



Monitoring report form
(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	"Methane Gas Capture and Electricity Production at Kubratovo Wastewater Treatment Plant, Sofia, Bulgaria"	
GS reference number of the project activity	GS4238	
Version number of the monitoring report	04	
Completion date of the monitoring report	30/12/2016	
Monitoring period number and duration of this monitoring period	1 st Monitoring period; 01/04/2014 – 31/05/2016 (2 years and 2 months)	
Project participant(s)	Sofiyska Voda AD (Project owner)	
Host Party	Bulgaria	
Sectoral scope(s)	Sectoral scope 01: Energy Industries – Renewable Energy Sources Sectoral scope 13: Waste handling and disposal;	
Selected methodology(ies)	AMS-III.H/Version 17: Methane recovery in wastewater treatment, dated 28 Nov 2014; AMS-I.D/Version 18 "Grid connected renewable electricity generation", dated 28/11/2014; AMS-I.C./Version 20: Thermal energy production with or without electricity, dated 01 June 2014;	
Selected standardized baseline(s)	N/A	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	152,265	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	-	130,376

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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 newly installed CHP gas engines for electricity and heat production, which in turn will substitute both the plant's electricity purchases from the grid and diesel fuel usage. Excess electricity is supplied to the grid.

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 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.

A.2. Location of project activity

The project activity is situated at the site of Sofia central waste-water treatment plant near the village of Kubratovo, located some 20 km outside the centre of Sofia, the capital of Bulgaria, near the Iskar river.

The geographic coordinates of the project site are as follows:

Table 1: Geographic coordinates of the project.

Latitude	Longitude
42°45'10.70"N	23°22'11.56"E

Fig.1: Location of the project site.



The site is clearly visible in GOOGLE Earth as shown on Fig.1.

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



A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Republic of Bulgaria (host)	Sofiyska voda AD (joint venture between Sofia Municipality and Veolia)	No

A.4. Reference of applied methodology and standardized baseline

For determination of the baseline, the methodology AMS-III.H: Methane recovery in wastewater treatment (Version 17) and AMS-I.C, "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories – I.C. Thermal energy production with or without electricity", Version 20, approved by the CDM Executive Board, are applied, using conservative options and data as presented in the following section.

To prove additionality, 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") is used.

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

- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" Version 01;
- "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" Version 02;
- "Emissions from solid waste disposal site", Version 7.0.1;
- "Project emissions from flaring", Version 2.0.0;
- "Tool to calculate the emission factor for an electricity system", Version 04.0.0;

- “Tool to determine the remaining lifetime of equipment”, Version 1;
- “Project and leakage emissions from anaerobic digesters”, Version 1;

The project does not use a standardized baseline.

A.5. Crediting period of project activity

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 will get 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 is 01/04/2014 (2 years prior GS registration).

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

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 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)

A.6. Contact information of responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Sofiyska voda AD
Street/P.O. Box	Business Park Sofia, Mladost 4
Building	2A
City	Sofia
State/Region	Sofia
Postcode	1766
Country	Bulgaria
Telephone	+359 2 812 25 30
Fax	+359 2 974 45 14
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	Stanislav
First name	Head office
Department	
Mobile	+359 2 974 45 14
Direct fax	+359 2 812 25 30
Direct tel.	sstanev@sofiyskavoda.bg
Personal e-mail	Sofiyska voda AD

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Green Carbon Bulgaria Ltd.
Street/P.O. Box	33 "6 th September" str.
Building	-
City	Sofia
State/Region	Sofia
Postcode	1000
Country	Bulgaria
Telephone	+359 888937176
Fax	
E-mail	grozeva@greencarbon-bg.com
Website	
Contact person	Ivona Grozeva
Title	Executive Director
Salutation	Mrs.
Last name	Grozeva
Middle name	Grozeva
First name	Ivona
Department	
Mobile	+359 888937176
Direct fax	
Direct tel.	
Personal e-mail	grozeva@greencarbon-bg.com

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The project supplies Kubratovo waste-water treatment plant with thermal and electrical energy.

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.4: 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.5: Dewatering house



- Heat Exchanger

The anaerobic digestion process takes place under mesophilic conditions, which means within a temperature range of about 33 to 37°C. The fresh incoming raw sludge has to be heated up to the

required temperature conditions. Also the heat loss of the digester has to be compensated. For this purposes a double tube heat exchanger is installed for each digester.

The mixture of raw sludge and seeding sludge is transported from the seeding mixer via the heat exchanger where the sludge is indirectly heated in the counter-current flow with hot water. The heated sludge mixture is transported via the feeding line back into the digester.

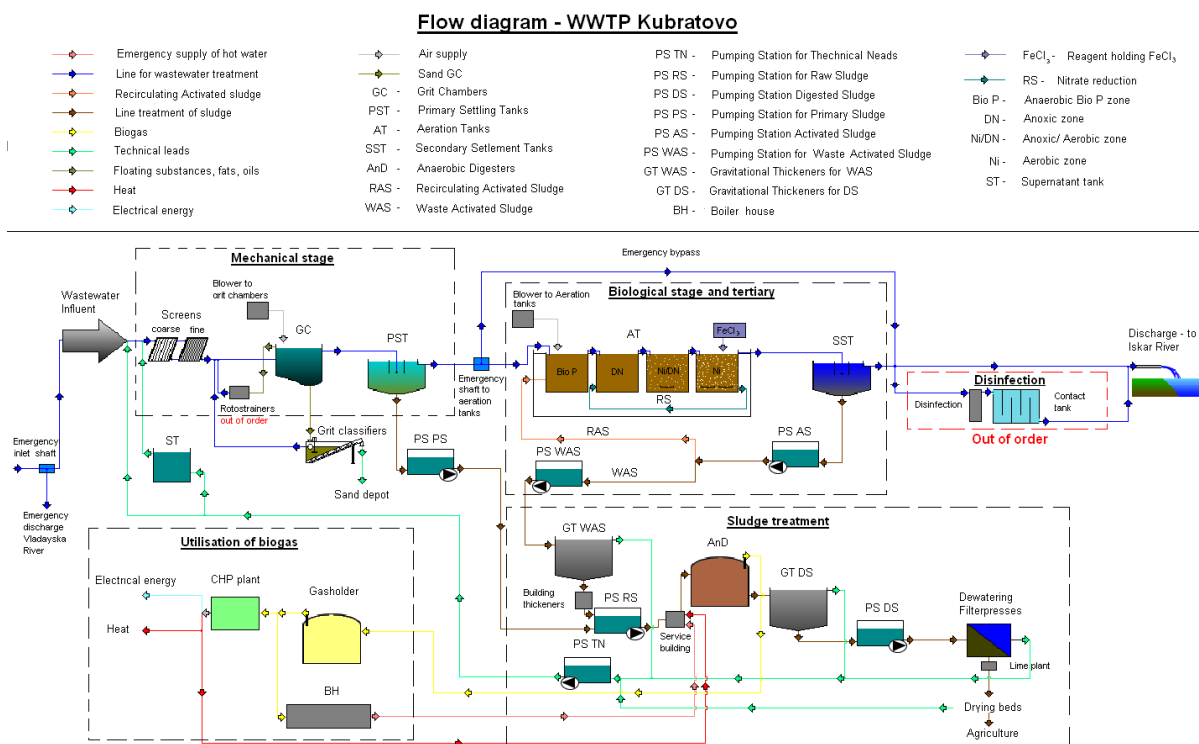
- Combined Heat and Power Plant

The CHP comprises of 3 new co-generation sets GE JMS 320 GS-B.LC with 1,063 kW electric capacity and 1,088 kW thermal capacity each, 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.

- Emergency flare system

An emergency flaring system have been implemented, consisting of 2 x DN150 flares, type Passavant-Roediger FAVAE.

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



B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

No deviations from the registered monitoring plan and applied methodology have been registered.

B.2.2. Corrections

No corrections are necessary.

B.2.3. Changes to start date of crediting period

There are no changes to the start date of the crediting period.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

No inclusions are necessary.

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

No permanent changes have been registered.

B.2.6. Changes to project design of registered project activity

No changes to the project design have been made.

B.2.7. Types of changes specific to afforestation or reforestation project activity

N/A

SECTION C. Description of monitoring system

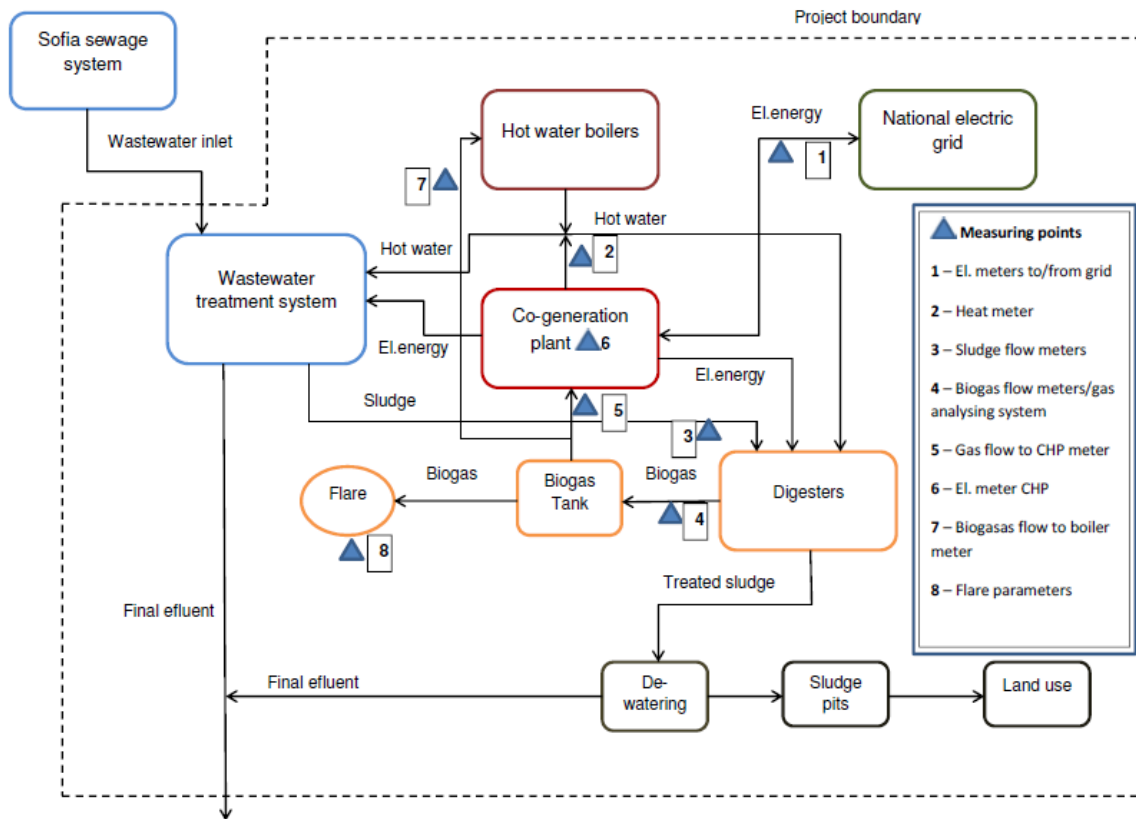
The Kubratovo WwTP is certified under ISO 14001:2004 by Tuev Nord and has certificate No 44 104 087290, valid until 12 Sept. 2016. The WwTP is also certified under OHSAS 18001:2007 with certificate No 44 116087290, valid until 15.01.2018.

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.

The diagramme below 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 will be 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 should be 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 2: List of measuring equipment

Measuring equipment	Measured parameter, variable	Equipment producer and type	Serial number	Installation date	Date of latest calibration	Periodicity of calibration	Measurement error data	Comments
Automatic gas analyser, flow-meter system	Methane concentration in the biogas $w_{CH_4,y}$ Methane – 0-100 Vol% Oxygen – 0-25 Vol% Carbon dioxide – 0-100 Vol% H ₂ S – 0-500 ppm Absolute pressure 0-1600 mbar	Draeger, Awite AwiFlex	564_09	01 July 2009	May 2016	6 months	+/-1 % for Methane and Carbon Dioxide +/- 0.015 % for temperature	Analysis the content of the biogas (normalised)
Automatic gas analyser, flow-meter system	Biogas flow $B_{G_{burnt,y}}$ 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 oC	Binder , Combimass eco basic switch bio EEx de Messsystems	IBExU05ATEX1068	01 July 2009	N/A	Not required if there are no range or construction changes.	+/-1%	The flow-meter is integral part of the AWITE automatic gas analyzer, flow-meter system.
Digital electric meter	Electricity generated by the CHP $E_{G_{grid,y}}$	Combined device “Integra 1630”; current transformer 200/5 Schneider Electric PM 5560	Ser. No 486543 annunciator module LSB6RGB Ser.No: 600008706	July 2009 (installed new with factory calibration) 28 January	Old New	4 years	+/- 0.5%	The old electric meter Integra 1630 was replaced in January 2016.

CDM-MR-FORM

				2016 (Installed new with factory calibration)				
Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/h Tmax:90°C Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/X001	2006	N/A	Not required if there are no range or construction changes	Standard Calibration +-0.5% of rate	Sludge flow meter for Digester 1
Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/h Tmax:90°C Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/X003	2006	N/A	Not required if there are no range or construction changes	Standard Calibration +-0.5% of rate	Sludge flow meter for Digester 2
Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/h Tmax:90°C Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/X004	2006	N/A	Not required if there are no range or construction changes	Standard Calibration +-0.5% of rate	Sludge flow meter for Digester 3
Inlet sludge flow to digester	Sludge Flow in m3/h Qmax:600m3/h Tmax:90°C Q_DGs_inlet	ABB Electromagnetic Flowmeter FXE4000 (COPA- XE/MAG-XE) DE41F	000015791/X002	2006	N/A	Not required if there are no range or construction changes	Standart Calibration +-0.5% of rate	Sludge flow meter for Digester 4

CDM-MR-FORM

Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 °C BG_{burnt,y}	Binder , Combimass eco basic switch bio EEx de Messsystems	S.No.C080650	01 July 2009	N/A	Not required if there are no range or construction changes	+/-1%	Biogas flowmeter for Digester 1 (normalised). The meter is for crosschecking and information purpose only.
Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 °C BG_{burnt,y}	Binder , Combimass eco basic switch bio EEx de Messsystems	S.No.C080647	01 July 2009	N/A	Not required if there are no range or construction changes	+/-1%	Biogas flowmeter for Digester 2 (normalised). The meter is for crosschecking and information purpose only
Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 °C BG_{burnt,y}	Binder , Combimass eco basic switch bio EEx de Messsystems	S.No.C080649	01 July 2009	N/A	Not required if there are no range or construction changes	+/-1%	Biogas flowmeter for Digester 3 (normalised). The meter is for crosschecking and information purpose only
Automatic gas analyser, flow-meter system	Biogas flow 24 V DC ; max. 3 W; IP 65 by EN 60529 -20 oC to +60 °C BG_{burnt,y}	Binder , Combimass eco basic switch bio EEx de Messsystems	S.No.C080648	01 July 2009	N/A	Not required if there are no range or construction changes	+/-1%	Biogas flowmeter for Digester 4 (normalised). The meter is for crosschecking

CDM-MR-FORM

								and information purpose only
Automatic gas analyser, flow-meter system	Biogas flow to CHPs, Nm ³ /h	Binder , Combimass eco ver.2014-02	S.No.C120564	July 2014	N/A	Not required if there are no range or construction 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
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 or construction changes	0.2Q _{max} -Q _{max} <+/- 1% Q _{min} -0.2Q _{max} <+/- 2%	The flowmeter is measuring the gas used in the boiler. For crosschecking purposes
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)	12.2015	2 years	EC± (0.5 + ΔΘ _{min} /ΔΘ) %	The heatmeters are installed at the delivery side of each CHP unit to measure the generated useful heat.
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)	12.2015	2 years	EC± (0.5 + ΔΘ _{min} /ΔΘ) %	The heatmeters are installed at the delivery side of each CHP unit to measure the generated useful heat.

CDM-MR-FORM

Digital thermal energy meter	Thermal energy generated by the CHP units. $EG_{\text{thermal,y}}$	Kamstrup, Type 602C00070D1233	Ser.No: 69303432/2013	30.12.2013 (with factory calibration)	12.2015	2 years	$EC \pm (0.5 + \Delta\Theta_{\text{min}}/\Delta\Theta) \%$	The heatmeters are installed at the delivery side of each CHP unit to measure the generated useful heat.
------------------------------	---	-------------------------------------	--------------------------	--	---------	---------	--	--

The management and operation of the project is the responsibility of the 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 will have 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 will 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 must develop and implement a protocol that provides for these critical functions and processes, which must be fit for independent auditing.

For electronic and paper based data entry and record keeping system, there must be 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 can be assessed by a third party. Stand-by processes and systems, e.g. paper based systems, must be outlined to provide for the possibility of electronic system failures and used in the event of such failure. The record keeping system must provide for a paper trail that can be audited.

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

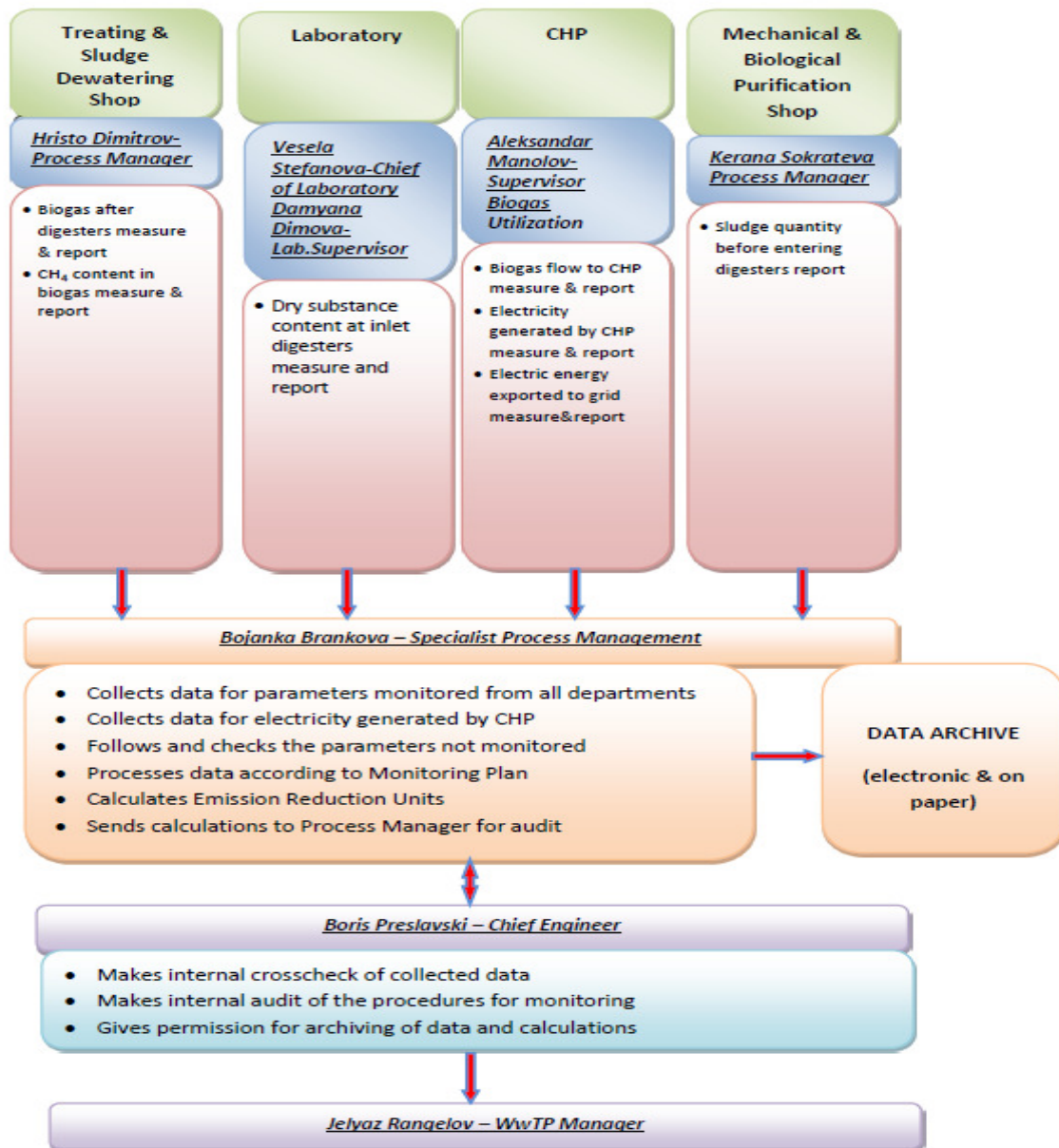
The general project management will be implemented by Mr. Jelyaz Rangelov – Manager of Kubratovo WwTP through supervising and coordinating activities of his subordinates, such as head of laboratory, head of Process Management dept., head of accounting department, head of planning unit. During the daytime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

On-line information will be transmitted to the Chief Engineer Mr. Boris Preslavski. His department will calculate finally emission reductions based on this data and will archive all data.

The personnel of Treating and Dewatering of the sludge process, listing 26 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. Damyana Dimova measure the dry substance content in the sludge at inlet of anaerobic digesters. The data is transferred to the Process Management dept. for further processing.

Flow chart with procedures for monitoring reporting and data flow



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period*(Copy this table for each piece of data and parameter)*

Data/parameter:	$EF_{EL,y}$
Unit	tCO ₂ /MWh
Description	Emission factor of the national power grid of Bulgaria
Source of data	Calculated value
Value(s) applied	1.0190
Choice of data or measurement methods and procedures	The project activity involves displacement of grid electricity. As per the AMS-I.D, version 18 methodology, the EFCO ₂ of the grid is calculated based on a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the Emission Factor for an electricity system"
Purpose of data	Calculation of baseline emissions
Additional comments	This parameter has been fixed ex-ante for the whole crediting period.

Data/parameter:	$MCF_{s,BL,final}$
Unit	
Description	Methane correction factor of the disposal site that receives the final 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 07
Purpose of data	Calculation of baseline emissions
Additional comments	

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 comments	

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 comments	

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 comments	

Data/parameter:	UF _{BL}
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 comments	

Data/parameter:	GWP _{CH4}
Unit	
Description	Global Warming Potential for methane
Source of data	IPCC
Value(s) applied)	25
Choice of data or measurement methods and procedures	Default value for the second commitment period from IPCC is used as per the applied methodology
Purpose of data	Baseline/project emissions calculation
Additional comments	

Data/parameter:	η_{flare}
Unit	%
Description	Flare efficiency
Source of data	"Project emissions from flaring" , Version 02.0.0
Value(s) applied)	80%

Choice of data or measurement methods and procedures	Default value from “Project emissions from flaring”, Version 02.0.0. The flare efficiency for the minute m ($\eta_{flare,m}$) is 80% 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 ($Flame_m$). Otherwise $\eta_{flare,m}$ is 0%.
Purpose of data	Project emissions calculation
Additional comments	The value is 10% less the default value for conservativeness.

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	Manufacturer’s specifications ¹
Value(s) applied)	92%
Choice of data or measurement methods and procedures	The value is presented in the specifications provided by the manufacturer of the boilers. The baseline fuel is changed from light oil to natural gas.
Purpose of data	Baseline emissions calculation
Additional comments	The baseline fuel is changed from light oil to natural gas. The standard efficiency of newly built natural gas boilers is 90%.

Data/parameter:	$EF_{FF,CO2}$
Unit	tCO ₂ /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
Purpose of data	Baseline emissions calculation
Additional comments	The baseline fuel is changed from light oil (naphta) to natural gas

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

¹ <http://www.kotlostroene.com/kotlikV>

Purpose of data	Project emissions calculation
Additional comments	

Data/parameter:	EF _{CO2,i,y}
Unit	tCO ₂ /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 comments	

Data/parameter:	PE _{fugitive,s,y}
Unit	Nm ³ leaked/Nm ³ produced
Description	
Source of data	AMS-III.H, paragraph 42(b)
Value(s) applied	0.05
Choice of data or measurement methods and procedures	Default value
Purpose of data	Project emissions calculation
Additional comments	

Data/parameter:	D _{CH₄}
Unit	Kg/m ³
Description	Density of methane
Source of data	AMS-III.D ²
Value(s) applied	0.670
Choice of data or measurement methods and procedures	0.670 kg/m ³ at 20 °C and 1 atm pressure
Purpose of data	Project emissions calculation including emissions from incomplete flaring.
Additional comments	

2

http://cdm.unfccc.int/filestorage/F/J/S/FJS698M3YVDGXR4UOL1NPQTHW0CKZ5/Methodology%20%28SSC%29_AMS-III%20D_EB86a15%28ver20.0%2C%2016Oct15%29.pdf?t=MmF8bndvZGV5fDDC2QPwEh8AwE8LvfdKTNje

D.2. Data and parameters monitored*(Copy this table for each piece of data and parameter)*

Data/parameter:	$S_{\text{final,PJ,y}}$
Unit	t/y
Description	Amount of dry matter in the sludge in the year y
Measured/calculated/default	Measured
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 7
Monitoring equipment	See Table 2
Measuring/reading/recording frequency:	Measured continuously. Recorded monthly and yearly.
Calculation method (if applicable):	N/A
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 comments:	The quantity of sludge delivered to the digesters is equal to the quantity of sludge delivered for dewatering in the baseline.

Data/parameter:	$EG_{\text{thermal,y}}$
Unit	TJ
Description	The net quantity of heat supplied by the project activity
Measured/calculated/default	Measured
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 2
Monitoring equipment	See Table 2.
Measuring/reading/recording frequency:	Measured continuously. Recorded monthly and yearly.
Calculation method (if applicable):	N/A
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 comments:	

Data/parameter:	$EG_{grid,y}$
Unit	MWh
Description	Electricity generated by the CHP
Measured/calculated/default	Measured
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 3
Monitoring equipment	See Table 2
Measuring/reading/recording frequency:	Measured continuously. Recorded monthly and yearly.
Calculation method (if applicable):	N/A
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 comments:	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.

Data/parameter:	$BG_{burnt,y}$
Unit	m^3
Description	Quantity of biogas generated by the anaerobic digesters
Measured/calculated/default	Measured
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 4
Monitoring equipment	See Table 2
Measuring/reading/recording frequency:	Measured continuously. Recorded monthly and yearly.
Calculation method (if applicable):	N/A
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:	Project emissions calculation including emissions from incomplete flaring
Additional comments:	The analyser takes into consideration the pressure and temperature of the biogas. The final result is normalized.

Data/parameter:	$Q_{DG_{s_inlet}}$
Unit	m^3
Description	Quantity of sludge entering the anaerobic digesters
Measured/calculated/default	Measured
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 5
Monitoring equipment	See Table 2
Measuring/reading/recording frequency:	Measured continuously. Results are integrated hourly, recorded monthly and yearly.
Calculation method (if applicable):	N/A
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:	Baseline emissions calculation.
Additional comments:	

Data/parameter:	ρ_{sludge}
Unit	t/m^3
Description	Dry substance content in the sludge
Measured/calculated/default	Measured/calculated
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 6
Monitoring equipment	The tests are made by an accredited laboratory on-site the plant.
Measuring/reading/recording frequency:	Laboratory samples taken every hour. Results are recorded hourly, monthly and yearly
Calculation method (if applicable):	Calculated based on the laboratory samples taken every hour
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:	Baselines emissions calculation.
Additional comments:	

Data/parameter:	$W_{CH_4,y}$
Unit	%
Description	Methane content in biogas in the year y

Measured/calculated/default	Measured
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 8
Monitoring equipment	See Table 2
Measuring/reading/recording frequency:	Measured continuously. Aggregated hourly and recorded monthly and yearly.
Calculation method (if applicable):	N/A
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:	Project emissions calculation including emissions from incomplete flaring
Additional comments:	The analyser takes into consideration the pressure and temperature of the biogas. The final result is normalized.

Data/parameter:	FC _v
Unit	t
Description	Quantity of fossil fuel (naphta) used for emergency needs.
Measured/calculated/default	Measured/Calculated
Source of data	Plant records
Value(s) of monitored parameter	0
Monitoring equipment	Tank level indicator/meter
Measuring/reading/recording frequency:	yearly
Calculation method (if applicable):	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.
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:	Project emissions calculation
Additional comments:	

Data/parameter:	V _{t,db}
Unit	m ³ CH ₄
Description	Volumetric flow of the gaseous stream (methane) to the flares
Measured/calculated/default	Calculated
Source of data	Plant records (quantity of biogas generated)
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 13

Monitoring equipment	
Measuring/reading/recording frequency:	Integrated hourly, recorded hourly and monthly.
Calculation method (if applicable):	Calculated based on the measured content of methane in the biogas $W_{CH_4,y}$, the time flares have been in operation and the capacity of the flares.
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:	Project emissions calculation.
Additional comments:	

Data/parameter:	F_{CH_4}
Unit	$KgCH_4$
Description	Mass flow of methane in the residual biogas flared
Measured/calculated/default	Calculated
Source of data	Plant records
Value(s) of monitored parameter	See Attachment 1; Table 3; Column 15
Monitoring equipment	
Measuring/reading/recording frequency:	Calculated on hourly base and recorded hourly and monthly and yearly
Calculation method (if applicable):	The mass-flow of methane is calculated using the normalised quantity of biogas to the flares recorded hourly multiplied by the methane content for the period and the normal density of methane D_{CH_4} as recorded in the section "Parameters fixed ex-ante".
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:	Project emissions calculation.
Additional comments:	

D.3. Implementation of sampling plan

N/A

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

The baseline emissions due to methane avoidance are calculated according to the formula below:

$$BE_{s,final,y} = S_{final,BL,y} * DOC_s * UF_{BL} * MCF_{s,BL,final} * DOC_F * F * 16/12 * GWP_{CH4} \quad [tCO_{2,e}]$$

Where

$S_{final,BL,y}$	Amount of dry matter in the final sludge generated by the baseline wastewater treatment systems in the year y (t). If the baseline wastewater treatment system is different from the project system, it will be estimated using the monitored amount of dry matter in the final sludge generated by the project activity ($S_{final,PJ,y}$) corrected for the sludge generation ratios of the project and baseline systems
$MCF_{s,BL,final}$	Methane correction factor of the disposal site that receives the final 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” – 0.4
UF_{BL}	Model correction factor to account for model uncertainties (0.89)
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
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)
F	Fraction of CH ₄ in biogas (IPCC default of 0.5)

The ex-post calculation of the baseline emissions is as follows:

$$BE_{s,final,2014} = 21,149 * 0.4 * 0.5 * 0.89 * 0.5 * 0.5 * (16/12) * 25 = 31,371 \text{ tCO}_2 \text{ (for the period 01/04/2014 – 31/12/2014)}$$

$$BE_{s,final,2015} = 27,529 * 0.4 * 0.5 * 0.89 * 0.5 * 0.5 * (16/12) * 25 = 40,834 \text{ tCO}_2 \text{ (for the period 01/01/2015 – 31/12/2015)}$$

$$BE_{s,final,2016} = 12,666 * 0.4 * 0.5 * 0.89 * 0.5 * 0.5 * (16/12) * 25 = 18,788 \text{ tCO}_2 \text{ (for the period 01/01/2016 – 31/05/2016)}$$

The baseline emissions from thermal and electricity displacement are calculated as follows:

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

Where:

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

And

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

Where:

$BE_{thermal,CO2,y}$	= 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 39 or 40

The ex-post calculation of the baseline emissions from thermal and electricity displacement is as follows:

$$BE_{grid,2014} = 14,693 * 1.0190 = 14,972 \text{ tCO}_2 \text{ (for the period 01/04/2014 – 31/12/2014)}$$

$$BE_{grid,2015} = 20,061 * 1.0190 = 20,442 \text{ tCO}_2 \text{ (for the period 01/01/2015 – 31/12/2015)}$$

$$BE_{grid,2016} = 8,656 * 1.0190 = 8,820 \text{ tCO}_2 \text{ (for the period 01/01/2016 – 31/05/2016)}$$

$$BE_{thermal, CO_2, 2014} = ((48.80/0.92) * 54.3) / 1000 = 2,880 \text{ tCO}_2 \text{ (for the period 01/04/2014 – 31/12/2014)}$$

$$BE_{thermal, CO_2, 2015} = ((67.11/0.92) * 54.3) / 1000 = 3,961 \text{ tCO}_2 \text{ (for the period 01/01/2015 – 31/12/2015)}$$

$$BE_{thermal, CO_2, 2016} = ((28.54/0.92) * 54.3) / 1000 = 1,684 \text{ tCO}_2 \text{ (for the period 01/01/2016 – 31/05/2016)}$$

The total baseline emissions estimated for the project are:

$$BE_{2014} = 31,371 + 14,972 + 2,880 = 49,223 \text{ tCO}_2 \text{ (for the period 01/04/2014 – 31/12/2014)}$$

$$BE_{2015} = 40,834 + 20,442 + 3,961 = 65,237 \text{ tCO}_2 \text{ (for the period 01/01/2015 – 31/12/2015)}$$

$$BE_{2016} = 18,788 + 8,820 + 1,684 = 29,293 \text{ tCO}_2 \text{ (for the period 01/01/2016 – 31/05/2016)}$$

Total for the monitored period 01/04/2014 – 31/05/2016: **143,753 tCO₂**

The calculation of the baseline emissions is presented in details in the excel file named "Monitoring_report_Sofiyska_voda_VER_Calculation_ver.03_30.12.2016" which is attached to this Monitoring report.

E.2. Calculation of project emissions or actual net GHG removals by sinks

The project emissions from the project are determined as per the formula:

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

Where

$PE_{power,y}$ = Project emissions from combustion of fossil fuel (naphtha) in case of emergency;

$PE_{fugitive,y}$ = Project emissions from leaking methane from capturing system;

PE_{flare} = Project emissions from incomplete flaring.

And

$$PE_{power,y} = PE_{FC,y} = FC_{i,y} \times COEF_{,y}$$

$$COEF_{,y} = NCV_{,y} \times EF_{CO_2,,y}$$

Where

$PE_{FC,,}$ Are the CO₂ emissions from emergency fossil fuel (naphtha) combustion (tCO₂/yr);

FC	Is the quantity of naphtha combusted (mass or volume unit/yr);
COEF	Is the CO ₂ emission coefficient of naphtha (tCO ₂ /mass or volume unit)
NCV	Is the net calorific value of the emergency fuel, (GJ/mass or volume unit)
EF _{CO2}	Is the CO ₂ emission factor of emergency fuel (naphtha), (tCO ₂ /GJ)

For the monitored period there was no use of emergency fuel, hence

$$PE_{\text{power}} = 0$$

PE_{fugitive} are calculated as follows:

The fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in the year y will be determined as per paragraph 42 (b) of AMS-III.H: a default value of 0.05 m³ biogas leaked/m³ biogas produced will be used as an alternative.

PE_{flare} are determined as follows:

$$F_{\text{CH}_4,t} = V_{t,\text{db}} * V_{\text{CH}_4,t,\text{db}} * \rho_{\text{CH}_4,t} \quad \text{which is equivalent to}$$

$$F_{\text{CH}_4,t} = V_{t,\text{db}} * w_{\text{CH}_4,y} * D_{\text{CH}_4}$$

Where:

$F_{\text{CH}_4,t}$	Mass flow of the methane in the gaseous stream in time interval t (kg CH ₄ /h)
$V_{t,\text{db}}$	Volumetric flow of the gaseous stream in time interval t on a dry basis (m ³ CH ₄ /h)
$V_{\text{CH}_4,t,\text{db}} = W_{\text{CH}_4}$	Volumetric fraction of methane in the gaseous stream in a time interval t on a dry basis (m ³ CH ₄ /m ³ dry gas)
$\rho_{\text{CH}_4,t} = D_{\text{CH}_4} = 0.670$	Density of CH ₄ in the gaseous stream in time interval t (kg CH ₄ /m ³ CH ₄)
η_{flare}	90%

and

$$PE_{\text{flare}} = F_{\text{CH}_4,t} * GWP_{\text{CH}_4} * ((100 - \eta_{\text{flare}})/100)$$

$$PE_{\text{flare},2014} = 16,339.367 * 25 * ((100 - 90)/100) = 40,848 \text{ kgCO}_2 = 41 \text{ tCO}_2$$

$$PE_{\text{flare},2015} = 40,712.112 * 25 * ((100 - 90)/100) = 101,780 \text{ kgCO}_2 = 102 \text{ tCO}_2$$

$$PE_{\text{flare},2016} = 6,362.774 * 25 * ((100 - 90)/100) = 15,907 \text{ kgCO}_2 = 16 \text{ tCO}_2$$

The project emissions during the monitored period are as follows:

$$PE_{2014} = 4,207 + 41 = 4,248 \text{ tCO}_2$$

$$PE_{2015} = 6,224 + 102 = 6,325 \text{ tCO}_2$$

$$PE_{2016} = 2,788 + 16 = 2,804 \text{ tCO}_2$$

Total project emissions for the monitored period: **13,377 tCO₂**

The calculation of the project emissions is presented in the excel file named "Monitoring_report_Sofiyska_voda_VER_Calculation_ver.03_30.12.2016" which is attached to this Monitoring report.

Calculation of leakage

No leakage emissions are generated by the project.

Total emission reductions generated in the monitored period:

$$ER = 143,753 - 13,377 = 130,376 \text{ tCO}_{2e}$$

The calculation of the project emissions is presented in the excel file named "Monitoring_report_Sofiyska_voda_VER_Calculation_ver.03_30.12.2016" which is attached to this Monitoring report.

E.3. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	143,753	13,377	0	-	130,376	130,376

E.4. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	152,265	130,376

E.5. Remarks on difference from estimated value in registered PDD

The quantity of the emission reductions generated by the project during the monitored period is lower than estimated due to the difference in the vintage data for quantity and quality of the sludge, used for the estimation of the emission reductions in the validated PDD, and the plant records during the monitored period.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Sofiyska voda AD
Street/P.O. Box	Business Park Sofia, Mladost 4
Building	2A
City	Sofia
State/Region	Sofia
Postcode	1766
Country	Bulgaria
Telephone	+359 2 812 25 30
Fax	+359 2 974 45 14
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	Stanislav
First name	Head office
Department	
Mobile	+359 2 974 45 14
Direct fax	+359 2 812 25 30
Direct tel.	sstanev@sofiyskavoda.bg
Personal e-mail	Sofiyska voda AD

Project participant and/or responsible person/ entity	☐ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Green Carbon Bulgaria Ltd.
Street/P.O. Box	33 "6 th September" str.
Building	-
City	Sofia
State/Region	Sofia
Postcode	1000
Country	Bulgaria
Telephone	+359 888937176
Fax	
E-mail	grozeva@greencarbon-bg.com
Website	
Contact person	Ivona Grozeva
Title	Executive Director
Salutation	Mrs.
Last name	Grozeva
Middle name	Grozeva
First name	Ivona
Department	
Mobile	+359 888937176
Direct fax	
Direct tel.	
Personal e-mail	grozeva@greencarbon-bg.com

ATTACHMENT 1: Monitoring data

Table 3:Monitoring data

Month/Year	Net thermal energy by cogenerators EGthermal,y	El. Energy produced by cogenerations EGgrid,y	Biogas generated BGburnt,y	Quantity of sludge at inlet digesters Q_DGs_inlet	Specific content of dry matter in the sludge psludge	Quantity of dry matter in the sludge at inlet digesters Sfinal.PJ.v	CH4 content in the biogas WCH4,y	Quantity of CH4 in the biogas CH4burnt	Quantity of CH4 in the biogas CH4burnt	Quantity of emergency fuel used FCy	Flare debit	Quantity of CH4 to flare Vt,db	Flare working hours	Mass flow of CH4 to flare FCH4
	[TJ]	[MWh]	[Nm3]	[m3]	[t/m3]	[t]	[%]	[m3]	[kg]	[t]	[m3/h]	[m3CH4]	[h]	[kgCH4]
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Apr 2014	5.35	1,731.80	964,506.00	48,080.00	0.06	2,718.91	65.00	626,928.90	420,042.36	0.00	500.00	7,507.50	23.10	5,030.03
May 2014	5.36	1,622.15	854,580.00	52,340.00	0.05	2,648.06	65.00	555,477.00	372,169.59	0.00	500.00	10,263.50	31.58	6,876.55
Jun 2014	5.08	1,631.78	850,840.00	53,020.00	0.04	2,312.14	64.00	544,537.60	364,840.19	0.00	500.00	1,126.40	3.52	754.69
Jul 2014	5.02	1,739.36	948,550.00	52,820.00	0.05	2,602.82	61.00	578,615.50	387,672.39	0.00	500.00	982.10	3.22	658.01
Aug 2014	5.07	1,572.90	887,050.00	51,140.00	0.04	2,254.75	61.00	541,100.50	362,537.34	0.00	500.00	616.10	2.02	412.79
Sep 2014	4.87	1,461.66	815,000.00	47,955.00	0.04	2,000.80	61.00	497,150.00	333,090.50	0.00	500.00	924.15	3.03	619.18
Oct 2014	5.48	1,520.96	871,273.00	50,880.00	0.04	2,083.75	61.00	531,476.53	356,089.28	0.00	500.00	1,317.60	4.32	882.79
Nov 2014	5.75	1,562.75	899,140.00	49,840.00	0.04	2,022.89	59.82	537,904.80	360,396.21	0.00	500.00	846.51	2.83	567.16
Dec 2014	6.82	1,849.51	965,790.00	56,720.00	0.04	2,504.96	63.00	608,447.70	407,659.96	0.00	500.00	803.25	2.55	538.18
TOTAL	48.80	14,692.85	8,056,729.00	462,795.00		21,149.08		5,021,638.53	3,364,497.81	0.00				16,339.37
Jan 2015	5.19	1,532.00	992,280.00	56,520.00	0.04	2,424.16	64.00	635,059.20	425,489.66	0.00	500.00	1,577.60	4.93	1,056.99
Feb 2015	4.49	1,410.67	842,740.00	48,340.00	0.04	2,132.63	64.00	539,353.60	361,366.91	0.00	500.00	8,054.40	25.17	5,396.45
Mar 2015	5.48	1,693.39	923,600.00	55,760.00	0.05	2,811.56	63.00	581,868.00	389,851.56	0.00	500.00	85.05	0.27	56.98
Apr 2015	5.23	1,489.52	795,720.00	53,280.00	0.04	2,319.70	64.00	509,260.80	341,204.74	0.00	500.00	150.40	0.47	100.77
May 2015	6.09	1,829.51	1,020,500.00	55,800.00	0.05	2,608.20	64.00	653,120.00	437,590.40	0.00	500.00	1,584.00	4.95	1,061.28
Jun 2015	5.71	1,753.89	1,009,990.00	53,760.00	0.04	2,107.85	64.00	646,393.60	433,083.71	0.00	500.00	17,865.60	55.83	11,969.95
Jul 2015	5.72	1,807.92	1,034,740.00	54,560.00	0.04	2,322.94	62.00	641,538.80	429,831.00	0.00	500.00	6,215.50	20.05	4,164.39
Aug 2015	5.36	1,602.55	986,805.75	54,560.00	0.04	2,224.99	62.72	618,948.01	414,695.17	0.00	500.00	8,665.10	27.63	5,805.61
Sep 2015	5.32	1,555.09	936,372.00	52,800.00	0.04	2,114.11	64.00	599,278.08	401,516.31	0.00	500.00	4,697.60	14.68	3,147.39
Oct 2015	5.40	1,541.65	977,120.00	53,440.00	0.04	1,957.45	62.00	605,814.40	405,895.65	0.00	500.00	5,580.00	18.00	3,738.60
Nov 2015	6.30	1,846.12	1,131,410.00	53,400.00	0.04	2,256.16	61.00	690,160.10	462,407.27	0.00	500.00	2,690.10	8.82	1,802.37
Dec 2015	6.83	1,998.46	1,164,600.00	56,640.00	0.04	2,249.02	61.00	710,406.00	475,972.02	0.00	500.00	3,599.00	11.80	2,411.33
TOTAL	67.11	20,060.76	11,815,877.75	648,860.00		27,528.77		7,431,200.59	4,978,904.39	0.00				40,712.11
Jan 2016	6.28	1,786.53	1,090,960.00	56,800.00	0.04	2,398.62	63.16	689,051.84	461,664.73	0.00	500.00	622.13	1.97	416.83
Feb 2016	5.28	1,553.24	960,360.00	51,040.00	0.04	1,973.66	64.00	614,630.40	411,802.37	0.00	500.00	873.60	2.73	585.31
Mar 2016	5.48	1,573.80	941,060.00	56,000.00	0.04	2,438.60	64.00	602,278.40	403,526.53	0.00	500.00	342.40	1.07	229.41
Apr 2016	5.82	1,978.09	1,156,180.00	57,040.00	0.05	3,016.48	64.00	739,955.20	495,769.98	0.00	500.00	6,105.60	19.08	4,090.75
May 2016	5.67	1,764.42	1,084,918.09	58,320.00	0.05	2,838.95	63.00	683,498.40	457,943.93	0.00	500.00	1,552.95	4.93	1,040.48
TOTAL	28.54	8,656.08	5,233,478.09	279,200.00		12,666.32		3,329,414.24	2,230,707.54	0.00				6,362.77
TOTAL for the period	144.45	43,409.68	25,106,084.84	1,390,855.00		61,344.18		15,782,253.35	10,574,109.74	0.00				63,414.25

Note: For the period 01.04.2014 to the end of January 2016 the electric meter that registers the electric energy generated by the CHP has not been calibrated. In order to take into consideration the possible inaccuracy the recorded readings of the meter will be reduced by the percentage of the theoretical mistake of the device which is 0.5%.

Annex 1: Sustainable development matrix

ENVIRONMENT	
No	001
Indicator	Air Quality
Mitigation measure	Not required
Chosen parameter 1.1	Emissions of CH ₄ , SO ₂ , NO _x , CO and dust in the stack flue gas.
Current situation of parameter 1.1	Last available data from measurements are documented in Protocols NoNo E126 A, E127 A, E128 A dated 10.02.2016 issued by SGS and are as follows: - Engine 1; No 59115371 SO₂ – <1.39 mg/Nm³ CO – 97+-5 mg/Nm³ NO_x – 42.57+-2.13 mg/Nm³ - Engine 2; No 59115391 SO₂ – <1.42 mg/Nm³ CO – 97+-5 mg/Nm³ NO_x – 43.29+-2.16 mg/Nm³ - Engine 3; No 59115381 SO₂ – <1.39 mg/Nm³ CO – 99+-5 mg/Nm³ NO_x – 39.46+-1.97 mg/Nm³ Acceptable values by the law: SO₂ – 35 mg/Nm³ CO – 100mg/Nm³ NO_x - 250 mg/Nm³ The National Statistics Institute of Bulgaria gives the following values of the specific emissions of air pollutants for the electricity generation in the country (latest data available for 2014): SO_x – 2.96357 g/kWh NO_x – 0.89263 g/kWh CO – 0.03648 g/kWh As demonstrated by the protocols the content of SO₂, CO and NO_x gases in the stack flue gas of the co-generator units is in the permitted range according to the relevant Regulation No1 of 27.06.2005 for gaseous fuels. In order to keep values inside permitted limits the operating personnel is paying higher attention to the operating regime of the gas engines in order to provide optimal conditions for the combustion of the biogas. In order to reduce emissions the operating team cleans at a regular base the oxidizing catalyst and adjusts the combusting process to reach optimal performance of the process.

		Future measurements of the gas emissions will be regarded with higher attention. The project combusts biogas containing CH₄ and no measurement of its content as well as dust content in the flue gas is required.
Estimation of baseline situation of parameter		SO₂ – <35 mg/Nm³ CO – <100 mg/Nm³ NO_x - <250 mg/Nm³
Future target for parameter		SO₂<35 mg/Nm³ CO<100 mg/Nm³ NO_x <250 mg/Nm³
Way of monitoring	How	As per internal procedures, ISO 14001: 2004 and OHSAS 18001:2007.
	When	On yearly bases.
	By who	WwTP Kubratovo

No	002					
Indicator	Water quality and quantity					
Mitigation measure	Not necessary					
Repeat for each parameter						
Chosen 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;					
Current situation of parameter	The values measured in 2014, 2015 and 2016 are given in the table below:					
	Protocol No	Date	COD inlet [mgO ₂ /l]	BOD inlet [mgO ₂ /l]	COD effluent [mgO ₂ /l]	BOD effluent [mgO ₂ /l]
	OB7782	18.09.2014	149.0+-9	52.7+-5.9		
	OB7785	29.09.2014			17.0+-0.9	<5.3
	OB7799	30.09.2014	197.0+-11	80.2+-6.3		
	OB7802	30.09.2014			18.0+-0.9	<5.3
	OB7842	01.10.2014	208.0+-12	68.5+-7.7		
	OB7845	01.10.2014			18.0+-0.9	<5.3
	OB7859	02.10.2014	200.0+-12	73.0+-8.2		
	OB7862	02.10.2014			19.0+-1.0	7.6+-0.8
	OB7879	03.10.2014			21.0+-	<5.3

					1.1	
	OB7876	03.10.2014	116.0+- 7	46.3+- 3.5		
	21508815	02.11.2015			15.0+- 1.9	<5.3
	21508812	02.11.2015	248.0+- 29.0	88.8+- 14.0		
	21505542	02.11.2015			12.0+-2	<5.3
	21508839	02.11.2015	363.0+- 20	195.7+- 22.9		
	21508902	02.11.2015			12.0+-2	<5.3
	21508899	02.11.2015	221.0+- 24	85.8+- 13.6		
	21508941	03.11.2015			11.0+- 1.8	<5.3
	21508938	03.11.2015	368.0+- 20	17.8		
	21508960	04.11.2015			13.0+- 2.2	<5.3
	21508957	04.11.2015	315.0+- 35	98.2+- 15.5		
	21601070	15.02.2016			11.0+- 1.8	<5.3
	21601067	15.02.2016	280.0+- 31	137.4+- 16.1		
	21601102	15.02.2016			12.0+- 2.0	<5.3
	21601099	15.02.2016	222.0+- 24	153.7+- 18.0		
	21601121	15.02.2016			13.0+- 2.2	6.6+-0.8
	21601118	15.02.2016	275.0+- 30	112.3+- 17.7		
	21601155	16.02.2016			13.0+- 2.1	8.0+-1.0
	21601152	16.02.2016	316.0+- 17	139.4+- 16.3		
	21601190	17.02.2016			14.0+- 2.3	8.3+-1.0
	21601187	17.02.2016	220.0+- 24	82.3+- 13.0		
	As demonstrated by the table all measured values of effluent water are lower than the values permitted by the standard. Acceptable values by the standard (effluent water): 2.COD – 125 mgO₂/l 2a.BOD₅ – 25.0 mgO₂/l					
Estimation of baseline	2.COD – 16.0+/- 1.1 mgO ₂ /l 2a.BOD – 5.3 +/- 0.7 mgO ₂ /l					

situation of parameter		
Future target for parameter		This parameter is variable and depends on the current quality of the waste water from the city.
Way of monitoring	How	As per VLM NoWW-17/27.05.2008 and BDS EN 1899-1:2004, B.4.2
	When	As per approved internal procedures.
	By who	WwTP Kubratovo

No	003
Indicator	Waste oil disposal
Mitigation measure	Not necessary
<i>Repeat for each parameter</i>	
Chosen parameter	Quantity of waste oil disposed.
Current situation of parameter	Waste oil is disposed according to the Decision for Waste Treatment No 12-ДО-1204-00 dated 20.02.2013, issued by the Regional Inspection for Environment. According to the delivery documents the WwTP has delivered for further utilization to the authorized company "Moby-shop" Ltd (Agreement No OO120-00/2013-A of 11.04.2013) and company Ecologika Bulgaria Ltd. (Agreement No 6625 of 26.06.2015, Annex No 1 of 11.05.2016) the following amounts of waste mineral motor oil (code No 13 02 05): 1. 13.05.2014 – 1,107 kg. 2. 21.10.2014 – 1,719 kg. 3. 24.07.2014 – 1,107 kg. 4. 29.04.2015 – 1,934 kg. 5. 06.08.2015 - 2,080 kg. 6. 18.11.2015 – 580 kg. 7. 29.02.2016 – 271 kg. 8. 14.04.2016 – 1,110 kg. The waste oil has been transported in steel barrels by trucks. All protocols for waste oil delivery are available at the plant for inspection.
Estimation of baseline situation of	Prior to the project this parameter did not exist.

parameter		
Future target for parameter		Follow strictly all requirements of the Decision for Waste Treatment No 12-ДО-1204-00 dated 20.02.2013, issued by the Regional Inspection for Environment.
Way of monitoring	How	The plant management registers the quantity waste oil collected and delivered to a specially certified company for recycling.
	When	Annually, with annual monitoring effort
	By who	WwTP Kubratovo

ENVIRONMENT	
No	004
Indicator	Quality of employment
Mitigation measure	Not required
Chosen parameter 1.1	Number of employees receiving vocational training
Current situation of parameter	Employees' training is carried for awareness and competence of the integrated management system for quality, environment, health and safety at work. Each year is performed a training for maintaining / improving the qualification of staff. The assessment is done by an oral exam or by test. The results are documented in a report. For the period 2014-2016 altogether 213 employees, including personnel engaged with the project, have received vocational training on different subjects. Staff training is determined by the procedures for awareness and competence of the Environmental Management ISO 14001: 2004 and management of health and safety of BS OHSAS 18001: 2007. The training needs of staff and preparation of annual programs are identified that are updated depending on the needs for staff training. Work on their own responsibility is assigned only when the skills concerned are checked and written permission by the trainer is issued. Protocols for the monitoring period 2014-2016 training to determine the level of staff qualifications and records as required by the Ordinance on the device safe operation and Technical Supervision of pressure equipment, Ordinance on safe operation and technical supervision of pressurised vessels and equipment, and the Ordinance on safe operation and technical supervision of gas equipment are presented to the DOE. In 2014 28 persons including operating staff engaged with the project have received training on environmental awareness. According to the Protocols on 20.05.2015 24 persons, including operating staff engaged with the project have received training on environmental awareness. The trainings have been performed according to the requirements of ISO 14001:2005. According to the protocols in June 2015, 16 persons have received training and have been tested on Rules and safety regulations on work with electrical equipment. According to Protocols dated 09.2014 7 persons including operating staff engaged in the project have received training on Rules and safety regulations on work in electrical substations and thermal power plants.

		According to Protocols dated 06.2015 6 persons including operating staff engaged in the project have received training on Rules and safety regulations on work with electrical installations up to 1,000 volts. According to Protocol 149 dated 08.12.2014 58 persons including operating staff engaged in the project have received training on Rules and safety regulations on work with biogas equipment. According to Protocol 151 dated 09.12.2014 64 persons including operating staff engaged in the project have received training on Rules and safety regulations on work with pressurised equipment. According to Protocol 115 dated 01.12.2015 62 persons including operating staff engaged in the project have received training on Rules and safety regulations on work with biogas equipment. According to Protocol 116 dated 02.12.2015 62 persons including operating staff engaged in the project have received training on Rules and safety regulations on work with pressurised equipment. To meet the requirements of the monitoring plan operator organized and conducted training of operating personnel before starting the project.
Estimation of baseline situation of parameter		Prior to the project, these positions did not exist and no training related to the project has been performed.
Future target for parameter		Continuation of the training for all employees engaged in the operation and management of the project according to the internal procedures, ISO 14001: 2004 and OHSAS 18001:2007.
Way of monitoring	How	As per internal regulations, ISO 14001: 2004 and OHSAS 18001:2007
	When	On yearly bases
	By who	WwTP Kubratovo

No		005
Indicator		Quantitative employment and income generation
Mitigation measure		Not required
Chosen parameter		Number of jobs created by the project
Current situation of parameter		According to a reference from HR department from 07.2016 25 persons are employed full time on shifts plus 2 persons full time regular shift are engaged with the project. They all have full-time employment contracts for permanent positions. The contracts are available for inspection by DOE at HR Department.
Estimation of baseline situation of parameter		Prior to the project these positions did not exist
Future target for parameter		Continued employment of 25 persons full time on shifts plus 2 person full time regular shift.
Way of monitoring	How	Employee positions created are evidenced via employment contracts. These are checked on an annual basis to determine the number of employment positions created as a result of the project. The name of the employee, date of contracting, length of contract and position are recorded.
	When	Annually, with annual monitoring effort.
	By who	WwTP Kubratovo

No	006																																													
Indicator	Soil condition																																													
Mitigation measure	Not necessary																																													
<i>Repeat for each parameter</i>																																														
Chosen parameter	1. Heavy metals content in the final sludge: <table border="1"> <thead> <tr> <th>Designation</th><th>Unit</th><th>Quantity allowed</th></tr> </thead> <tbody> <tr><td>As</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Hg</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Cd</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Cu</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Ni</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Pb</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Cr</td><td>mg/kg</td><td>N/A</td></tr> <tr><td>Zn</td><td>mg/kg</td><td>N/A</td></tr> </tbody> </table> Note: There are no local or international regulations limiting the content of heavy metals.	Designation	Unit	Quantity allowed	As	mg/kg	N/A	Hg	mg/kg	N/A	Cd	mg/kg	N/A	Cu	mg/kg	N/A	Ni	mg/kg	N/A	Pb	mg/kg	N/A	Cr	mg/kg	N/A	Zn	mg/kg	N/A																		
Designation	Unit	Quantity allowed																																												
As	mg/kg	N/A																																												
Hg	mg/kg	N/A																																												
Cd	mg/kg	N/A																																												
Cu	mg/kg	N/A																																												
Ni	mg/kg	N/A																																												
Pb	mg/kg	N/A																																												
Cr	mg/kg	N/A																																												
Zn	mg/kg	N/A																																												
Current situation of parameter	<table border="1"> <tr> <td colspan="3">The tests performed by SGS on 16.07.2015 (Protocol No E1676 A/30.09.2014) give the following results for the heavy metals content:</td> </tr> <tr> <th>Designation</th><th>Unit</th><th>Quantity</th></tr> <tr><td>As</td><td>mg/kg</td><td>5.78+-0.40</td></tr> <tr><td>Hg</td><td>mg/kg</td><td><0.05</td></tr> <tr><td>Cd</td><td>mg/kg</td><td>0.789+-0.06</td></tr> <tr><td>Cu</td><td>mg/kg</td><td>79.6+-5.6</td></tr> <tr><td>Ni</td><td>mg/kg</td><td>5.82+-0.41</td></tr> <tr><td>Pb</td><td>mg/kg</td><td>14.4+-1.0</td></tr> <tr><td>Cr</td><td>mg/kg</td><td>13.8+-1.0</td></tr> <tr><td>Zn</td><td>mg/kg</td><td>306+-18</td></tr> </table> <table border="1"> <tr> <td colspan="3">The tests performed by SGS on 16.07.2015 (Protocol No E2319 A/19.11.2014) give the following results for the heavy metals content:</td> </tr> <tr> <th>Designation</th><th>Unit</th><th>Quantity</th></tr> <tr><td>As</td><td>mg/kg</td><td>9.56+-0.76</td></tr> <tr><td>Hg</td><td>mg/kg</td><td><0.05</td></tr> <tr><td>Cd</td><td>mg/kg</td><td>0.63+-0.37</td></tr> </table>	The tests performed by SGS on 16.07.2015 (Protocol No E1676 A/30.09.2014) give the following results for the heavy metals content:			Designation	Unit	Quantity	As	mg/kg	5.78+-0.40	Hg	mg/kg	<0.05	Cd	mg/kg	0.789+-0.06	Cu	mg/kg	79.6+-5.6	Ni	mg/kg	5.82+-0.41	Pb	mg/kg	14.4+-1.0	Cr	mg/kg	13.8+-1.0	Zn	mg/kg	306+-18	The tests performed by SGS on 16.07.2015 (Protocol No E2319 A/19.11.2014) give the following results for the heavy metals content:			Designation	Unit	Quantity	As	mg/kg	9.56+-0.76	Hg	mg/kg	<0.05	Cd	mg/kg	0.63+-0.37
The tests performed by SGS on 16.07.2015 (Protocol No E1676 A/30.09.2014) give the following results for the heavy metals content:																																														
Designation	Unit	Quantity																																												
As	mg/kg	5.78+-0.40																																												
Hg	mg/kg	<0.05																																												
Cd	mg/kg	0.789+-0.06																																												
Cu	mg/kg	79.6+-5.6																																												
Ni	mg/kg	5.82+-0.41																																												
Pb	mg/kg	14.4+-1.0																																												
Cr	mg/kg	13.8+-1.0																																												
Zn	mg/kg	306+-18																																												
The tests performed by SGS on 16.07.2015 (Protocol No E2319 A/19.11.2014) give the following results for the heavy metals content:																																														
Designation	Unit	Quantity																																												
As	mg/kg	9.56+-0.76																																												
Hg	mg/kg	<0.05																																												
Cd	mg/kg	0.63+-0.37																																												

Cu	mg/kg	92.0+-5.5
Ni	mg/kg	6.27+-0.50
Pb	mg/kg	16.5+-1.2
Cr	mg/kg	14.7+-1.0
Zn	mg/kg	264+-13

The tests performed by SGS on 16.07.2015 (Protocol No E1240 A/27.07.2015) give the following results for the heavy metals content:

Designation	Unit	Quantity
As	mg/kg	8.72+-0.70
Hg	mg/kg	<0.05
Cd	mg/kg	0.96+-0.08
Cu	mg/kg	107+-7
Ni	mg/kg	8.83+-0.62
Pb	mg/kg	18.2+-1.5
Cr	mg/kg	24.9+-2.0
Zn	mg/kg	308+-15

As evidenced the monitored parameters are lower than the baseline. However it should be notified that the content of heavy metals does not depend on the way of treatment in the WwTP and is highly dependent from the overall contamination of the wastewaters of the city of Sofia. The efforts to decrease that contamination concern the whole municipality of Sofia and are included in the plans for cleaner environment.

In this respect it is possible that occasionally some of the parameters monitored may exceed the baseline values but this will not have effect on the application of the sludge as fertilizer.

The measurement protocol is available at the plant for inspection by DOE.

2. Quantity of sludge shipped for agricultural application:

During the monitored period a total of 171,186 tons of dried sludge have been transported for use as fertilizer.

The transportation of the sludge has been performed by trucks and according to plant's records a total of 11,097 trucks have been used in that period.

All weigh-bridge bills are archived at the plant for inspection.

Estimation of baseline situation of parameter

1. Heavy metals content

		<table border="1"> <tr> <th>Designation</th> <th>Unit</th> <th>Quantity</th> </tr> <tr> <td>As</td> <td>mg/kg</td> <td><10</td> </tr> <tr> <td>Hg</td> <td>mg/kg</td> <td><0.1</td> </tr> <tr> <td>Cd</td> <td>mg/kg</td> <td><1.5</td> </tr> <tr> <td>Cu</td> <td>mg/kg</td> <td><200</td> </tr> <tr> <td>Ni</td> <td>mg/kg</td> <td><15</td> </tr> <tr> <td>Pb</td> <td>mg/kg</td> <td><50</td> </tr> <tr> <td>Cr</td> <td>mg/kg</td> <td><50</td> </tr> <tr> <td>Zn</td> <td>mg/kg</td> <td><1000</td> </tr> </table>	Designation	Unit	Quantity	As	mg/kg	<10	Hg	mg/kg	<0.1	Cd	mg/kg	<1.5	Cu	mg/kg	<200	Ni	mg/kg	<15	Pb	mg/kg	<50	Cr	mg/kg	<50	Zn	mg/kg	<1000
		Designation	Unit	Quantity																									
		As	mg/kg	<10																									
		Hg	mg/kg	<0.1																									
		Cd	mg/kg	<1.5																									
		Cu	mg/kg	<200																									
		Ni	mg/kg	<15																									
		Pb	mg/kg	<50																									
		Cr	mg/kg	<50																									
		Zn	mg/kg	<1000																									
Future target for parameter	<table border="1"> <tr> <th>Designation</th> <th>Unit</th> <th>Quantity</th> </tr> <tr> <td>As</td> <td>mg/kg</td> <td><10</td> </tr> <tr> <td>Hg</td> <td>mg/kg</td> <td><0.1</td> </tr> <tr> <td>Cd</td> <td>mg/kg</td> <td><1.5</td> </tr> <tr> <td>Cu</td> <td>mg/kg</td> <td><200</td> </tr> <tr> <td>Ni</td> <td>mg/kg</td> <td><15</td> </tr> <tr> <td>Pb</td> <td>mg/kg</td> <td><50</td> </tr> <tr> <td>Cr</td> <td>mg/kg</td> <td><50</td> </tr> <tr> <td>Zn</td> <td>mg/kg</td> <td><1000</td> </tr> </table> 2. Quantity of sludge shipped for agricultural application: Prior to the project this parameter did not exist.	Designation	Unit	Quantity	As	mg/kg	<10	Hg	mg/kg	<0.1	Cd	mg/kg	<1.5	Cu	mg/kg	<200	Ni	mg/kg	<15	Pb	mg/kg	<50	Cr	mg/kg	<50	Zn	mg/kg	<1000	
Designation	Unit	Quantity																											
As	mg/kg	<10																											
Hg	mg/kg	<0.1																											
Cd	mg/kg	<1.5																											
Cu	mg/kg	<200																											
Ni	mg/kg	<15																											
Pb	mg/kg	<50																											
Cr	mg/kg	<50																											
Zn	mg/kg	<1000																											
Way of monitoring	How	The heavy metals content is measured by accredited laboratory (SGS) The quantity of the deactivated sludge shipped to the agricultural farms is measured and recorded regularly according to the internal ISO9001 procedures.																											
	When	The quality of the sludge is measured annually, with annual monitoring effort. The quantity of sludge shipped for agricultural use is monitored and recorded on a continuous base for every																											

		shipment.
	By who	WwTP Kubratovo

No	007	
Indicator	Human and institutional capacity	
Mitigation measure	Not necessary	
<i>Repeat for each parameter</i>		
Chosen parameter	Number of male and female employees engaged by the project. Number of trainings related to the environmental awareness carried out annually.	
Current situation of parameter	The project engages 27 full-time employee positions, of which 11 are women. The quantitative characteristics of the parameter have changed positively in respect to women during the monitored period.	
Estimation of baseline situation of parameter	Prior to the project, these positions did not exist	
Future target for parameter	Continued employment of 27 full-time, permanent employees. To keep the approximate percentage of women employment. To provide at least one training annually related to the environmental awareness.	
Way of monitoring	How	Employee positions created are evidenced via employment contracts. These will be checked on an annual basis to determine the number of employment positions created as a result of the project. The name of the employee, date of contracting, length of contract and position will be recorded. A signed protocol for attendance will be provided for every training related to the environmental awareness listing all attendees. Information about the environmental trainings conducted is presented in Parameter 4.
	When	Annually, with annual monitoring effort
	By who	WwTP Kubratovo