baselines emissions calculation.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 33

Data / Parameter	$W_{\text{CH}_4,y}$
Unit	%
Description	Methane content in biogas in the year y
Source of data	Plant records, Data from Table 21 for ex-ante

	calculations.
Value(s) applied	64.107
Measurement methods and procedures	Measured by digital combined gas-meters AWITE
Monitoring frequency	Measured continuously. Aggregated hourly and recorded monthly and yearly.
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007. ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Project emissions calculation including emissions from incomplete flaring
Additional comment	The analyser takes into consideration the pressure and temperature of the biogas. The final result is normalized.

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 34

Data / Parameter	FC _y
Unit	t/y
Description	Quantity of fossil fuel (naphta) used for emergency needs in the year y.
Source of data	Plant records
Value(s) applied	0
Measurement methods and procedures	The yearly quantity is calculated using accounting documents for the purchased quantity of fuel during the reported period the initial and the residual content of the reservoirs.
Monitoring frequency	yearly
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007. ISO 45001:2018 and the internal

	quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Project emissions calculation
Additional comment	

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 35

Data / Parameter	$V_{t,db}$
Unit	m^3CH_4/h
Description	Volumetric flow of the gaseous stream
Source of data	Plant records (quantity of biogas generated). Data from Table 21 for ex-ante calculations.
Value(s) applied	For ex-ante calculations formula (3) is used omitting GWP of methane.
Measurement methods and procedures	Calculated based on the measured content of methane in the biogas $w_{CH_4,y}$, the time flares have been in operation and the maximal capacity of the flares.
Monitoring frequency	Measured every minute, Integrated hourly, recorded hourly and monthly
QA/QC procedures	The activities outlined here are undertaken under the OHSAS 18001:2007. ISO 45001:2018 and the internal quality procedures implemented. This will ensure that all management and operational systems will meet the requirements of external auditors. QA/QC internal procedures are implemented in the plant and all measurement processes, as device technical description and documentation, position, calibration, training, temporally replacing procedures etc. are included.
Purpose of data	Project emissions calculation.
Additional comment	

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 36

Data / Parameter	$F_{CH_4,y}$
Unit	KgCH ₄ /y
Description	Mass flow of methane in the residual biogas flared in the year y
Source of data	Plant's records. Data from Table 21 for ex-ante calculations.
Value(s) applied	For ex-ante calculations formula (3) is used omitting GWP of methane.
Measurement methods and procedures	The quantity and quality of biogas is measured continuously and normalized. The mass flow is calculated based on above measurements.
Monitoring frequency	Continuously, calculated for every minute interval
QA/QC procedures	The procedure is integrated in the ISO 9001:2015 system implemented by the plant. The meters are checked and calibrated every year.
Purpose of data	Ex-post project emissions calculation.
Additional comment	

SDG 13: Climate action

13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Table 37

Data / Parameter	ER
Unit	tCO _{2e}
Description	GHG emission reductions
Source of data	PDD-VER calculation table, filename: Sofiyska_voda_VER_Calculation_ver.04_25.02.2021_GS_recertification

Value(s) applied	66,424
Measurement methods and procedures	Calculated as per equation (14)
Monitoring frequency	Yearly
QA/QC procedures	The procedure is integrated in the ISO 9001:2015 system implemented by the plant. The meters are checked and calibrated every year.
Purpose of data	Estimation of the GHG emission reductions from the project
Additional comment	

SDG 11 Sustainable cities and communities

11.6: Release of pollutants

Table 38

Data / Parameter	<i>Emissions of NO_x in the stack flue gas.</i>
Unit	mg/Nm ³ ;
Description	Emissions in the air by the project activities.
Source of data	Plant records, 3 rd party protocols
Value(s) applied	<i>NO_x gasses</i> <i>Unit 1 -189.5 mg/Nm³</i> <i>Unit 2 -209 mg/Nm³</i> <i>Unit 1 -211.5 mg/Nm³</i>
Measurement methods and procedures	Measured according to plant internal procedures by an independent 3rd party laboratory
Monitoring frequency	Every 2 years for exhaust gases as by local law
QA/QC procedures	As per internal procedures, ISO 14001: 2015, OHSAS 18001:2007 and ISO 45001:2018.
Purpose of data	Ex-post monitoring of dangerous emissions and pollutants

Additional comment	The project combusts biogas containing CH ₄ and no measurement of its content as well as dust content in the flue gas is required.
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SDG 6 Clean water and sanitation

6.3.1 Impact on natural water patterns and flow

Table 39

Data / Parameter	1.COD (Chemical Oxygen Demand) of the inlet wastewater; 1a.BOD5 (Biochemical Oxygen Demand for 5 days) of the inlet wastewater; 2.COD (Chemical Oxygen Demand) of the effluent water; 2a.BOD5 (Biochemical Oxygen Demand for 5 days) of the effluent water;
Unit	1mgO ₂ /l 1a. mgO ₂ /l 2. mgO ₂ /l 2a. mgO ₂ /l
Description	Water quality
Source of data	Plant records. Data from Table 24 for ex-ante presentation.
Value(s) applied	1. COD-. 319.32+-32.55 1.a. BOD-140.93+-33.29 2.COD - 23.56+-2.35 2a.BOD ₅ - 7.98+-1.88
Measurement methods and procedures	As per VLM NoWW-17/27.05.2008 and BDS EN 1899-1:2004. Samples taken and analysed by accredited laboratory
Monitoring frequency	As per approved internal procedures – 2-3 times every month
QA/QC procedures	As per ISO 9001:2015
Purpose of data	Ex-post monitoring of the water quality
Additional comment	

B.7.2. Sampling plan

N/A

B.7.3. Other elements of monitoring plan

Monitoring objective

The objective of the monitoring plan is to assure the complete, consistent, clear, and accurate monitoring and calculation of the project emission reductions during the whole crediting period. The project owner is responsible for the implementation of the monitoring plan.

General information

The Kubratovo WwTP is certified under ISO 14001:2004 by Tuev Nord and has certificate No 44 104 087290, valid until 23 Dec 2023.

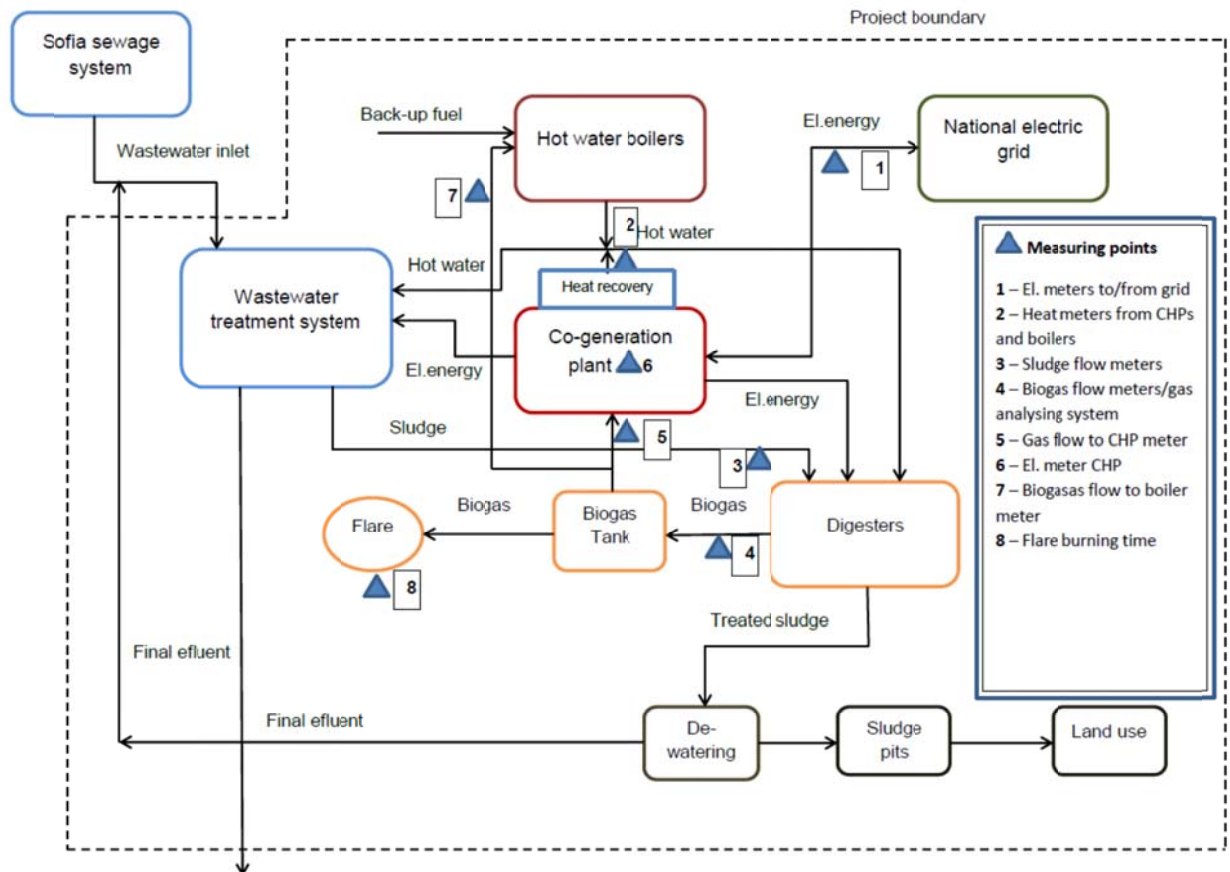
The scope of services is:

“Management and maintenance of water supply and sewerage systems on the territory of Sofia Municipality. Water supply, sewerage and treatment of waste waters services on the territory of Sofia Municipality.”

The operator of the Waste water Treatment Plant is required to comply with the data collection, testing and analysis, and data management obligations of this MP. The operator must integrate the following data collection requirements into the company's data basis and information collection policies.

Monitoring data

The following diagram shows the main measuring points related to the project:



1. Data on CHP plant performance:

Total electricity generation (MWh/yr)

Total net heat production (MWh/yr)

The data will be collected and processed on yearly basis

2. Data on biogas generation and sludge:

- Quantity and quality of biogas generated (m³/year)

- Quantity of CH₄ flared (kg/year)
- Quantity of sludge entering digesters (m³/y)
- Quantity of dry substance in the sludge entering digesters (t/y)

The data is collected continuously and recorded and processed monthly and yearly.

The operator has the responsibility to input the required data feeds on a monthly and annual basis as required in the monitoring methodology and input data templates in the electronic workbook. The workbook should be saved after each update. Back-up copies of the workbook are saved and stored on a secure system on a monthly basis to avoid loss of information.

The following measuring equipment will be used for monitoring of the project activity:

Table 40: List of measuring equipment

No	Measuring equipment	Measured parameter, variable	Equipment producer and type	Serial number	Installation date	Date of latest calibration	Periodicity of calibration	Measurement error data	Comments
1	Automatic gas analyser, flow-meter system	Methane concentration in the biogas wCH₄,y Methane – 0-100 Vol% Oxygen – 0-25 Vol% Carbon dioxide – 0-100 Vol% H₂S – 0-500 ppm Absolute pressure 0-1600 mbar	Draeger, Awite Awiflex	564_09	01 July 2009	27.05.2020	6 months	+/-1 % for Methane and Carbon Dioxide +/- 0.015 % for temperature	Analysis the content of the biogas (normalised)
2	Automatic gas analyser, flow-meter system	Biogas flow Bgburnt,y	FCI International LLC ST51 MASS FLOW METER	MODEL 022218-0620J1 S/N 642404	January 2018	N/A	N/A	+/-2%	The flow-meter is integral part of the AWITE automatic gas analyzer, flow-meter system.

3	Digital electric meter	Electricity generated by the CHP EGgrid,y	Schneider Electric PM 5560	Ser. No 600 008 706 annunciator module LSB6RGB	January 2016	New	N/A	+/- 0.5%	The electric meter is used only for internal control of the electric energy generated by the SCADA system and is not for commercial use or monitoring for the needs of this project..
4	Digital electric meter	Electricity exported to the grid EGgrid,y	ZMQ 202C.8; L+G	Ser. No 37566358	April 2019	April 2019	4 years according to the regulation	+/- 0.5%	The commercial electric meter is property of the electric distribution company (NEC)
5	Digital electric meter	Electricity exported to the grid EGgrid,y	ZMQ 202C.8; L+G	Ser. No 95591477	April 2017	April 2017	4 years according to the regulation	+/- 0.5%	The commercial electric meter is property of the electric distribution company (NEC)

6	Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/ h Tmax:90oC Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/ X001	2006	N/A	Not required if there are no range changes	Standard Calibration +- 0.5% of rate	Sludge flow meter for Digester 1
7	Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/ h Tmax:90oC Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/ X003	2006	N/A	Not required if there are no range changes	Standard Calibration +- 0.5% of rate	Sludge flow meter for Digester 2
8	Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/ h Tmax:90oC Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/ X004	2006	N/A	Not required if there are no range changes	Standard Calibration +- 0.5% of rate	Sludge flow meter for Digester 3
9	Inlet sludge flow to	Sludge Flow in m3/h	ABB Electromagnetic	000015791/ X002	2006	N/A	Not required if there are	Standart Calibration +- 0.5% of rate	Sludge flow meter for

	digester	Qmax:600m3/h Tmax:90oC Q_DGs_inlet	Flowmeter FXE4000 (COPA-XE/MAG-XE) DE41F				no range changes	0.5% of rate	Digester 4
10	Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 oC BGburnt,y	Binder , Combimass eco basic switch bio EEx de Messsystems	S.No.C0806 50	01 July 2009	N/A	Not required if there are no range changes	+/-1%	Biogas flowmeter for Digester 1 (normalised)
11	Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 oC BGburnt,y	Binder , Combimass eco basic switch bio EEx de Messsystems	S.No.C0806 47	01 July 2009	N/A	Not required if there are no range changes	+/-1%	Biogas flowmeter for Digester 2 (normalised)
12	Automatic gas analyser, flow-meter	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN	Binder , Combimass eco basic switch bio EEx de	S.No.C0806 49	01 July 2009	N/A	Not required if there are no range	+/-1%	Biogas flowmeter for Digester 3 (normalised)

	system	60529 -20 oC to +60 oC BGburnt,y	Messystems				changes		
13	Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 oC BGburnt,y	Binder , Combimass eco basic switch bio EEx de Messystems	S.No.C0806 48	01 July 2009	N/A	Not required if there are no range changes	+/-1%	Biogas flowmeter for Digester 4 (normalised)
14	Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 oC BGburnt,y	AWITE AwiFLEX Cool+	S.No 2764	2019	N/A	Not required if there are no range changes	+/-1%	Biogas flowmeter for Digester 5 (normalised)
15	Automatic gas analyser, flow-meter system	Biogas flow to CHPs, Nm3/h	Binder , Combimass eco ver.2014-02	S.No.C1205 64	July 2014	N/A	Not required if there are no range changes	+/- 0.25%+0.025% of max calibrated value(4245,24Nm 3/h)	The flowmeter is measuring the gas used in the CHPs (normalised)

									For crosschecking purposes
16	Turbine gas meter	Biogas flow to boilers 50-1000m ³ /h	Common Turbine gas meter	450345/2011	09.2014	N/A	Not required if there are no range changes	0.2Q _{max} - Q _{max} <+/-1% Q _{min} - 0.2Q _{max} <+/-2%	The flowmeter is measuring the gas used in the boiler. 16For crosschecking purposes
17	Digital thermal energy meter	Thermal energy generated by the CHP units. EG _{thermal,y}	Kamstrup, Type 602C00070D1233	Ser.No: 69303430/2013	30.12.2013 (with factory calibration)	10.2020	2 years	EC± (0.5 + Δθ _{min} /Δθ) %	The heatmeter is installed at the delivery side of the CHP unit to measure the generated useful heat.
18	Digital thermal energy meter	Thermal energy generated by the CHP units. EG _{thermal,y}	Kamstrup, Type 602C00070D1233	Ser.No: 69303431/2013	30.12.2013 (with factory calibration)	10.2020	2 years	EC± (0.5 + Δθ _{min} /Δθ) %	The heatmeter is installed at the delivery side of the CHP unit to measure the generated useful heat.
19	Digital thermal	Thermal energy	Kamstrup,	Ser.No: 69303432/2	30.12.2013	10.202	2 years	EC± (0.5 +	The heatmeter is

	energy meter	generated by the CHP units. EGthermal,y	Type 602C00070D123 3	013	(with factory calibration)	0		$\Delta\theta_{min}/\Delta\theta$ %	installed at the delivery side of the CHP unit to measure the generated useful heat.
20	Digital thermal energy meter	Thermal energy generated by the CHPs exhaust gasses	Kamstrup 602C00070D123 3	S.No 78347526	2017	10.202 0	2 years	$EC \pm (0.5 + \Delta\theta_{min}/\Delta\theta)$ %	The heatmeter is installed at the delivery side of the utiliser to measure the generated useful heat.
21	Digital thermal energy meter	Thermal energy generated by the boiler. EGthermal,y	Kamstrup, Type 602C00020C123 3	Ser.No: 69303436/2 013	30.12.2 013 (with factory calibration)	10.202 0	2 years	$EC \pm (0.5 + \Delta\theta_{min}/\Delta\theta)$ %	The heatmeter is installed at the delivery side of the boiler units to measure the generated useful heat.

The management and operation of the project is a responsibility of Sofiyska voda AD (the project operator). Ensuring the environmental credibility of the project through accurate and systematic monitoring of the project's implementation and operation, for the purpose of achieving trustworthy VERs is the key responsibility of the operator.

The project operator has the responsibility to procure and install all the necessary equipment and data acquisition systems to enable the collection and of the stipulated data at the required frequency, and to manage and present this data in the electronic workbook as part of a wider data management system that would be sufficient to meet the needs of the monitoring and the independent verifier.

The establishment of transparent, auditable systems for the collection and storage of data, including adequate record keeping and data monitoring systems is also a responsibility of the operator. The operator developed and implemented a protocol that provided for these critical functions and processes, fit for independent auditing.

For electronic and paper based data entry and record keeping system, there is clarity in terms of the procedures and protocols for collection and entry of data, use of workbooks and spreadsheets and any assumptions made, so that compliance with requirements could be assessed by a third party. Stand-by processes and systems, e.g. paper based systems, are outlined to provide for the possibility of electronic system failures and used in the event of such failure. The record keeping system provides for a paper trail that could be audited.

The operator appointed a competent manager who has been in charge of and accountable for the generation of VERs including monitoring, record keeping, computation of VERs, audits and verification. The operator officially signed off on all official paper versions of GHG emission worksheets.

The general project management was implemented by Mr. Jelyaz Rangelov – Manager of Kubratovo WwTP through supervising and coordinating activities of his subordinates, such as head of laboratory, head of Process Management dept., head of accounting department, head of planning unit. During the daytime a group of mechanics who are responsible for maintenance of all technological and measuring equipment as well as automation tools are present on-site.

On-line information was transmitted to the Chief Engineer Mr. Boris Preslavski. His department calculated finally emission reductions based on that data and I archived all data.

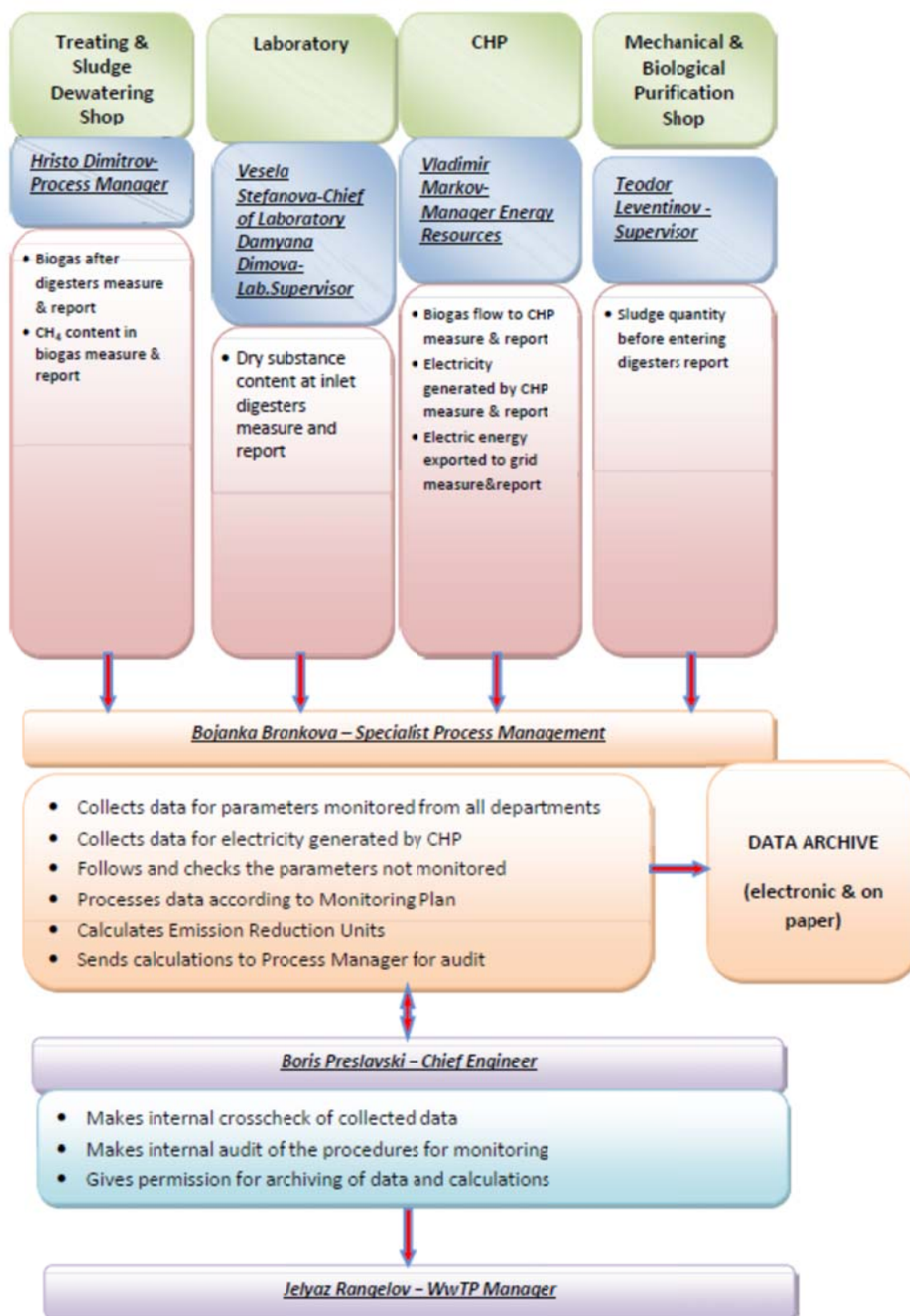
The personnel of Treating and Dewatering of the sludge process, listing 32 people and headed by the Process manager Mr. Hristo Dimitrov are authorized to take all measurements related to the generation of biogas.

The plant laboratory managed by Mrs. Vesela Stefanova and Mrs. Danyana Dimova measure the dry substance content in the sludge at inlet of anaerobic digesters. The data are transferred to the Process Management dept. for further processing.



TEMPLATE

Flow chart with procedures for monitoring reporting and data flow



SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1. Start date of project

As per GS TAC decision from September 2014 the crediting period is a renewable 3*7 year period with a maximum of 21 years overall. The starting date of the first crediting period under JI and under a Green Investment Scheme is 1 January 2007. The baseline got renewed retroactively 2 years prior to the date of registration of the project under Gold Standard.

The 6-week review by the Gold Standard expired on 31/03/2016 and the project is considered registered on 01/04/2016. According to the GS regulations the start date of the GS crediting period was 01/04/2014 (2 years prior GS registration).

The length of the 1st GS crediting period is 7 years 0 months (renewable period).

C.1.2. Expected operational lifetime of project

25 years as validated in the initial GS certified PDD.

C.2. Crediting period of project

C.2.1. Start date of crediting period

As per the above GS TAC decision dated September 2014 the total crediting period of the project activity is 21 years for the period 01/01/2007 - 31/12/2028. This was confirmed by GS when transition of the project to GS4GG took place.

The overall crediting period includes the following schemes:

01/01/2007 – 31/12/2007 – Green Investment Scheme

01/01/2008 – 31/12/2012 – Joint Implementation Scheme

01/04/2014 – 31/03/2021 – 1st 7-years GS crediting period

01/04/2021 – 31/03/2028 – 2nd 7-years GS crediting period (subject to GS approval)

C.2.2. Total length of crediting period

21 years 0 months

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1. Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in [Appendix 1](#). No mitigation measures need \ed to be added to the monitoring plan.

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	In accordance with the discussion provided in Gold Standard Gender Policy's Foundational gender-sensitive requirement, the project will strengthen Gold Standard's 'do no harm' approach and addresses safeguards to prevent or mitigate adverse impacts on women or men and girls and boys. It is very well understood that such action is mandatory for all projects seeking Gold Standard certification and includes compliance with the gender 'do no harm' safeguards, gender gap analysis and gender sensitive stakeholder consultations. From this point of view, the renewable energy source provided by this project does not discriminate people on gender. The Project does not impact women or men directly or indirectly. The gender sensitiveness of the Project will be checked during the local stakeholder engagement rounds in the future
Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	Answer: Bulgaria ratified the UN's Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) in 20/12/1985. It has also ratified ILO conventions C100 & C111 in 1967, making illegal the discrimination based on sex. Moreover, Bulgaria views gender equality as a key priority in the national human rights agenda and an absolute necessity for the full realization of human rights. To achieve full gender equality in the next 10 years, adopted in April, 2016 a new specialized law on gender equality³⁹, and will ensure that a gender perspective is mainstreamed into all policies. As one of the 47 member states of the Council of Europe, Bulgaria has signed the Council's Convention on Preventing and Combating Violence against Women

³⁹<https://lex.bg/en/laws/ldoc/2136803101>

	and Domestic Violence (Istanbul Convention)⁴⁰ and aims to implement the Council of Europe Gender Equality Strategy 2018-2023. The Strategy defines its goals and strategic objectives as 'prevent and combat gender stereotypes and sexism', 'prevent and combat violence against women and domestic violence', 'ensure the equal access of women to justice', 'achieve balanced participation of women and men in political and public decision-making', 'protect the rights of migrants, refugee and asylum-seeking women and girls', and 'achieve gender mainstreaming in all policies and measures'. The Project respects all of these relevant conventions, laws, commitments and strategies. Hence, it has been designed in accordance with the principles of gender equality, non-discrimination and women's empowerment.⁴¹ According to the Bulgarian Labour Code⁴², art.243 : " Women and men shall have the right to equal remuneration for identical and equal work.
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	No expert is required for the Gender Safeguarding Principles & Requirements.
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	The Stakeholder Consultation has been performed and certified by GS during the initial certification of the project in 2016.

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The Local stakeholder consultation process was organised according to the requirements of Gold Standard during the process of initial certification of the project after GS.

⁴⁰ Ratification by Parliament pending

⁴¹ [Please see the recent situation of Istanbul Convention](#)

⁴² <https://www.mlsp.government.bg/eng/legislation-1>

Sofyiska Voda invited a wide range of stakeholders, covering the categories suggested by Gold Standard. In addition to the relevant governmental institutions were invited local and international NGOs, as well as representatives of GS.

In order to invite stakeholders from Category A (Local People), announcements were published in one national newspaper, three news websites, on the information board of the head office of Sofyiska voda and the WWTP Kubratovo, as well as on the web page of Sofyiska Voda.

The meeting took place on April 15th, 2015 in Sofia, Kubvratovo WWTP. 15 stakeholders attended the meeting representing a diverse group of stakeholders from ministries, municipalities, agencies and NGOs.

Detailed information on the Stakeholder consultations can be found at the GS sustaincert here: https://impact.sustain-cert.com/public_projects/780.

In addition when a decision was taken to apply for re-certification of the project for a new crediting period, requests were sent by e-mail and post to stakeholders to update and share their opinion on the project.

Formal requests were sent to the following organisations and persons:

1. Ministry of Environment and Water
2. Sofia Municipality
3. Daniela Raycheva – Mayor of “Novi Iskar” Municipality
4. Eng. Todor Krastev- Mayor of “Serdika” Municipality
5. The Regional Inspectorate of Environment and Water-Sofia
6. WWF Bulgaria – Georgi Stefanov, Manager “Climate Change and Green Economy”
7. „Greenpeace” - Bulgaria
8. Renewable Energy and Energy Efficiency Partnership (REEP)
9. Helio international
10. Gold standard Foundation

Until present day official answers were received only from the Ministry of Environment and Water (letter No 26-00-1478/17/12/2020) and Sofia Municipality (letter No COA20-TD26-11995 – [1]/19.12.2020).

The letters are presented in Appendix 3 of this PDD.

Updated information for the project is published on the site of Sofiyska voda AD here: <https://www.sofiyskavoda.bg/CustomPages.aspx?PageID=41>

E.1. Summary of stakeholder mitigation measures

After the presentation of the project a discussion was held and questions were posed. The stakeholders performed the Blind SD Matrix exercise and filled in evaluation forms.

A few questions rather than comments were raised:

- Would the employees working on the project have been hired in the absence of project?
- What is the produces heat used for?
- How is the remaining sludge after the process managed?
- Is there any information about the effect of the sludge/soil fertilizer on the soils?Answers to these questions were given by the Management of the plant and project consultants.

E.2. Final continuous input / grievance mechanism

The overall evaluation of the meeting by the participants was very positive. The attendees expressed opinion that the project should be better publicized in order to serve as an example.

No negative comments/remarks were received. All the questions raised were answered accordingly.

A detailed description of the Local stakeholders consultation process is given in the LSCR, uploaded on the web site of GS during the initial certification in 2016.

The grievance mechanism provided for the project includes:

1. Special book for comments, questions and propositions regarding the project is organized at the office of the Waste-water Treatment Plant in the village of Kubratovo, near Sofia;
2. An e-mail address for any comments and opinions is published on the web site of Sofiyska voda here:
<https://www.sofiyskavoda.bg/CustomPages.aspx?PageID=41>
3. Contact telephones and name of the contact person are also published there.

Until now no any comments have been made in the book or by e-mail.

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights 2. The Project shall not discriminate with regards to participation and inclusion	NO	1. The Project is not in conflict with the general economic life in Bulgaria or of the local community. The Project does not cause any human rights abuse. Moreover, by providing of wastewater treatment to the capital of Bulgaria the project guarantees the right to high standard living conditions to more than 1,5 million citizens of	Not required

		Sofia. Bulgaria has ratified the Universal Declaration of Human Rights.⁴³ Bulgaria has also ratified all relevant conventions on human rights, including, without limitation: - The European Convention of Human Rights, and Protocols 1 (protection of property), 4 7 and 13 - International Covenant on Civil and Political Rights; - International Covenant on Economic, Social and Cultural Rights; - Convention on the Elimination of all forms of Racial Discrimination; 2. Project activities are not expected to cause any human rights abuse. Bulgaria is a member of the European	
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⁴³ <https://www.cdp.bg/en/index.php?p=element&aid=32>

		Union and of the United Nations and part of UN Agreement on Human Rights. As part of the EU Bulgaria is obliged to strictly follow all European standards regarding preservation of human rights. No action against human rights is tolerated what-so-ever.	
Principle 2. Gender Equality			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women 2. Projects shall apply the principles of nondiscrimination, equal treatment, and equal pay for equal work 3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)	NO	1. The project respects Women's rights, including dignity, cultural property and uniqueness of indigenous people. Participation is completely voluntary and the project respects personal freedom and liberty. The project respects internationally proclaimed human rights. Bulgaria has ratified the Convention on the Elimination of all forms of Discrimination Against Women; 2. The personnel of 32 engaged in the running	Not required

		of the project includes 9 women that occupy positions requiring high level of education and abilities. 3. The project takes into account the roles of women and men and their possibilities to work for the project following the requirements of the Ministry of Labour and Social Care; 4. The project has a potential to contribute to the increase of women's workload, having in mind that working for the project is a full-time job which can influence the possibility to take care for children and family. In this respect the government and local authorities are taking all possible measures to provide care for children in kindergardens and schools. 5. The project involves operation of	
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		mechanical, electrical and biological equipment which potentially can expose women workers to some risks and hazards in case of accidents or not following safety rules. However the company policy in that respect is very strict and involves regular trainings in safety measures and safety knowledge improvement.	
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community	NO	The Project avoids community exposure to increased health risks and does not adversely affect the health of the workers and the community. The Project developer Sofiyska voda AD is certified by ISO 45001:2018 – Health and safety management ⁴⁴ (reg.# 44 126 087290)	Not required

⁴⁴ https://www.sofiyskavoda.bg/about/safety_and_health.aspx

Principle 4.1 Sites of Cultural and Historical Heritage			
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	NO	The Project area does not include any historical or other sites of interest. It is situated in the field outside nearby communities.	Not required
>>			
Principle 4.2 Forced Eviction and Displacement			
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	NO	The Project is situated in the field outside nearby communities and did not require any physical or economic relocation of people.	Not required
>>			
>>			
Principle 4.3 Land Tenure and Other Rights			
Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership?	NO	The land on which the Project is situated is property of Sofia Municipality and the whole equipment based on it is issued for operation to Sofiyska Voda AD (the Project	Not required

>>		owner – part of Veolia group) under a General concession contract ⁴⁵ amended in lastly 2018. The company is part of the French Veolia group and strictly follows European standards against corruption.	
Principle 5. Corruption			
1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	NO	The Project is owned by a private entity and is certified by ISO 37001:2016 – Anti-bribery Management System with Certificate No 066 20 0002, valid until 05/07/2023.	Not required
Principle 6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental	NO	1. Sofiyska voda, as Project Developer, has ensured that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental	Not required

⁴⁵ <https://www.sofiyskavoda.bg/docs.aspx?docs=7>

conventions 2. Workers shall be able to establish and join labour organisations 3. Working agreements with all individual workers shall be documented and implemented and include: a) Working hours (must not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND c) Remuneration (must include provision for payment of overtime), AND d) Modalities on health insurance, AND e) Modalities on termination of the contract with provision for voluntary resignation by employee, AND		conventions. The company is certified by ISO 45001:2018 – Health and safety management ⁴⁶ (reg.# 44 126 087290) 2. All workers are able to establish and join labour organisations as per the Labour Code of Bulgaria⁴⁷. 3. Working agreements with all individual workers are documented and implemented and include: a) Working hours (do not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND c) Remuneration (include provision for payment of overtime), AND d) Modalities on health insurance, AND e) Modalities on termination of the contract with provision	
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⁴⁶ https://www.sofiyskavoda.bg/about/safety_and_health.aspx

⁴⁷ <https://www.mlsp.government.bg/zakoni>

f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave. 4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion) 5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures		for voluntary resignation by employee, AND f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave. All personal labour contracts follow the requirements of the Bulgarian Labour Code. 4. Children labour is not allowed in Bulgaria as per the Labour Code. Bulgaria has also ratified Convention on the Rights of the Child. 5. The Project Developer ensured the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures	
Principle 6.2 Negative Economic Consequences			
1. Does the project cause negative economic	NO	No negative economic consequences during and after	Not required

consequences during and after project implementation?		implementation of the project were registered. On the contrary, the project strengthened the economic status of the company and near-by communities by providing 32 additional working positions, some of them for local citizens.	
>>			
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario?	NO	The methane produced by the WWTP is captured in methane tanks and utilised as a fuel for energy production. This leads to the reduction of high amounts of CH ₄ (powerful greenhouse gas). In addition the production of electricity and heat from biogas replaces the use of fossil fuels thus reducing greenhouse gases such as CO ₂ .	Not required
>>			
Principle 7.2 Energy Supply			
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	NO	The project is self-sufficient in energy terms. It produces electricity, which in the absence of the project would have been supplied from the local grid. The fuel resource (methane) could not be used	Not required

>>		by local users in the absence of the project.	
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	NO	The project does not affect the natural water pattern and flow. No depletion or contamination of local reservoirs/ aquifers occurs. Water consumed in the whole range of the project is to prepare a solution of a flocculent for compression and dewatering of the treated sludge, as well as for washing the machines and to supplement the heating system if necessary. Part of the water used is technical water. The wastewater formed in the process is returned to the entrance of the plant for processing. The plant possesses Permission for deposition of the effluent outlet water into the Iskar river No 1295/14.04.2014, issued by the Ministry of Environment and Water. The Permission defines the quantity of inlet and outlet water and the quality of the effluent water.	Not required
>>			

		The quality of the effluent water and heavy metals content is monitored and measured according to the plan and frequency part of the Permission. The quality of the water is monitored by the accredited laboratory part of Kubratovo Wastewater Treatment Plant.	
Principle 8.2 Erosion and/or Water Body Instability			
Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	NO	The project does not result in soil erosion, and does not contribute to soil contamination by pollutants. The deactivated sludge coming out of the digesters is dewatered, dried and used as fertilizer.	Not required
>>			
Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	NO	The project does not involve the use of any land and soil for production of crops or other production. The equipment needed for the project is situated on the land of the WWTP.	Not required
>>			
Principle 9.2 Vulnerability to Natural Disaster			

Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	Potentially	The project is a municipal wastewater treatment and has no any direct relation to vulnerability to natural disaster. However in case of very heavy and long lasting rains in the area there is a potential threat of flooding the premises. That threat exists for the whole area around the capital of Sofia and is taken into account by the Municipality authorities.	Not required
>>			
Principle 9.3 Genetic Resources			
Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?	N/A	N/A	N/A
>>			
Principle 9.4 Release of pollutants			
Could the Project potentially result in the release of pollutants to the environment?	Potentially	The project has major positive effect on the air quality through dramatically reducing the existing methane gas emissions at the plant while	Not required
>>			

		also reducing the volume of sludge (to as much as 50%) that needs to be transported, hence reducing GHG emissions from transportation as well. Waste oil is disposed according to the Complex permission for Operation , issued by the Bulgarian Ministry of Environment and Water.	
Principle 9.5 Hazardous and Non-hazardous Waste			
Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	NO	One of the products as a result of the project is the deactivated sludge coming out of the digesters. It is dewatered, dried and used as fertilizer. The quality of the deactivated sludge is monitored and checked regularly by an accredited third party and the results are issued in a special Protocol for testing. The tests guarantee that the deactivated sludge corresponds to all requirements for use as a fertilizer and does not contaminate the soil whatsoever. The Protocols are available for	Not required
>>			

		inspection at the plant. The quantity of deactivated sludge shipped for use as fertilizer on the field is monitored by recording the trucks shipped and the tonnage of sludge shipped. Another waste product from the project is the waste oil used in the equipment. The collection of the waste oil is done by an authorized company certified for collection and treatment of waste oil. The waste oil is disposed according to the requirements of the Decision for Waste Treatment No 12-ДО-1204-00 dated 20.02.2013, issued by the Regional Inspection for Environment.	
Principle 9.6 Pesticides & Fertilisers			
Will the Project involve the application of pesticides and/or fertilisers?	N/A	N/A	N/A
>>			
Principle 9.7 Harvesting of Forests			
Will the Project involve the harvesting of forests?	N/A	N/A	N/A

>>			
Principle 9.8 Food			
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	N/A	N/A	N/A
>>			
Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry?	N/A	N/A	N/A
>>			
Principle 9.10 High Conservation Value Areas and Critical Habitats			
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	NO	The project area is not physically related to any intact or High Conservation Value ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified.	Not required
>>			
Principle 9.11 Endangered Species			
Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)?	NO	There are no endangered species identified in the Project area. The Wastewater treatment plant is situated on plain low category wasteland outside living areas.	Not required

AND/OR Does the Project potentially impact other areas where endangered species may be present through transboundary affects?		The effluent water is with very high quality and is safely deposited into the near-by Iskar river following all requirements of the Ministry of Environment and Water.	
>>			

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Sofiyska voda AD
Registration number with relevant authority	Business Park Sofia, Mladost 4
Street/P.O. Box	-
Building	2A
City	Sofia
State/Region	Sofia
Postcode	1766
Country	Bulgaria
Telephone	+359 2 812 25 30
E-mail	sstanev@sofiyskavoda.bg
Website	www.sofiyskavoda.bg
Contact person	Stanislav Stanev
Title	Operations and Maintenance Director
Salutation	Mr.
Last name	Stanev
Middle name	
First name	Stanislav
Department	Head office
Mobile	+359 888206952
Direct tel.	+359 2 812 25 30
Personal e-mail	sstanev@sofiyskavoda.bg

APPENDIX 3 – LETTERS FROM STAKEHOLDERS REGARDING RE-CERTIFICATION



РЕПУБЛИКА БЪЛГАРИЯ МИНИСТЕРСТВО НА ОКОЛНАТА СРЕДА И ВОДИТЕ

Дирекция „Политика по изменение на климата“

Изм. № 26-00-1478/17.12.2020 г.

ДО

Г-Н СТАНИСЛАВ СТАНЕВ
ЗАМЕСТИК ИЗПЪЛНИТЕЛЕН ДИРЕКТОР НА
„СОФИЙСКА ВОДА“ АД
Бизнес парк София, Стара 2А
гр. София

Относно: Проект „Улавяне на метан и комбинирано производство на енергия в пречиствателна станция „Кубратово“ на „Софийска вода“ АД, одобрен през 2016 г.

УВАЖАЕМИ ГОСПОДИН СТАНЕВ,

Във връзка с Ваше писмо вх. № 26-00-1478 от 10.12.2020 г. за коментар и становище относно проект „Улавяне на метан и комбинирано производство на енергия в пречиствателна станция „Кубратово“ на „Софийска вода“, моля да имате предвид следното.

До настоящия момент, участието на „Софийска вода“ АД по установените в международното и националното право механизми за намаляване на емисиите на парникови газове, управлявани от Министерството на околната среда и водите бележи постоянство и приемственост. Министерството на околната среда и водите администрира проект „Улавяне на метан и комбинирано производство на енергия в пречиствателна станция „Кубратово“ от 2008 г., като същият премина успешно през всички етапи на механизма Съвместно изпълнение. Този подход беше запазен и от 2016 г. до момента проектът удостоверява намаления по доброволната схема за намаляване на емисии по чл. 69 от Закона за ограничаване изменението на климата.

Подкрепената от българската държава амбиция на ЕС за климатична неутралност до 2050 г. и приетата от европейските лидери нова по-амбициозна цел от минимум 55 % намаление на емисиите на парникови газове на ЕС до 2030 г. е свързана с въвеждането на иновативни технологии за енергийна ефективност, които да заменят и подобрят традиционните методи на производство и доставка на електрическа енергия за промишлеността и бита. Тези два приоритетни аспекта са в основата на управлението от „Софийска вода“ АД проект.

Впечатление прави, че реализацията на проекта и постигнатата до голяма степен енергийна независимост на Пречиствателна станция „Кубратово“ е довела до почти пълното



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енергийно обезпечаване на нуждите от електрическа енергия на цялото дружество „Софийска вода“.

Бихме предложили да споделяте добрия си опит и с други ВиК оператори с оглед решаване на съществуващи проблеми с третирането на утайки на места в страната.

Проектът допринася пряко за осъществяване на три от целите за устойчиво развитие на ООН: Цел 6: Чиста вода и санитарни условия, в която индикатор 6.3 „Качество на водата и отпадъчни води“ се изисква съществено повишаване на безопасната повторна употреба на водата.

Цел 11: Устойчиви градове и общности – нарастването на населението на Софийска област представлява предизвикателство за оползотворяването на всякакъв вид отпадъци, в това число и отпадъчните води. Проектът предлага адекватен технологичен отговор на необходимостта от рециклиране на утайките

Цел 13: мерки за борба с климатичните промени – пряк принос към постигането на тази цел са реализираните с проекта намаления на емисии на парникови газове – които от 2008 г. до момента, според данните от верификационните доклади са приблизително 1 500 000 tCO₂.

По отношение на изразеното от дружеството желание реализирането на намаления на емисии по доброволната схема да продължи и след 2020 г., бихме искали да посочим, че ни е необходимо известно време за оценка, дали това би било възможно. От 1 януари 2021 г. започва Четвъртият етап на Европейската схема за търговия с емисии, а на 31 декември 2020 г. приключва Вторият период на Протокола от Киото. Необходими са известни консултации със службите на ЕК относно статута на предписаните емисионни единици и прехода между периодите.

При повече яснота в тази връзка ще имаме ангажмента да уведомим всички участници в доброволната схема.

С уважение,

БОРЯНА КАМЕНОВА

ДИРЕКТОР НА ДИРЕКЦИЯ „ВК“





СТОЛИЧНА ОБЩИНА

София 1000, ул. "Московски" № 33, телефон: 029377351, факс: 029809870, www.sofia.bg



Столична община

Исходящ №
COA20-ТД26-11995-[1]
Регистриран на 19.12.2020

За преглед: <https://sofia.bg/registry-report>



ДО
Г-Н СТАНИСЛАВ СТАНЕВ
ЗАМ. ИЗПЪЛНИТЕЛЕН ДИРЕКТОР
„СОФИЙСКА ВОДА“ АД

КОПИЕ ДО
Г-ЖА ДЕСИСЛАВА БИЛЕВА
ЗАМ. КМЕТ НА СТОЛИЧНА ОБЩИНА

На наш № COA20-ТД26-11995/10.12.2020 г.

Относно: Удължаване на регистрацията по Златен Стандарт за намаляване на емисиите на парникови газове за проект „Улавяне на метан и комбинирано производство на електрическа енергия в Станция за преработка на отпадъчни води Кубратово“

УВАЖАЕМИ Г-Н СТАНЕВ

По повод Ваше писмо с под горния номер относно удължаване на регистрацията на проект „Улавяне на метан и комбинирано производство на електрическа енергия в Станция за преработка на отпадъчни води Кубратово“ по доброволния Златен стандарт за намаляване на емисиите на парникови газове, предоставям на Вашето внимание отговори на поставените въпроси в писмото, както следва:

1. Какво е Вашето цялостно впечатление за проекта?

Проектът, изпълнен от „Софийска вода“ АД, има значителен ефект за смекчаване изменението на климата, тъй като чрез него се ограничават емисиите от силния парников газ метан с приблизително 90 хил. tCO₂e годишно. В допълнение на този директен ефект, се произвежда чиста енергия по ефективен начин (комбинирано производство), което също допринася за намаляване на емисиите на парникови газове от заместване на закупената електроенергия, част от която се произвежда от изкопаеми горива и се избягва използването на дизелово гориво за отопление. Изпълненият проект произвежда около 22 хил. MWh топлинна и 20 хил. MWh електрическа енергия годишно.

Като цяло изпълнението на такъв тип дейности може да служи за добър пример, който да бъде репликиран и в други пречиствателни станции в страната.

2. Кои аспекти от проекта намирате за привлекателни?

Освен директното намаляване на емисии, което е основен принос на проекта към борбата с изменението на климата, безспорни ползи се наблюдават по отношение на ефективността при производството и оползотворяването на енергия. Използваната технология същевременно намалява обема на утайките (до 50%), които трябва да бъдат транспортирани, като по този начин намаляват и емисиите на парникови газове от транспорта. Вече преработените утайки се оползотворяват в земеделието за наторяване (приблизително 33 хил. тона годишно), като по този начин се постига ресурсна ефективност на предлаганите от дружеството комунални услуги и постепенно преминаване към кръгова икономика. От основно значение е замаяната на съществуващия преди реализирането на проекта през 2007 г. нискотехнологичен процес на третиране на утайки в Кубратово със съвременен

Писмото се издава в 1 (еден) оригинален екземпляр и не носи хартиен носител. Писмото се сканира и се изпраща до адресата чрез АИССО/СЕОС.

усъвършенстван процес, отговарящ на най-добрите практики за третиране на утайки, налични в Западна Европа.

3. Кои аспекти от проекта считате, че могат да бъдат подобрени?

По отношение на аспекти, които могат да бъдат подобрени, бихме посъветвали да се обърне повече внимание на процеса на третиране на утайките преди предоставянето им на земеделските производители за оползотворяване предвид отделянето на неприятни миризми. В столична община са постъпвали сигнали от граждани за неприятни миризми в района на оползотворяване на утайките и в тази връзка бихме препоръчали да се потърсят технологични подобрения в тази насока.

4. Какво е Вашето мнение за приноса на проекта към изпълнението на целите на ООН за устойчиво развитие?

Считам, че изпълненият проект има принос към основната релевантна цел за устойчиво развитие Цел 13 – „Спешни мерки за борба с климатичните промени“. Метанът, който се отделя при пречистването на отпадъчните води, се улавя в резервоари и се използва като гориво за производство на енергия, голяма част от която е необходима в процеса на пречистване на водите. Това води до намаляване на количествата метан с ок. 95 %, които при липса на направените подобрения биха се изпускали в атмосферата. Производството на енергия допълнително води до намаления на емисии на парникови газове посредством замяна на използваните конвенционални горива. В допълнение се намаляват и емисиите на метан от утайките, които преди реализацията на проекта са били депонирани. От началото на работата на когенерационната инсталация до момента е постигнато общо намаление на емисиите на въглероден диоксид еквивалент от над 1 милион тона.

Проектът спомага за подобряване на достъпа до безопасна и достъпна питейна вода за местното население, с което допринася за постигане на Цел за устойчиво развитие 6 – „Чиста вода и санитарни условия“. Чрез стимулиране на инвестиции в разширяване и усъвършенстване на водопроводната и канализационна система на град София, проектът помага да се осигури достъп до адекватни и справедливо разпределени чиста вода и санитарни условия за местните граждани.

Приносът на изпълнения проект на Софийска вода към Цел за устойчиво развитие 11 – „Устойчиви градове и общности“ е от особена важност в контекста на поетите от Столична община ангажменти във връзка с присъединяването си към Глобалното споразумение на кметовете за климат и енергия, както и предприетите дейности като текущото разработване на „План за действие за устойчива енергия и климат“, приетите „Краткосрочна програма за насърчаване използването на енергия от възобновяеми източници и биогорива на СО 2020-2022“ и „План за действие за Зелен град“ на Столична община.

Предвид казаното по-горе изказвам подкрепа за удължаване на регистрацията на проект „Улавяне на метан и комбинирано производство на електрическа енергия в Станция за преработка на отпадъчни води Кубратово“ по доброволния Златен стандарт.

С УВАЖЕНИЕ,

ТЕОДОРА ПОЛИМЕРОВА
ДИРЕКТОР НА ДИРЕКЦИЯ
„КЛИМАТ, ЕНЕРГИЯ И ОВЪЗДУХ“
СТОЛИЧНА ОБЩИНА

Съгласували:

Антония Новакова, началник на отдел КЕ

Изготвил: Ивона Грозева, гл. експерт в отдел КЕ

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TRANSLATION IN ENGLISH

TO
Mr. STANISLAV STANEV
DEPUTY EXECUTIVE DIRECTOR
"SOFIA WATER" AD

COPY TO
MRS. DESISLAVA BILEVA
DEPUTY MAYOR OF THE CAPITAL MUNICIPALITY
On our No COA20-Td26-11995 / 10.12.2020 r.

Subject: Extension of the registration under the Gold Standard for reduction of emissions of greenhouse gases for the project "Capture of methane and cogeneration of electricity at Kubratovo Wastewater Treatment Plant "

DEAR MR. STANEV

Regarding your letter under the above number regarding the extension of the project registration of

"Methane Capture and Cogeneration at a Wastewater Treatment Plant
Kubratovo Wastewater " with voluntary Gold Standard for Reducing Greenhouse Gas Emissions,

I bring to your attention the answers to the questions left in the list as follows:

1. What is your overall impression of the project?

The project has a significant effect on mitigating the change of climate, as it limits methane gas methane emissions by approximately 90 thousand tCO₂e per year. In addition to this direct effect, clean energy is produced by efficient way (cogeneration), which also contributes to reducing emissions of greenhouse gases from the replacement of grid electricity, part of which is produced by

fossil fuels and the use of diesel fuel for heating is avoided. The completed project produces about 22 thousand MWh of heat and 20 thousand MWh of electricity per year.

In general, the implementation of this type of activity can serve as a good example to be realized in other treatment plants in the country.

2. Which aspect of the project do you consider most attractive

Except for the direct reduction of Greenhouse gasses, which is a basic contribution of the project to the struggle against Climate change, indisputable benefits are observed in terms of the effectiveness of the production and utilization of energy. At the same time, the used technology decreases

the volume of sludge (up to 50%) which must be transported, thus reducing and greenhouse gas emissions from transport. The processed sludge is used as fertilizer in agriculture (about 33 thousand tons per year), thus achieving resource efficiency of the utility services offered by the company and gradual transition to a circular economy. The replacement of the existing low-tech sludge treatment process in Kubratovo before the realization of the project in 2007, with modern one is of basic significance.

3. Which aspect from the project you think can be improved?

On more aspects, although there may be improvements, we would advise to pay more attention to the process of tertiary treating of the sludge before agricultural implementation. There were signals for emission of unpleasant odours in the areas of the utilization of the sludge and

in this connection we would recommend to look for technological improvements in this area.

4. What is your opinion to the implementation of the UN Goals for

sustainable development?

I think that the implemented project has a contribution to the main relevant SDG 13 - "Emergency measures to combat climate change". The methane released in wastewater treatment is captured in tanks and used as a fuel for production of energy, a large part of which is necessary in the process of water treatment. This leads to reducing the amount of methane by approx. 95%, which in the absence of the project would be emitted into the atmosphere. Energy production further leads to a reduction in emissions of Greenhouse gases by the substitution of used conventional fuels. In addition Methane emissions from sludge, which were deposited before project implementation, are also reduced.

Since the beginning of the operation of the co-generation installation, a total reduction of carbon dioxide emissions equivalent to more than 1 million tons has been registered.

The project is able to improve the deficit of available drinking water for the local population, which contributes to the achievement of Sustainable Development Goal 6- "Clean water and sanitation

conditions " by stimulating investment and expanding and improving the water supply and sewerage system of the city of Sofia. the project cannot be accessed fairly distributed clean water in sanitary conditions for local citizens.

The contribution of the completed project of Sofia Water to the Sustainable Development Goal 11

"The development of cities and towns" is of a special importance in the aspect of Sofia Municipality

commitments in connection with their accession to the Global Covenant of Mayors for energy, as well as activities such as the ongoing development of action plans for sustainable energy and climate". The adopted "Short - term program to promote the use of Energy from Renewable Sources of the Council 2020-2022" and "Green City Action Plan" of Sofia municipality.

In view of the above, I support the extension of the registration of the project "Methane Capture and Combined Production of Electricity in Kubratovo Wastewater Treatment Plant" under the voluntary Gold standard.