CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

Biogas production from sugar beet press pulp Südzucker Moldova sugar plant
Version number of the document: 1
Date: 29th of July, 2010

A.2. Description of the project activity:

Summary
The Objective of the project is to abate GHG emissions stemming from the decay of sugar beet press pulp. Furthermore the project shall replace heat generation from fossil fuels with heat generation from biogas.

At present there are four sugar factories operating in the Republic of Moldova. They have a combined processing capacity of approx. 11,000 tons/day of sugar beet. Südzucker Moldova S.A owns two of these factories in Moldavia. During an average campaign period of 100 days both Südzucker factories process 650,000 t sugar beet and produce about 91,000 tons of sugar, when optimal growth conditions (i.e. amount harvested, sugar content) prevail. The two Südzucker Moldova factories contribute to the supply of the national sugar market with a yearly sugar demand of 85,000 tons. The remaining sugar is sold to the EU (depending on the available quota), Russia and the Balkan States.

The project activity will involve the installation of a biodigester at the Südzucker sugar factory in Drochia, Moldova, to capture and utilize biogas from sugar beet press pulp and sugar beet processing waste. The sugar plant has the capacity to process 3,000 tons of sugar beet per day resulting in a waste stream of 900 tons of sugar beet press pulp waste and sugar beet residues. As the plant is operating roughly 100 days a year approximately 90,000 tons of sugar beet waste are produced each year.

The baseline scenario for the project consists of two parts:

1. With respect to the sugar beet press pulp the baseline is dumping of the waste in unmanaged landfills with a depth of around 5.5 to 10 meters. There the waste is left to decay anaerobically resulting in considerable methane emissions. At the moment there are 8 landfills with a total volume of 398,411 m^3 in which the sugar beet press pulp is dumped. The filling of these landfills has begun during the year 2008 and the volume will be enough for the next 3-4 years, approximately till the year 2012. Within the vicinity of the factory areas are reserved for the construction of future landfills with the same characteristics as the present landfills. The methane emissions are avoided by the project activity, through treatment of the waste in the designated biogas plant and the capture of the produced biogas.

2. The baseline for the generation of heat and electricity is the continuous use of natural gas. As part of the project activity the biogas produced in the biodigester is utilized in the co-generation unit of the sugar factory replacing natural gas and therefore preventing GHG emissions from the combustion of fossil fuels.

To abate these emissions the project will process the sugar beet press pulp as well as small amounts of waste from sugar beet in a biodigester. There it will be treated to produce biogas, which will be captured and used to generate heat and electricity. The proposed biogas plant will be constructed on the premises of the existing beet storage of the Drochia sugar factory. The area is situated on the northern, slightly sloped outskirts of Drochia next to the sugar factory. The factory borders on farmland, pastures, orchards and vineyards. The settlements of Hlavan, Nijnije Sury and Ketrosy are located within a radius of 5 km from the factory site.

Contribution to sustainable development

Apart from reducing GHG emissions from the decaying waste and from fossil fuel consumption the project involves the following other environmental and social benefits:

- The reduction of dumping of the waste will lead to improved air quality from reduced odor emissions.
- The reduction of air pollution especially unpleasant smells from the landfills will result in an increased attractiveness of the surrounding areas
- The project reduces substantial amounts of GHGs which are associated to global warming resulting in climate change threats.
- The project represents an introduction of a new technology to Moldova.
- The project will result in professional training for the future employees at the project site.
- The project contributes to a sustainable energy supply and to climate protection through the provision of renewable energies.
- The project results in a reduction of imports of natural gas to Moldova, thus reducing the dependency on foreign resources and improving the trade balance of Moldova.
- The project ensures the viability of the sugar factory by providing a renewable and reliable energy source.
- The project will lead to the creation of jobs both during the construction phase of the project as well as during the operation.
- The project will furthermore lead to a strengthening of the employment situation for external suppliers and services, which will perform services for the project thus strengthening there opportunities for development.

A.3. Project participants:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Moldova (host)	Südzucker Moldova S.A.	No

Ecofys Germany GmbH is the consultancy preparing the PDD.

Full contact information for the project participants is provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Republic of Moldova

A.4.1.2. Region/State/Province etc.:

Eponymous district, Drochia District

A.4.1.3. City/Town/Community etc.:

Drochia

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The Site is located near the town of Drochia. The geographic coordinates of the site are 48° 2' 38.00" East, 27° 48' 37.32" North.

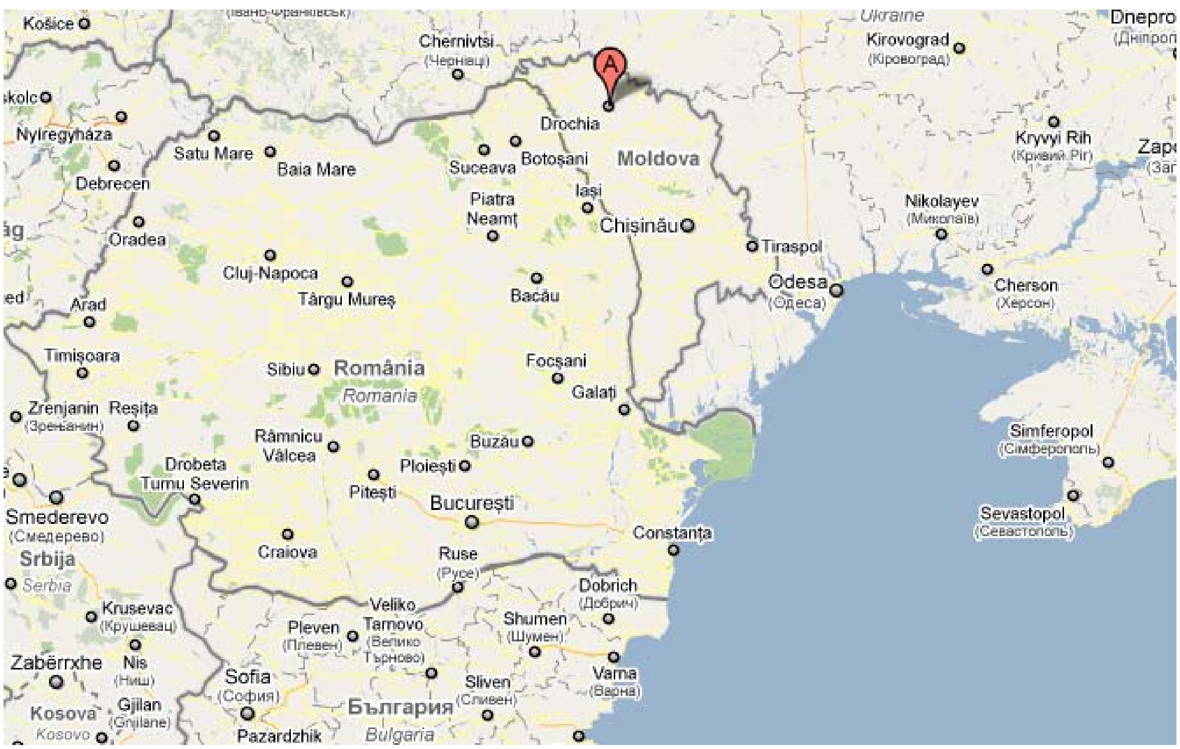

Figure 1. Project site in Moldavia (Source: Google Earth)

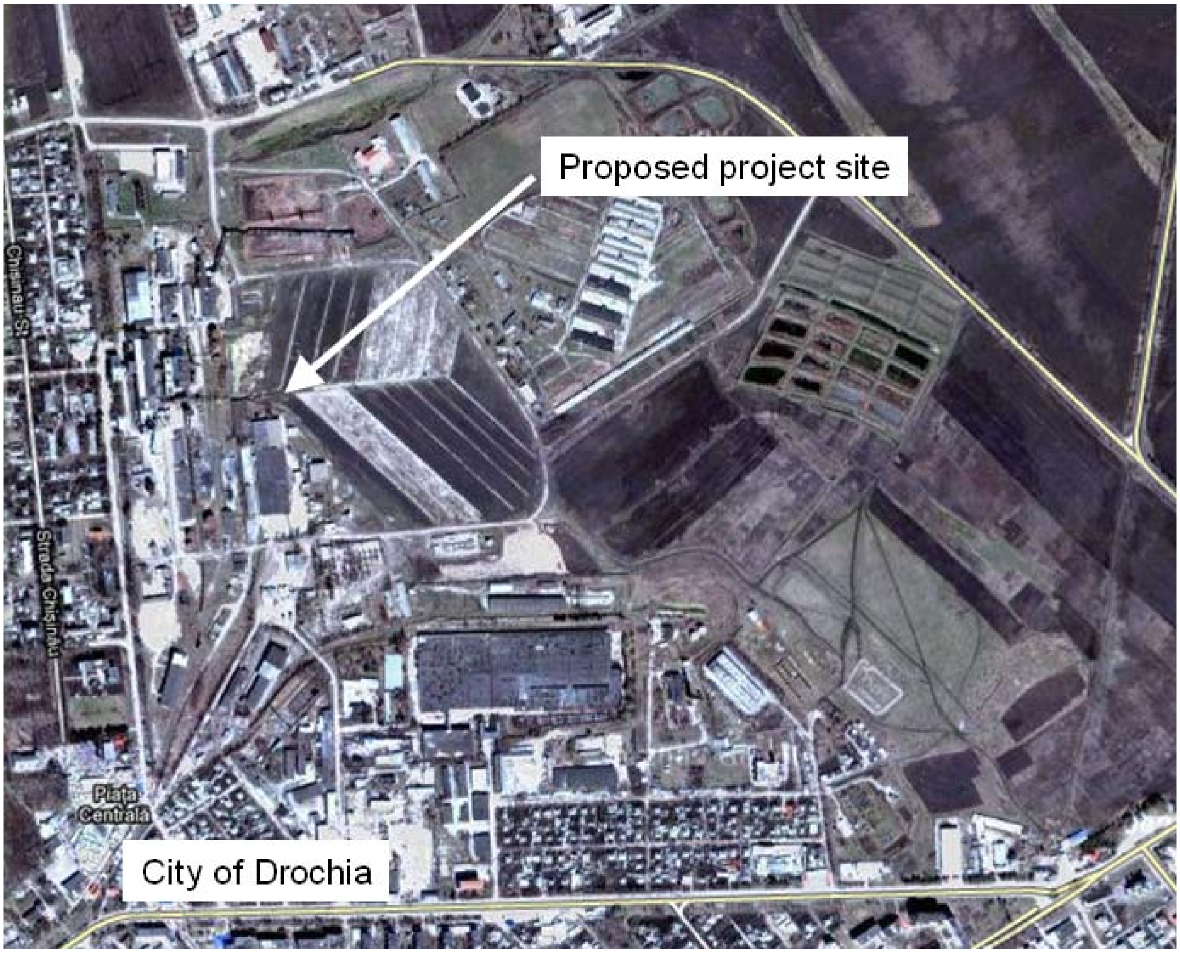

Figure 2. Project site City of Drochia (Source: Google Earth)

A.4.2. Category(ies) of project activity:

The project involves waste handling, sectoral scope 13 and renewable energy generation, sectoral scope 1.

A.4.3. Technology to be employed by the project activity:

The project will use biogas technology is engineered by Dipl.-Ing. Dr. Leopold Prendl. A similar plant design is already used outside of Moldova for the processing of sugar beet waste pulp in the sugar factory in Kapsovar Hungary. The following graphs show the present layout of the Südzucker sugar factory compared to the situation after the implementation of the CDM project.

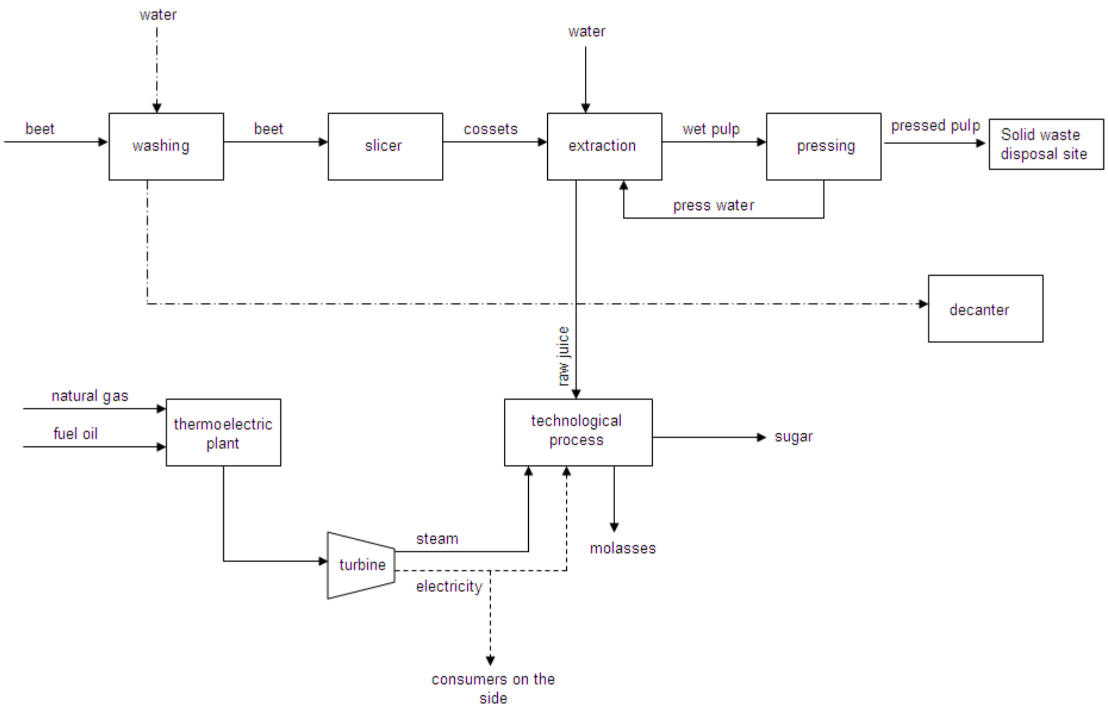

Figure 3. Situation prior to start of the project activity

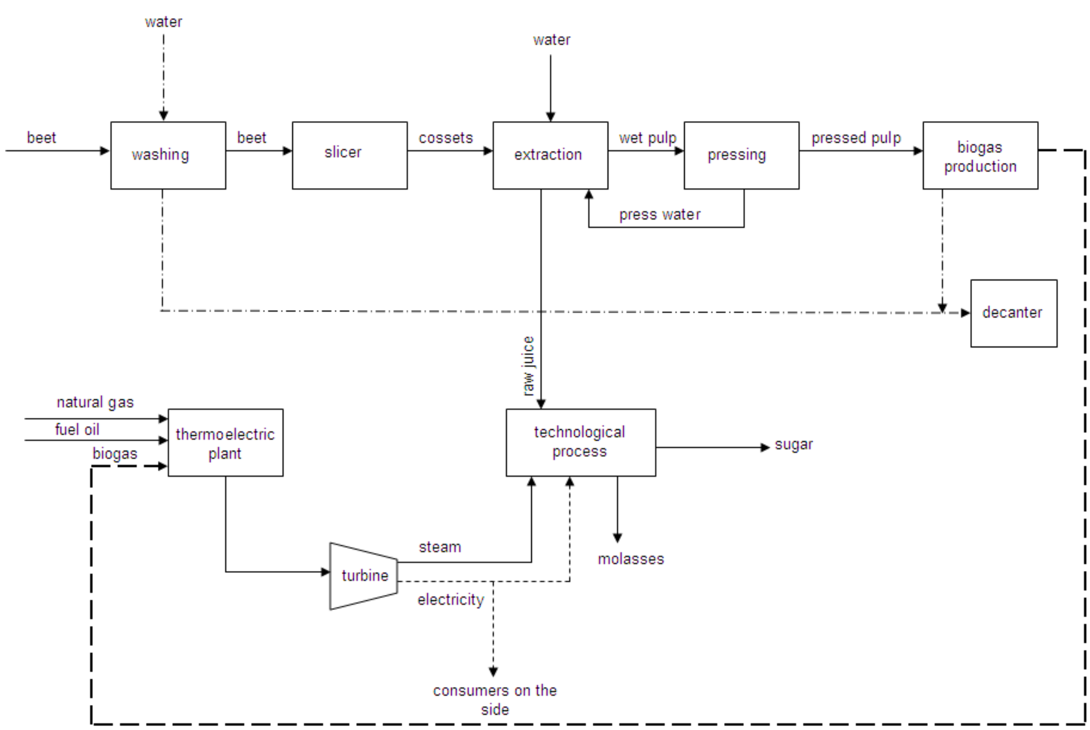

Figure 4. Situation after implementation of the project activity

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions (tonnes of CO_2-eq)
2012	8,153
2013	11,511
2014	14,674
2015	17,653
2016	20,458
2017	23,100
2018	25,588
2019	27,931
2020	30,138
2021	32,216
Total emission reductions (tonnes of CO_2-eq)	211,424
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2-eq)	21,142

A.4.5. Public funding of the project activity:

The project does not obtain public funding.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

The project activity uses the following methodologies and tools:

The approved baseline and monitoring methodology applied to the Project activity is:

- AM0025 Avoided emissions from organic waste through alternative waste treatment processes --- Version 11

The Project activity refers to the latest version of following tools:

- "Tool to calculate the emission factor for an electricity system" (Version 02)
- "Tool to determine project emissions from flaring gases containing methane" (Version 01)
- "Tool for the demonstration and assessment of additionality" (Version 05.2)
- "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (Version 04)

The baseline and monitoring methodology applied to the project activity and tools referred to are the latest version at the time of the PDD publication for public comments.

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The proposed project activity fulfils all the applicability conditions of the approved methodology AM0025 Avoided emissions from organic waste through alternative waste treatment processes (Version 11).

Table 1 Applicability Conditions

Applicability condition AM0025	Project activity meets the applicability conditions since:
The project activity involves one or a combination of the following waste treatment options for the fresh waste that in a given year would have otherwise been disposed of in a landfill: (c) Anaerobic digestion with biogas collection and flaring and/or its use;	This condition is applicable to the project activity as the waste sugar beet press pulp would have been disposed in a landfill. It will be treated using anaerobic digestion including biogas use.
In case of anaerobic digestion, gasification or RDF processing of waste, the residual waste from these processes is aerobically composted and/or delivered to a landfill;	The residual waste will be used as a fertilizer on the surrounding fields under aerobic conditions.
The proportions and characteristics of different types of organic waste processed in the project activity can be determined, in order to apply a multiphase landfill gas generation model to estimate the quantity of landfill gas that would have been generated in the absence of the project activity;	The properties of the sugar beet press pulp are well known and can be applied to the landfill model.
The project activity may include electricity generation and/or thermal energy generation from the biogas, syngas captured, RDF/stabilized biomass produced, combustion heat generated in the incineration process, respectively, from the anaerobic digester, the gasifier, RDF/stabilized biomass combustor, and waste incinerator. The electricity can be exported to the grid and/or used internally at the project site. In the case of RDF produced, the emission reductions can be claimed only for the cases where the RDF used for electricity and/or thermal energy generation can be monitored;	The project includes heat and electricity generation from the produced biogas replacing natural gas.
The project activity does not involve thermal treatment process of neither industrial nor hospital waste;	No thermal treatment processes of industrial or hospital waste are undertaken in the project.

Based on the above it can be concluded that the proposed project activity meets the applicability conditions of the approved methodology AM0025 Avoided emissions from organic waste through alternative waste treatment processes (Version 11).

The selected methodology is only applicable if either scenario 1 or scenario 2 as identified in Table 2 is identified as the most plausible baseline scenario. The following table shows all combinations possible as given in the Methodology.

Table 2 Combinations of baseline options and scenarios applicable to this methodology

Scenario	Baseline			Description of situation
	Waste	Electricity	Heat	
Scenario 1	M2/M3	P4 or P6	H4	The disposal of the waste in a landfill site without capturing landfill gas or the disposal of the waste in a landfill site where the landfill gas is partly captured and subsequently being flared. The electricity is obtained from an existing/new fossil based captive power plant or from the grid and heat from an existing/new fossil fuel based boiler.
Scenario 2	M2/M3	P2	H2	The disposal of the waste in a landfill site without capturing landfill gas or the disposal of the waste in a landfill site where the landfill gas is partly captured and subsequently being flared. The electricity and/or heat are generated by an existing/new fossil fuel based cogeneration plant.

B.3. Description of the sources and gases included in the project boundary:

The physical project boundary covers all production processes related to the biogas production, including the following sources and gases according to AM0025:

Table 3 Summary of gases and sources included in the project boundary, and justification / explanation where gases and sources are not included

	Source	Gas		Justification / Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CH_4	Included	The major source of emissions in the baseline
		N_2O	Excluded	N_2O emissions are small compared to CH_4 emissions from landfills. Exclusion of this gas is conservative.
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.[a]
	Emissions from electricity consumption	CO_2	Included	Electricity may be consumed from the grid or generated onsite/offsite in the baseline scenario
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Emissions from thermal energy generation	CO_2	Included	If thermal energy generation is included in the project activity
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel consumption due to the project activity other than for electricity generation	CO_2	Included	Maybe an important emission source. It includes vehicles used on-site, heat generation, start up of the gasifier, auxiliary fossil fuels needed to be added into incinerator, etc.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Included	May be an important emission source. If electricity is generated from collected biogas/syngas, these emissions are not accounted for. CO_2 emissions from fossil based waste from RDF/stabilized biomass combustion to generate electricity to be used on-site are accounted for.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Direct emissions from the waste treatment processes.	N_2O	Excluded	May be an important emission source for composting activities. N_2O can be emitted from incineration, Syngas[a] produced, anaerobic digestion of waste and RDF/stabilized biomass combustion.

[a] Project proponents wishing to neglect these emission sources shall follow the clarification in Annex 2 of EB 22 report which states that "magnitude of emission sources omitted in the calculation of project emissions and leakage effects (if positive) should be equal to or less than the magnitude of emission sources omitted in the calculation of baseline emissions".

	Source	Gas		Justification / Explanation
		CO_2	Included	CO_2 emissions from incineration, gasification or combustion of fossil based waste shall be included. CO_2 emissions from the decomposition or combustion of organic waste are not accounted.[a]
		CH_4	Included	The composting process may not be complete and result in anaerobic decay. CH_4 leakage from the anaerobic digester and incomplete combustion in the flaring process are potential sources of project emissions. CH_4 may be emitted from stacks[a] from incineration, the gasification process and the RDF/stabilized biomass combustion.
	Emissions from waste water treatment	CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	Included	The wastewater treatment should not result in CH_4 emissions, such as in anaerobic treatment; otherwise accounting for these emissions should be done.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

As per the approved methodology AM0025 Avoided emissions from organic waste through alternative waste treatment processes (Version 11) the baseline scenario is identified using Step 1 of the "Tool for the demonstration and assessment of additionality" (Version 05.2), to identify all realistic and credible baseline alternatives.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

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

Table 4 Alternative disposal scenarios

	Alternative disposal scenarios that are available to the project participants	Applicability for the project scenario
M1	The project activity (i.e. anaerobic digestion) not implemented as a CDM project;	This scenario is an alternative scenario for the project activity.
M2	Disposal of the waste at a landfill where landfill gas captured is flared;	No such landfill is available in the vicinity of the project site. As such this scenario is not an alternative scenario for the project activity.
M3	Disposal of the waste on a landfill without the capture of landfill gas.	This scenario is an alternative scenario for the project activity as it constitutes current practice.

For power generation, the realistic and credible alternative(s) are:

Table 5 Alternative power generation scenarios

	Alternative power generation scenarios that are available to the project participants	**Applicability for the project scenario**
P1	Power generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity;	This scenario is an alternative scenario for the project activity.
P2	Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;	This scenario is an alternative scenario for the project activity as it constitutes current practice.
P3	Existing or Construction of a new on-site or off-site renewable based cogeneration plant;	Renewable feedstock is not available in the quantities necessary for the project. As such this scenario is not an alternative scenario for the project activity.
P4	Existing or Construction of a new on-site or off-site fossil fuel fired captive power plant;	There is no existing captive fossil fuel power plant present. There is no additional demand for a new fossil fuel based electricity at the project site. As such this scenario is not an alternative scenario for the project activity.
P5	Existing or Construction of a new on-site or off-site renewable based captive power plant;	There is no existing captive renewable based power plant present. As such this scenario is not an alternative scenario for the project activity.
P6	Existing and/or new grid-connected power plants	The local existing capacities are not sufficient to supply the electricity needed. Since the public generating capacity is often scarce and commonly subjected to outages a grid-connected power plant is not an option. As such this scenario is not an alternative scenario for the project activity

For heat generation, the realistic and credible alternative(s) are:

Table 6 Alternative heat generation scenarios

	Alternative heat generation scenarios that are available to the project participants	Applicability for the project scenario
H1	Heat generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity;	This scenario is an alternative scenario for the project activity.
H2	Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant;	This scenario is an alternative scenario for the project activity.
H3	Existing or Construction of a new on-site or off-site renewable based cogeneration plant;	Renewable feedstock is not available in the quantities necessary for a full supply with renewable sources. As such this scenario is not an alternative scenario for the project activity.
H4	Existing or new construction of on-site or off-site fossil fuel based boilers;	This scenario is not an alternative scenario for the project activity. The project site requires the provision of heat and electricity, heat only is not a viable option.
H5	Existing or new construction of on-site or off-site renewable energy based boilers;	This is not a credible scenario for the project activity. No renewable fuel sources which are comparable to the present fuel are available for the boiler. As such this scenario is not an alternative scenario for the project activity.
H6	Any other source such as district heat;	No district heating network is available at the factory site. As such this scenario is not an alternative scenario for the project activity.
H7	Other heat generation technologies (e.g. heat pumps or solar energy).	Novel heat generation technologies are not commercially available in the application type used in the project activity or would not supply sufficient heat levels. As a reliable heat supply is paramount they are not considered as a reliable and credible alternative.

Based on the above the following alternative baseline scenarios for the project activity can be identified:

For the disposal/treatment of the fresh waste:

M1: The project activity (i.e. anaerobic digestion) not implemented as a CDM project
M3: Disposal of the waste on a landfill without the capture of landfill gas.

For power generation:

P1: Power generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity;
P2: Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant

For heat generation:

H1: Heat generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity ;
H2: Existing or Construction of a new on-site or off-site fossil fuel fired cogeneration plant

In the following table 7 the two alternatives are summarized as follows:

Alternative 1: a combination of M1, P1 and H1
Alternative 2: a combination of M3, P2 and H2

Table 7 Combinations of baseline options and scenarios applicable to this methodology

Alternative	Baseline			Description of situation
	Waste	Electricity	Heat	
Alternative 1	M1	P1	H1	M1: The project activity (i.e. anaerobic digestion) not implemented as a CDM project P1: Power generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity; H1: Heat generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity
Alternative 2	M3	P2	H2	M3: Disposal of the waste on a landfill without the capture of landfill gas. P2: Existing on-site fossil fuel fired cogeneration plant H2: Existing on-site fossil fuel fired cogeneration plant

Step 2: Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable

The present baseline fuel assumed is natural gas with fuel oil being used in addition. Natural gas is the least GHG-emission intensive fossil fuel available and there are no limitations on its use expected from the Moldavian government. At the same time no supply shortage of natural gas is to be expected for the duration of the project. Therefore the sole use of natural gas as the baseline fuel represents a conservative choice with respect to the project activity.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

As per approved methodology AM0025 Avoided emissions from organic waste through alternative waste treatment processes - Version 11 the additionality is assessed using the “Tool for the demonstration and assessment of additionality ” Version 05.2.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

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

Section B.4 identified two alternatives to the project activity as shown in Table 8.

Table 8 Combinations of baseline options and scenarios applicable to this methodology

Alternative	Baseline			Description of situation
	Waste	Electricity	Heat	
Alternative 1	M1	P1	H1	M1: The project activity (i.e. anaerobic digestion) not implemented as a CDM project P1: Power generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity; H1: Heat generated from by-product of one of the options of waste treatment as listed in M1 above, not undertaken as a CDM project activity
Alternative 2	M3	P2	H2	M3: Disposal of the waste on a landfill without the capture of landfill gas. P2: Existing on-site fossil fuel fired cogeneration plant H2: Existing on-site fossil fuel fired cogeneration plant

Sub-step 1 b will check if the alternatives are consistent with the law.

Sub-step 1b: Consistency with mandatory applicable laws and regulations

The following national policies and circumstances relevant to the baseline of the proposed project are the applicable legislation. For the Alternative 1 the implementation of the biogas system without CDM this is:

- Law No. Nr. 1515-XII of 16th of June 1993 on environmental protection
- Law No. 1540-XIII on fees for waste disposal
- GOST 12.1.003-83 - norm for noise in production facilities
- GOST 12.1.012-78 - norm for admitted vibration levels

Alternative 1 complies with all the above stated laws and norms. Alternative 2 represents the continuation of current practice. As such both alternatives comply with all presently applicable legislations.

According to the "Tool for demonstration and assessment of additionality" the next step is to Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). For the project activity Step 3, barrier analysis is selected.

Step 3: Barrier analysis

Sub-step 3a: Identified barriers that may prevent one or more alternative scenarios to occur.

In this step a complete list of realistic and credible barriers that would prevent the implementation of the proposed project activity from being carried out if the project activity was not registered as a CDM activity is identified.

The following barriers have been identified:

Barriers due to prevailing practice:
The project activity is the first of its kind. Until now there is no co-firing of biogas as fuel for a large scale commercial operation. Furthermore there is no application of biogas technology in the whole private sector in Moldavia.

Since the project activity is a first of its kind in Moldavia this presents all sorts of barriers such as lack of operational knowledge, required training of personnel, risks of longer downtimes due to application of a new technology, the set up of a logistic system to secure the availability of spare parts, that are not locally available.

Technological barriers:
The anaerobic digestion process is a sensitive biological process, that requires corresponding knowledge and skills. This is built up, however it is expected that it will take some time before the project activity is operating at the desired levels. This might result in lower gas yields then expected.

The co-firing of biogas increases the risk of malfunctioning compared to the use of natural gas only.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The prevailing practice barrier and the technological barrier prevent the implementation of Alternative 1 the project activity (i.e. anaerobic digestion) not implemented as a CDM project where power and heat is generated from biogas.

After applying Sub-steps 3a and 3b it can be concluded that Alternative 2 the disposal of the waste in a landfill site without capturing landfill gas. The electricity and/or heat are generated by an existing fossil fuel based cogeneration plant is not prevented by any barrier, and this alternative is not the proposed project activity undertaken without being registered as a CDM project activity.

Since the utilization of CDM alleviates the identified prevailing practice barrier, as per the “Tool for the demonstration and assessment of additionality ” version 5.2. and there is only one alternative scenario, which is Alternative 2, the next step left is a common practice analysis.

Step 4: Common practice analysis

Sub-step 3a has shown that the project is a first of its kind and therefore common practice analysis is not applicable.

Conclusion
From the above additionality analysis, it can be concluded that the project would not have occurred without support from CDM. The CDM project activity goes beyond the applicable legislation and the prevailing practice for sugar mills in Moldova. It can be concluded that the project activity faces barriers

that prevent its implementation and that are alleviated by the CDM. Therefore, the proposed project activity can be deemed additional to the baseline scenario.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The following equations will be applied for the emission reductions:

Project emissions:

Project emissions include project emissions from the use of alternative fuels and/or less carbon intensive fossil fuels ($PE_{k,y}$), project emissions from additional electricity and/or fossil fuel consumption as a result of the project activity ($PE_{EC,y}$ and $PE_{FC,y}$), project emissions from combustion of fossil fuels for transportation of alternative fuels to the project plant ($PE_{T,y}$), and, if applicable, project emissions from the cultivation of renewable biomass at the dedicated plantation ($PE_{BC,y}$):

The project emissions in year *y* are:

$$PE_y = PE_{elec,y} + PE_{fuel,\ on\text{-}site,y} + PE_{c,y} + PE_{a,y} + PE_{g,y} + PE_{r,y} + PE_{i,y} + PE_{w,y} \quad \textbf{(1)}$$

Where:

PE_y	=	Is the project emissions during the year *y* (tCO_2e)
$PE_{elec,y}$	=	Is the emissions from electricity consumption on-site due to the project activity in year *y* (tCO_2e)
$PE_{fuel,\ on\text{-}site,y}$	=	Is the emissions on-site due to fuel consumption on-site in year *y* (tCO_2e)
$PE_{c,y}$	=	Is the emissions during the composting process in year *y* (tCO_2e)
$PE_{a,y}$	=	Is the emissions from the anaerobic digestion process in year *y* (tCO_2e)
$PE_{g,y}$	=	Is the emissions from the gasification process in year *y* (tCO_2e)
$PE_{r,y}$	=	Is the emissions from the combustion of RDF/stabilized biomass in year *y* (tCO_2e)
$PE_{i,y}$	=	Is the emissions from waste incineration in year *y* (tCO_2e)
$PE_{w,y}$	=	Is the emissions from wastewater treatment in year *y* (tCO_2e)

The following table summaries the reasoning why certain Project emissions are not accounted for:

Table 9 Overview of project emissions

Project Emissions	Consideration	Reason

source		
PE_y	Included	Mandatory part.
$PE_{elec,y}$	Included	Is the emissions from electricity consumption on-site due to the project activity in year *y* (tCO_2e)
$PE_{fuel,\ on\text{-}site,y}$	Not Included	Is the emissions on-site due to fuel consumption on-site in year *y* (tCO_2e)
$PE_{c,y}$	Not Included	No composting takes place.
$PE_{a,y}$	Included	No emissions from the digester as it is constructed in a very air-tight manner. If flaring takes place emissions will be monitored.
$PE_{g,y}$	Not Included	No gasification takes place.
$PE_{r,y}$	Not Included	No combustion of RDF takes place.
$PE_{i,y}$	Not Included	No waste incineration takes place.
$PE_{w,y}$	Not Included	No wastewater is produced, hence no wastewater treatment takes place.

Project emissions are calculated in the following steps:

Step 1. Calculate project emissions from electricity consumption on-site due to the project activity in year y (tCO2e)

$$PE_{elec,y} = EG_{PJ,FF,y} * CEF_{elec} \quad \textbf{(2)}$$

Where:

$EG_{PJ,FF,y}$	=	Is the amount of electricity generated in an on-site fossil fuel fired power plant or consumed from the grid as a result of the project activity, measured using an electricity meter (MWh)
CEF_{elec}	=	Is the carbon emissions factor for electricity generation in the project activity (tCO_2/MWh)

Step 2. Calculate project emissions from the anaerobic digestion process in year y (tCO2e)

$$PE_{a,y} = PE_{a,l,y} + PE_{a,s,y} \quad \textbf{(3)}$$

Where:

$PE_{a,l,y}$	=	Is he CH_4 leakage emissions from the anaerobic digesters in year *y* (tCO_2e)
$PE_{a,s,y}$	=	Is the total emissions of N_2O and CH_4 from stacks of the anaerobic digestion process in year *y* (tCO_2e)

CH_4 Emissions from leakage ($PE_{a,l,y}$)

A potential source of project emissions is the physical leakage of CH_4 from the anaerobic digester. Three options are provided for quantifying these emissions:

Option 1: Monitoring the actual quantity of the gas leakage;
Option 2: Applying an appropriate IPCC physical leakage default factor, justifying the selection:

$$PE_{a,l,y} = P_l * M_{a,y} \quad \textbf{(4)}$$

Where:

$PE_{a,l,y}$	=	Is the leakage of methane emissions from the anaerobic digester in year *y* (tCO_2e)
P_l	=	Is the physical leakage factor from a digester (fraction)
$M_{a,y}$	=	Is the total quantity of methane produced by the digester in year *y* (tCO_2e)

Option 3: Applying a physical leakage factor of zero where advanced technology used by the project activity prevents any physical leakage. In such cases, the project proponent must provide the DOE with the details of the technology to prove that the zero leakage factor is justified.

Option 3 has been chosen as the most appropriate option for the biogas plant in Drochia. Documentation is provided to the DOE.

Step 3. Emissions from anaerobic digestion stacks ($PE_{a,s,y}$)

Biogas produced from the anaerobic digestion process may be either flared or used for energy generation. The final stack emissions come from these two sources and are treated independently.

1. Emissions form anaerobic digestion stacks form the co-generation unit – $PE_{a,l,y}$
2. Emissions from flaring - $PE_{flare,y}$

1. Emissions form anaerobic digestion stacks from the co-generation unit,

These stacks are omitted as they represent only a very small share of expected emission reductions.

The emissions from anaerobic digestion stacks have been estimated to be around 30 t CO_{2eq} per year. The same amount as in the baseline if natural gas is used as a fuel.

Furthermore the Methodology states that:

> "magnitude of emission sources omitted in the calculation of project emissions and leakage effects (if positive) should be equal to or less than the magnitude of emission sources omitted in the calculation of baseline emissions"

In contrast to that the choice of natural gas as a baseline fuel instead of the past real mix of natural gas and heavy fuel oil leads to an underestimation of baseline emissions of at least 100 t CO_{2eq} per year. The project emissions from electricity consumption on site have been calculated using a national grid emission factor of 0.521 t CO_{2eq} / MWh. This value is higher than the real emission factor of the electricity used which is self generated in the co-generation unit. As such the project emissions are of a larger magnitude than the real project emissions.

Additionally the fuel change from natural gas to biogas in the co-fired boiler does not affect the amount of N_2O and CH_4 emissions which are largely determined by the combustion conditions which are identical in the boiler for both fuels, which means there is no change from the Baseline to the project activity.

Following the above the omission of the stack emissions from the co-generation is justified.

2. Emissions from flaring

If flaring occurs, the "Tool to determine project emissions from flaring gases containing methane" (Version 01) should be used to estimate methane emissions. Therefore the emissions from anaerobic digestion stacks are determined by the emissions from flaring. In the project an automatic ignition open flare will be used to secure flaring of biogas not utilized in the co-generation unit.

Flaring emissions are calculated as follows:

Step 1. Determination of the mass flow rate of the residual gas that is flared

This step calculates the residual gas mass flow rate in each hour h, based on the volumetric flow rate and the density of the residual gas. The density of the residual gas is determined based on the volumetric fraction of all components in the gas.

$$FM_{RG,h} = \rho_{RG,n,h} \times FV_{RG,h} \quad (5)$$

Where:

$FM_{RG,h}$	=	Mass flow rate of the residual gas in hour h (kg/h)
$\rho_{RG,n,h}$	=	Density of the residual gas at normal conditions in hour h (kg/m^3)
$FV_{RG,h}$	=	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h (m^3/h)

and:

$$\rho_{RG,n,h} = \frac{P_n}{\frac{R_u}{MM_{RG,h}} \times T_n} \quad (6)$$

Where:

$\rho_{RG,n,h}$	=	Density of the residual gas at normal conditions in hour h (kg/m^3)
P_n	=	Atmospheric pressure at normal conditions (101 325) (Pa)
R_u	=	Universal ideal gas constant (8 314) (Pa.m^3/kmol.K)
$MM_{RG,h}$	=	Molecular mass of the residual gas in hour h (kg/kmol)
T_n	=	Temperature at normal conditions (273.15) (K)

and:

$$MM_{RG,h} = \sum_i (fv_{i,h} * MM_i) \quad (7)$$

Where:

$MM_{RG,h}$	=	Molecular mass of the residual gas in hour h (kg/kmol)
$fv_{,i,h}$	=	Volumetric fraction of component i in the residual gas in the hour h
MM_i	=	Molecular mass of residual gas component i

i = The components CH4, N2

Step 2. Determination of the mass fraction of carbon, hydrogen, oxygen and nitrogen in the residual gas

Determine the mass fractions of carbon, hydrogen, oxygen and nitrogen in the residual gas, calculated from the volumetric fraction of each component i in the residual gas, as follows:

$$fm_{j,h} = \frac{\sum_i fv_{i,h} \cdot AM_j \cdot NA_{j,i}}{MM_{RG,h}} \quad (8)$$

Where:

$fm_{j,h}$ = Mass fraction of element j in the residual gas in hour h

$fv_{i,h}$ = Volumetric fraction of component i in the residual gas in the hour h

AM_j = Atomic mass of element j (kg/kmol)

$NA_{j,i}$ = Number of atoms of element j in component i

$MM_{RG,h}$ = Molecular mass of the residual gas in hour h (kg/kmol)

j = The elements carbon, hydrogen, oxygen and nitrogen

i = The components CH_4, N_2

Step 5. Determination of methane mass flow rate in the residual gas on a dry basis

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \quad (9)$$

Where:

$TM_{RG,h}$ = Mass flow rate of methane in the residual gas in the hour h (kg/h)

$FV_{RG,h}$ = Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m3/h)

$fv_{CH4,RG,h}$ = Volumetric fraction of methane in the residual gas on dry basis in hour h (NB: this corresponds to $fv_{i,RG,h}$ where i refers to methane).

$\rho_{CH4,n}$ = Density of methane at normal conditions (0.716 kg/m3)

Step 6. Determination of the hourly flare efficiency

In case of **open flares**, the flare efficiency in the hour h ($\eta_{flare,h}$) is

- 0 % if the flame is not detected for more than 20 minutes during the hour h.
- 50 % if the flare is detected for more than 20 minutes during the hour h

Step 7. Calculation of annual project emissions from flaring

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1-\eta_{flare,h}) \times \frac{GWP_{CH4}}{1000} \qquad (10)$$

Where:

$PE_{flare,y}$	=	Project emissions from flaring of the residual gas stream in year y (tCO_2e)
$TM_{RG,h}$	=	Mass flow rate of methane in the residual gas in the hour h
$\eta_{flare,h}$	=	Flare efficiency in hour h
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

Baseline emissions

Baseline emissions are calculated as follows:

To calculate the baseline emissions project participants shall use the following equation:

$BE_y = (MB_y - MD_{reg,y}) + BE_{EN,y}$ **(11)**

Where:

BE_y	=	Is the baseline emissions in year *y* (tCO_2e)
MB_y	=	Is the methane produced in the landfill in the absence of the project activity in year *y* (tCO_2e)
$MD_{reg,y}$	=	Is methane that would be destroyed in the absence of the project activity in year *y* (tCO_2e)
$BE_{EN,y}$	=	Baseline emissions from generation of energy displaced by the project activity in year *y* (tCO_2e).

Adjustment Factor (AF)
In cases where regulatory or contractual requirements do not specify $MD_{reg,y}$, an Adjustment Factor (AF) shall be used and justified, taking into account the project context. In doing so, the project participant should take into account that some of the methane generated by the landfill may be captured and destroyed to comply with other relevant regulations or contractual requirements, or to address safety and odour concerns.

$MD_{reg,y} = MB_y * AF$ **(12)**

Where:

AF	=	Is Adjustment Factor for MB_y (%)

Methane generation from the landfill in the absence of the project activity (MB_y)

The amount of methane that is generated each year (MB_y) is calculated as per the latest version of the approved “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site – Version 04”:

$MB_y = BE_{CH4,SWDS,y}$

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \tfrac{16}{12} \cdot F \cdot DOC_f \cdot MCF \sum_{x=1}^{y} W_{j,x} \cdot DOC_j e^{-k_j(y-x)} \cdot (1-e^{-k_j}) \quad \textbf{(13)}$$

Where:

$BE_{CH4,SWDS,y}$	=	Methane emissions avoided during the year *y* from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO_2e)
φ	=	Model correction factor to account for model uncertainties (0.9)
f	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	=	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	=	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	=	Fraction of degradable organic carbon (DOC) that can decompose
MCF	=	Methane correction factor
$W_{j,x}$	=	Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)
DOC_j	=	Fraction of degradable organic carbon (by weight) in the waste type *j*
k_j	=	Decay rate for the waste type *j*
j	=	Waste type category (index)
x	=	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)
y	=	Year for which methane emissions are calculated

Baseline emissions from electricity and heat cogeneration that is displaced by the project activity

Baseline emissions from electricity and heat cogeneration are calculated by multiplying electricity ($EG_{d,y}$) and heat supplied (Qy) with the CO_2 emission factor of the fuel used by the cogeneration plant, as follows:

$$BE_{EN,y} = \frac{(EG_{d,y} \cdot 3.6) * 10^{-3} + Q_y}{\eta_{cogen}} \cdot EF_{fuel,c} \quad \textbf{(14)}$$

Where:

3.6	=	Conversion factor, expressed as TJ/GWh
$EF_{fuel,c}$	=	Is the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline cogeneration plant in (tCO_2/TJ), obtained from reliable local or national data if available, otherwise, taken from the country specific IPCC 2006 default emission factors
Qy	=	The quantity of thermal energy produced utilizing the biogas/syngas collected/RDF/stabilized biomass/combustion heat from incineration in the project activity displacing thermal energy from cogeneration during the year *y* in TJ
$EG_{d,y}$	=	Is the amount of electricity generated utilizing the biogas/syngas collected/RDF/stabilized biomass/combustion heat from incineration in the project activity displacing onsite/offsite cogeneration plant during the year *y* in GWh
η_{Cogen}	=	The efficiency of cogeneration plant that would have been used in the absence of the project activity

Efficiency of the cogeneration plant (η_{Cogen}) shall be one of the following:

1. Highest of the measured efficiencies of similar plants;
2. Highest of the efficiency values provided by two or more manufacturers for similar plants; or
3. Maximum efficiency of 90%, based on net calorific values.

The calculated efficiency of the co-generation plant was around 90% the use of a lower value would lead to an increase of emission reductions. Thus the choice of the Maximum efficiency of 90% is conservative.

Leakage emissions

The sources of leakage considered in the methodology are CO_2 emissions from off-site transportation of waste materials in addition to CH_4 and N_2O emissions from the residual waste from the anaerobic digestion.

Leakage emissions should be estimated from the following equation:

$$L_y = L_{t,y} + L_{r,y} + L_{i,y} + L_{s,y} \quad \textbf{(15)}$$

Where:

$L_{t,y}$	=	Is the leakage emissions from increased transport in year *y* (tCO_2e)
$L_{r,y}$	=	Is the leakage emissions from the residual waste from the anaerobic digester, the gasifier, the processing/combustion of RDF/stabilized biomass, or compost in case it is disposed of in landfills in year *y* (tCO_2e)
$L_{i,y}$	=	Is the leakage emissions from the residual waste from MSW incinerator in year *y* (tCO_2e)
$L_{s,y}$	=	Is the leakage emissions from end use of stabilized biomass

From the above potential leakage sources the following are considered as relevant in the project at hand.

Leakage emissions	Consideration	Reason
$L_{t,y}$	Included	Transport of the fertilizer to the fields.
$L_{r,y}$	Not included	Residual waste is treated aerobically on the fields not resulting in emissions of GHG..

$L_{i,y}$	Not included	No incineration takes place hence not applicable.
$L_{s,y}$	Not included	No stabilized biomass is produced hence this is not applicable.

Emissions from transportation ($L_{t,y}$)

The project results in the production of a valuable fertiliser that will be transported to surrounding fields for an average distance of 10 km one way to be spread and to improve soil fertility.

$$L_{t,y} = \sum_{i}^{n} NO_{vehicles,i,y} * DT_{i,y} * VF_{cons,i} * NCV_{fuel} * D_{fuel} * EF_{fuel} \qquad \textbf{(16)}$$

Where:

$NO_{vehicles,i,y}$	=	Is the number of vehicles for transport with similar loading capacity
$DT_{i,y}$	=	Is the average additional distance travelled by vehicle type i compared to baseline in year *y* (km)
$VF_{cons,i}$	=	Is the vehicle fuel consumption in litres per kilometre for vehicle type *i* (l/km)
NCV_{fuel}	=	Is the Calorific value of the fuel (MJ/Kg or other unit)
D_{fuel}	=	Is the fuel density (kg/l), if necessary
EF_{fuel}	=	Is the Emission factor of the fuel (tCO_2/MJ)

Emission Reductions

To calculate the emission reductions the following equations are used:

$$ER_y = BE_y – PE_y – L_y \qquad \textbf{(17)}$$

Where:

ER_y	=	Is the emissions reductions in year *y* (t CO_2e)
BE_y	=	Is the emissions in the baseline scenario in year *y* (t CO_2e)
PE_y	=	Is the emissions in the project scenario in year *y* (t CO_2e)
L_y	=	Is the leakage in year *y* (t CO_2e)

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	φ
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	Default form the methodology.
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is the default required by the methodology.
Any comment:	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	Based on site visit. Use 0 for other types of solid waste disposal sites.
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The methodology recommends the following two ways of calculating the value: • Conduct site visit of the solid waste disposal site to assess the type of cover of the solid waste disposal site. Use 2006 IPCC Guidelines for National Greenhouse Gas Inventories for the choice of value to be applied • Use 0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites. As the baseline scenario is unmanaged SWDS without cover, OX value in this case is 0
Any comment:	

Data / Parameter:	F
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume fraction)
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0,5
Justification of the choice of data or description of measurement methods and procedures actually applied :	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.
Any comment:	

Data / Parameter:	DOC_f
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is the default required by the methodology.
Any comment:	

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	0.8 for **unmanaged solid waste disposal sites . deep and/or with high water table**. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters. The depth of the landfill has been confirmed as more than 5 meters by measurements at the site.
Any comment:	The methane correction factor (MCF) accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS.

Data / Parameter:	DOC_j
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value applied:	0.15
Justification of the choice of data or description of measurement methods and procedures actually applied :	The methodology requires the use of the value for DOCj which best fits the properties of the waste present at the project.. For sugar production waste food waste is assumed to be the most appropriate waste category.
Any comment:	

Waste type *j*	DOC_j (% wet waste)	DOC_j (% dry waste)
Wood and wood products	43	50
Pulp, paper and cardboard (other than sludge)	40	44
Food, food waste, beverages and tobacco (other than sludge)	15	38
Textiles	24	30
Garden, yard and park waste	20	49
Glass, plastic, metal, other inert waste	0	0

Data / Parameter:	k_j
Data unit:	-
Description:	Decay rate for the waste type j
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Value applied:	0.06
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is based on information from the United Nations Development Programme's national Human Development Report (NHDR) on Moldova. Providing information on the climate of Moldova. The sugar beet press pulp is rapidly degrading food waste degrading under dry and temperate conditions.
Any comment:	

Data / Parameter:	CEF_{elec}
Data unit:	tCO_2/MWh
Description:	Emission factor for the production of electricity in the project activity
Source of data used:	Based on IEA study of grid emission factor of Moldova
Value applied	0.521
Justification of the choice of data or description of measurement methods and procedures actually applied	The value used is based on an IEA study for the grid emission factor of Moldova. The real value for the co-generation system cannot be determined as allocation of emissions to the heat and electricity is not clear. This approach is conservative as the co-generation system is more efficient than the Moldovian grid mix.
Any comment:	

Data / Parameter:	NCV_{fuel}
Data unit:	MJ/mass or volume units of fuel
Description:	Net calorific value of fuel
Source of data used:	IPCC default values and Supplier information.
Value applied:	NCV_{Diesel} = 43 MJ/kg (IPCC default) $NCV_{FuelOil}$ = 40.12 MJ/kg (Supplier information) $NCV_{NaturalGas}$ = 33.66 MJ/m^3 (Supplier information)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Conservative IPCC default value
Any comment:	

Data / Parameter:	EF_{Fuel}
Data unit:	tCO_2/MJ
Description:	Emission factor of the fuel
Source of data used:	IPCC default value
Value applied:	$EF_{Diesel =}$ 0.0000741 tCO_2/MJ $EF_{FuelOil =}$ 0.0000774 tCO_2/MJ $EF_{NaturalGas =}$ 0.0000561 tCO_2/MJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	Conservative IPCC default value
Any comment:	

Data / Parameter:	η_{Cogen}
Data unit:	%
Description:	Efficiency of cogeneration plant that would have been used, in absence of the project activity.
Source of data used:	Based on technical description of project participant as provided to the DOE
Value applied:	90 %
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value represent a conservative value and also closely matches the calculated value.
Any comment:	

Data / Parameter:	P_l

Data unit:	fraction
Description:	Leakage of methane emissions from anaerobic digester
Source of data used:	Based on technical description of project participant as provided to the DOE
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The biogas plant will be checked regularly for potential leakage and any leakage, which is highly unlikely, will be remedied immediately.
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e / t CH_4
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data used:	Decisions under UNFCCC and the Kyoto Protocol (a value of 21 is to be applied for the first commitment period of the Kyoto Protocol)
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed by the UNFCCC.
Any comment:	

Data / parameter:	D_{Diesel}
Data unit:	kg/L
Description:	Density of fuel
Source of data:	IPCC default values.
Value applied:	0.84
Justification of the choice of data or description of measurement methods and procedures actually applied :	*Conservative IPCC default value*
Any comment:	

B.6.3. Ex-ante calculation of emission reductions:

The total emission reductions of the project activity are calculated on the basis of the equations and parameters presented and explained in section B.6.1 of this document.

1. Calculation of the project emissions

Input data

Table 10. Project emissions from electricity consumption on-site

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$PE_{elec,y}$ [tCO_2eq/year]	521	521	521	521	521	521	521	521	521	521

$PE_{fuel,\ on\text{-}site,y} = 0$

$PE_{c,y} = 0$

$PE_{g,y} = 0$

$PE_{r,y} = 0$

$PE_{i,y} = 0$

$PE_{a,y} = 0$

Calculations

Equation (1): $PE_y = PE_{elec,y} + PE_{fuel,\ on\text{-}site,y} + PE_{c,y} + PE_{a,y} + PE_{g,y} + PE_{r,y} + PE_{i,y} + PE_{w,y}$

Results

Table 11. Project emissions

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PE_y [tCO_2eq/year]	521	521	521	521	521	521	521	521	521	521

2. Calculation of project emissions from electricity consumption on-site in year y (tCO2e)

Input data

Table 12. Electricity consumption

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$EG_{PJ,FF,y}$ [MWh/year]	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

$CEF_{elec} = 0.521$ [tCO_2eq/MWh]

Calculations
Equation (2): $PE_{elec,y} = EG_{PJ,FF,y} * CEF_{elec}$
Results
Table 13. project emissions from electricity consumption on-site

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$PE_{elec,y}$ [tCO_2eq/year]	521	521	521	521	521	521	521	521	521	521

4. Calculation of project emissions from anaerobic digestion process in year y (tCO2e)

Input data
$PE_{a,l,y}$ = 0 [tCO2eq]
$PE_{a,s,y}$ = 0 [tCO2eq]
Calculations
Equation (3): $PE_{a,y} = PE_{a,l,y} + PE_{a,s,y}$
Results
Table 14 . Project emissions from anaerobic digestion processes

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$PE_{a,y}$ = [tCO_2eq/year]	0	0	0	0	0	0	0	0	0	0

5. Calculation of project emissions from CH4 leakage in year y (tCO2e)

Input data
P_l = 0
$M_{a,y}$ = 0 [tCO2eq]
Calculations
Equation (4): $PE_{a,l,y} = P_l * M_{a,y}$
Results
Table 15. Project emissions from CH4 leakage

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$PE_{a,l,y}$ [tCO_2eq/year]	0	0	0	0	0	0	0	0	0	0

6. Calculation of baseline emissions in year y (tCO2e)

Input data

$MB_y = BE_{CH4,SWDS,y} =$

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$BE_{CH4,SWDS,y}$ [tCO_2eq/year]	0	3,358	6,521	9,500	12,305	14,947	17,435	19,778	21,985	24,063

$MD_{reg,y =}$ 0

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$BE_{EN,y}$ [tCO_2eq/year]	8,714	8,714	8,714	8,714	8,714	8,714	8,714	8,714	8,714	8,714

Calculations

Equation (11): $BE_y = (MB_y - MD_{reg,y}) + BE_{EN,y}$

Results

Table 16. Baseline emissions

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
BE_y [tCO_2eq/year]	8,714	12,073	15,235	18,214	21,019	23,661	26,149	28,492	30,699	32,777

7. Calculation of methane emissions avoided in year y (tCO2e)

Input data

$\varphi = 0.9$

f = 0

$GWP_{CH4} = 21$

OX = 0.1

F = 0.5

$DOC_f = 0.5$

MCF = 0.8

$W_{j,x}$ = 90,000 ton

$DOC_j = 0.15$

$k_j = 0.06$

j = waste type category index

x = Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)

y = Year for which methane emissions are calculated

Calculations

Equation (13):

$$BE_{CH4,SWDS,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot \tfrac{16}{12} \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1-e^{-k_j})$$

Results

Table 17. Methane emissions avoided

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$BE_{CH4,SWDS,y}$ [tCO_2eq/year]	0	3,358	6,521	9,500	12,305	14,947	17,435	19,778	21,985	24,063

8. Baseline emissions from electricity and heat cogeneration that is displaced by the project activity in year y (tCO2e)

Input data

$EF_{fuel,c}$ = 56.1 tCO_2/TJ

Qy = 139.779 TJ

$EG_{d,y}$ = 5.406 GWh

η_{Cogen} = 0.9

Calculations

Equation (14): $$BE_{EN,y} = \frac{(EG_{d,y} \cdot 3.6) * 10^{-3} + Q_y}{\eta_{cogen}} \cdot EF_{fuel,c}$$

Results

Table 18. Baseline emissions from electricity and heat cogeneration that is displaced by the project activity

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$BE_{EN,y}$ [tCO_2eq/year]	8,714	8,714	8,714	8,714	8,714	8,714	8,714	8,714	8,714	8,714

9. Calculation of Leakage emissions in year y (tCO2e)

Input data

$L_{t,y}$ = 40 t CO_{2eq}/year

$L_{r,y}$ = 0

$L_{i,y}$ = 0

$L_{s,y}$ = 0

Calculations

Equation (15): $L_y = L_{t,y} + L_{r,y} + L_{i,y} + L_{s,y}$

Results

Table 19. Leakage emissions in year y (tCO2e)

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
L_y [tCO_2eq/year]	40	40	40	40	40	40	40	40	40	40

10. Calculation of Leakage emissions from transportation in year y (tCO2e)

Input data

$NO_{vehicles,i,y} = 3{,}000$

$DT_{i,y} = 20$ km

$VF_{cons,i} = 0.25$ l/km

$NCV_{fuel} = 43$ MJ/kg

$D_{fuel} = 0.84$ kg/l

$EF_{fuel} = 0.0000741$ tCO_2/MJ

Calculations

Equation (16): $L_{t,y} = \sum NO_{vehicles,i,y} * DT_{i,y} * VF_{cons,i} * NCV_{fuel} * D_{fuel} * EF_{fuel}$

Results

Table 20. Leakage emissions from transportation

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$L_{t,y}$ [tCO_2eq/year]	40	40	40	40	40	40	40	40	40	40

11. Calculation of Emission reductions in year y (tCO2e)

Input data

BE_y =

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
BE_y [tCO_2eq/year]	8,714	12,073	15,235	18,214	21,019	23,661	26,149	28,492	30,699	32,777

PE_y=

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PE_y [tCO_2eq/year]	521	521	521	521	521	521	521	521	521	521

L_y =

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$L_{t,y}$ [tCO_2eq/year]	40	40	40	40	40	40	40	40	40	40

Calculations

Equation (17): $ER_y = BE_y – PE_y – L_y$

Results

Table 21. Emission reductions

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$ER_{,y}$ [tCO_2eq/year]	8,153	11,511	14,674	17,653	20,458	23,100	25,588	27,931	30,138	32,216

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tCO2-eq)	Estimation on baseline emission (tCO2-eq)	Estimation of leakage (tCO2-eq)	Estimation of overall emission reduction (tCO2-eq)
2012	521	8,714	40	8,153
2013	521	12,073	40	11,511
2014	521	15,235	40	14,674
2015	521	18,214	40	17,653
2016	521	21,019	40	20,458
2017	521	23,661	40	23,100
2018	521	26,149	40	25,588
2019	521	28,492	40	27,931
2020	521	30,699	40	30,138
2021	521	32,777	40	32,216
Total	**5,210**	**217,034**	**400**	**211,424**

B.7. Application of the monitoring methodology and description of the monitoring plan:

The Proposed project is monitored according to the approved methodology Version 11 of AM0025 "Avoided Emissions from Organic Waste through Alternative Waste Treatment Processes."

B.7.1 Data and parameters monitored:

Data / Parameter:	ID.1 / $EG_{d,y}$
Data unit:	MWh
Description:	Amount of electricity generated utilizing the biogas in the project activity displacing electricity in the baseline during the year *y*
Source of data to be used:	Electricity meter and calculation
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5,406,000
Description of measurement methods and procedures to be applied:	Continuous measurements of total generated electricity. Value multiplied by the energetic fraction of biogas of the total energy supplied to the boiler. $$EG_{d,y} = \frac{M_{a,y} * NCV_{Methane}}{(M_{a,y} * NCV_{Methane}) + (M_{NaturalGas,y} * NCV_{NaturalGas}) + (M_{FuelOil,y} * NCV_{FuelOil})} * EG_{Total,y}$$
QA/QC procedures to be applied:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Any comment:	

Data / Parameter:	ID.2 / $EG_{PJ,FF,y}$
Data unit:	MWh
Description:	Amount of electricity consumed from the co-generation unit as a result of the project activity
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,000 MWh
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures to be applied:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Any comment:	

Data / Parameter:	ID.3 / $M_{a,y}$
Data unit:	m^3/year
Description:	Total methane produced from anaerobic digester
Source of data to be used:	Flow meter and calculation
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5,055,222
Description of measurement methods and procedures to be applied:	Continuous measurement of total biogas flow through a flow meter. Total methane will be calculated by multiplying the flow meter value with the methane content (ID.11 / $fv_{i,h}$)
QA/QC procedures to be applied:	Data can be checked from usage records. Flow meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Any comment:	.

Data / Parameter:	ID.4 / MB_y
Data unit:	tCH_4
Description:	Methane produced in the landfill in the absence of the project activity in year *y*
Source of data to be used:	Calculated as per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Value of data applied for the purpose of calculating expected emission reductions in section B.5	As per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Description of measurement methods and procedures to be applied:	As per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
QA/QC procedures to be applied:	As per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Any comment:	

Data / Parameter:	ID.5 / Q_y
Data unit:	TJ
Description:	Net quantity of thermal energy generated utilizing the biogas supplied by the project activity in year *y*
Source of data to be used:	Steam meter and calculation
Value of data applied for the purpose of calculating expected emission reductions in section B.5	139.779 TJ
Description of measurement methods	Continuous measurement of the steam flow and measurement of both temperature and pressure to determine the thermal energy delivered to the factory, then

and procedures to be applied:	multiplied by the energetic fraction of biogas of the total energy supplied to the boiler. $Q_y = \frac{M_{a,y} * NCV_{Biogas}}{(M_{a,y} * NCV_{Biogas}) + (M_{NaturalGas,y} * NCV_{NaturalGas}) + (M_{FuelOil,y} * NCV_{FuelOil})} * Q_{Total,y}$
QA/QC procedures to be applied:	In case of monitoring of steam, it will be calibrated for pressure and temperature of steam at regular intervals. The meter will be subject to regular maintenance and testing to ensure accuracy.
Any comment:	

Data / Parameter:	ID.6 / f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data to be used:	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Recorded Annually
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	ID.7 / W_x
Data unit:	tons
Description:	Total amount of organic waste prevented from disposal in year *x* (tons)
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	90,000
Description of measurement methods and procedures to be applied:	Continuously measured through a belt weigher, aggregated at least annually
QA/QC procedures to be applied:	The belt weigher will be subject to regular (in accordance with stipulation of the supplier) maintenance and testing to ensure accuracy.
Any comment:	

Data / parameter:	ID.8 / $NO_{vehicles,i,y}$
Data unit:	Number

Description:	Vehicles per carrying capacity per year
Source of data to be used:	Counting
Value of data applied for the purpose of calculating expected emission reductions in section B.5	3,000
Description of measurement methods and procedures to be applied:	Number of vehicles recorded, aggregated annually
QA/QC procedures to be applied:	
Any comment:	

Data / parameter:	ID.9 / $DT_{i,y}$
Data unit:	km
Description:	Average additional distance travelled by vehicle type *i* compared to the baseline in year *y*
Source of data to be used:	Expert estimate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	Assumption to be approved by DOE
Any comment:	

Data / parameter:	ID.10 / $VF_{cons,i}$
Data unit:	L/km
Description:	Vehicle fuel consumption in litres per kilometre for vehicle type *i*
Source of data to be used:	Expert estimate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.25
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to	Assumption to be approved by DOE

be applied:	
Any comment:	

Data / parameter:	ID.11 / $fv_{i,h}$
Data unit:	-
Description:	Volumetric fraction of component i in the biogas in the hour h where i = CH_4
Source of data to be used:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.51
Description of measurement methods and procedures to be applied:	Continuously. Values will be averaged hourly
QA/QC procedures to be applied:	Analysers will be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas.
Any comment:	

Data / parameter:	ID.12 / $FV_{RG,h}$
Data unit:	m^3/h
Description:	Volumetric flow rate of the residual gas to the flare in dry basis at normal conditions in the hour h
Source of data to be used:	Measurements by project participants using a flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Continuously. Values will be averaged hourly
QA/QC procedures to be applied:	Flow meters will be periodically calibrated according to the manufacturer's recommendation.
Any comment:	

Data / Parameter:	ID.13 / Flaring in operation
Data unit:	Hours/year
Description:	number of hours in a year where flaring is in operation

Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Number of hours where flaring is operational will be monitored continuously, aggregated annually
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	ID.14 / Flame detection
Data unit:	
Description:	Measure whether the flare is active
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuously measure whether the flare is burning to indicates that a significant amount of gases are still being burnt and that the flare is operating.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	ID.15 / $M_{NaturalGas, y}$
Data unit:	m^3
Description:	Total amount of natural gas fed to the boiler
Source of data to be	Measurements by project participants using a flow meter

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures to be applied:	Data can be checked from usage records. Flow meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Any comment:	

Data / Parameter:	ID.16 / $M_{FuelOil,\ y}$
Data unit:	kg
Description:	Total amount of fuel oil fed to the boiler
Source of data to be used:	Measurements by project participants using a flow meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures to be applied:	Data can be checked from usage records. Flow meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.
Any comment:	

B.7.2. Description of the monitoring plan:

Monitoring data will be gathered by Südzucker and stored in a database. The database will store the data at least for two years after the project has been completed.

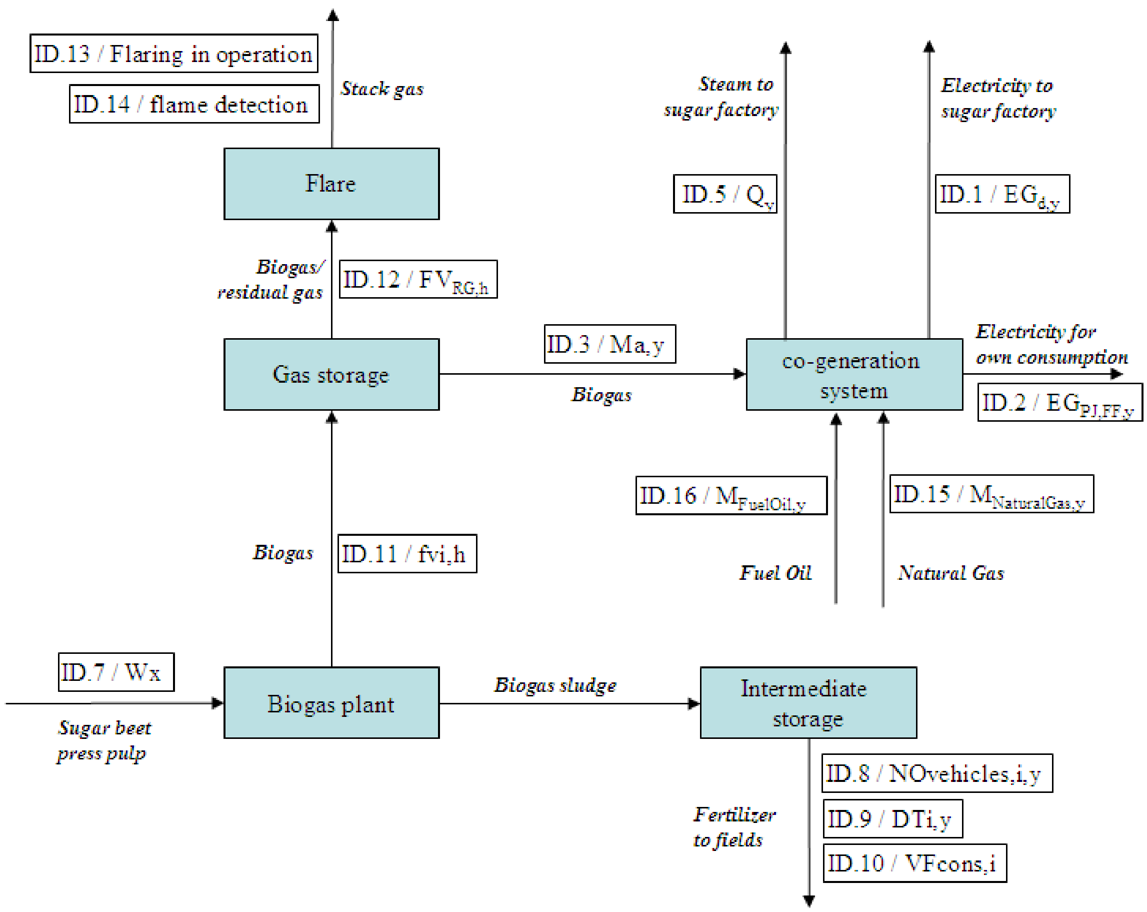

Figure 5. Overview of monitoring stations

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

The final draft of this baseline section has been completed on 29/07/2010 by Mr. Piotr Jaworski and Ms. Catharina Beyer.

The baseline has been prepared by Ecofys Germany GmbH
Ecofys Germany GmbH should not be considered as a project participant.

Company name:	Ecofys Germany GmbH
Visiting Address:	Landgrabenstr. 94 D-90443 Nürnberg Germany
Contact Person:	Piotr Jaworski
Telephone number:	+49 (0)911 994 358 - 16
e-mail:	p.jaworski@ecofys.com

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

The starting date of the project activity is expected to be by 01/03/2011

C.1.2. Expected operational lifetime of the project activity:

The operational lifetime of the project is expected to be 20 years.

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

N.A.

C.2.1.2. Length of the first crediting period:

N.A.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/01/2012

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Environmental Impacts of the proposed project were analysed by:

„NATIONAL INSTITUTION OF RESEARCHES AND ENGINEERING IN AREA, URBANISTICS AND ARCHTECTURE IMPROVEMENT DOMAIN, WITH THE TERRITORIAL FUNCTIONS U R B A N P R O J E C T “

The translated results of the study are summarised below:

„The impact of the biogas production at the sugar factory in Drochia of the GC Südzucker Moldova S.A. (SZM) on the environment“

The impact of the biogas production facility were examined according to the possible environmental effects. The following areas where examined:

- Location and impact of the biogas production on the population
- The impact of the biogas production on the ambient flora and fauna
- The impact of the biogas production on the soil
- The impact of the biogas production on the waters in the region
- The impact of the biogas production on the air and regarding climate change
- The impact of the biogas production on the surrounding landscape, architecture and settlements
- The impact of the biogas utilization

Conclusion

Looking at the effects of the commissioning of a biogas plant at the site of the sugar factory on the environment the findings can be summarized as follows.

Environmental Issue	Significance Rating	Possible Impact
population	low due to existing agricultural industry	no higher than of existing facilities
flora and fauna	low due to existing agricultural industry	no higher than of existing facilities
soil	low due to minimal land consumption	no higher than of existing facilities
waters	insignificant	none
air	high due to major change of operation	improvement regarding effects on climate change
landscape, architecture and settlements	low due to existing agricultural industry	no higher than of existing facilities

In summary it shows that the operation of the biogas plant is less harmful to the environment than the current practice and equal compared to the already existing operation of the sugar plant.

Overall it can be concluded that the benefits of the project are far greater than the impact on the environment. The construction of the biogas plant at the SZM sugar factory in Drochia marks an important step towards environmental protection and constitutes a positive solution for the sugar beet press pulp elimination. In addition the project exploits local resources to substitute fossil fuels from abroad. Due to the introduction of a new technology also socio-economic benefits should be greatly enhanced.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Environmental impacts are not considered significant by the project participants nor by the host party.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

The stakeholder consultation was held in two parts on the 31st March 2010 and on the 9th June 2010. Overall it was very well attended by a total of 40 people. Invitations were distributed through local television, newspaper announcements, public postings, individual invitations as well as personal contact with local residents.
Attendees had a broad background ranging from local residents, government representatives, local businesses, green movements to the press. The proceedings are documented in two protocols as well as photos and films.
At the beginning of both stakeholder consultations presentations explaining the sugar factory, the CDM mechanism as well as the planned biogas plant were given to facilitate understanding of the project of all parties.

E.2. Summary of the comments received:

Stakeholder's response to the project was overwhelmingly positive, and no comments were received regarding potential negative impacts of the project. The table below presents a few examples of the comments received from the stakeholders at the meeting reflective of their positive views, both on the project's merits and Südzucker's contribution to the sustainable development of the region.

Stakeholder	Comment
D. Burlacu	I would like to express my gratification with the fact, that there are such people, who are eager to do something in this domain. I am so proud of the fact, that there would be such a plant in my city. The pressed pulp transportation is one of our biggest problems. During the processing season there are some problems with the roads by the pressed pulp transportation. They are always moist and dirty. There are always hazards on the road. Taking into consideration the fact, that there would be no hazards anymore, we may state that it is good.
Mr. Pirvan	Moldova doesn't have its own natural resources. If bioethanol and biodiesel would be mixed to 10% and in USA to 20%, the biogas would be used for all the 100%. And this is very good. I mean, this project leads to the cost savings of the final product. I would be very happy to have here such a plant, the first in Moldova. This would be pretty good to have the whole region provided with gas. I would like to thank Südzucker Moldova sugar beet factory for the realization of this project.
V. Scorpan	We are familiar with this project, the Ministry of Ecology and Environment supports Clean Development Mechanism. Next week a National Commission session in support of Clean Development Mechanism and Kyoto-Agreement will take place. There will be definitely adopted a positive resolution supporting such projects.

E.3. Report on how due account was taken of any comments received:

The stakeholders did not identify any negative impact of the project; on the contrary they mentioned that the project is very valuable for the local community. Therefore no actions needed to be taken to address the comments from the stakeholders' consultation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Südzucker Moldova S.A.
Street/P.O.Box:	Str. 27 August 1
Building:	
City:	Drochia
State/Region:	
Postcode/ZIP:	5200
Country:	Moldova
Telephone:	+373 / 252 280 10
FAX:	+373 / 252 280 20
E-Mail:	
URL:	
Represented by:	
Title:	Dr.
Salutation:	Mr.
Last name:	Dandar
Middle name:	
First name:	Richard
Department:	Technik - Technology and Production
Mobile:	+ 373 / 691 74 044
Direct FAX:	+ 373 / 252 280 24
Direct tel:	+ 373 / 252 280 24
Personal e-mail:	Richard.Dandar@suedzucker.de

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding has been received for the project activity.

Annex 3

The following document describes the baseline situation as recognised by Südzucker and expressed by Dr. Richard Dandar in August 2009.

Press pulp elimination at the Südzucker Moldova sugar factory in Drochia

1. Description of the situation

The amount of the pulp for sale decrease from year to year in Moldova due to the demand reduction. Only in years 2003 and 2007 the situation with the pulp selling was positive. However not only due to the growth of demand, but also due to the general less amount of the processed sugar beet, according to the bad weather conditions during both of the years. Other reasons for this development are: a great reduction of livestock units in the country and pulp transport expenses connected with the growing diesel and petrol prices. At the same time there are many other food means (e.g. corn) available in the neighbouring villages.

In the Drochia factory operating region there are cattle units in the amount of about 24,000, whereof only 1,000 units are kept at big farm holds. Here we can count on raw materials consumption of about 5 t pulp per animal and the feeding period only for one onset (general amount of about 5,000 t). The rest of the cows are kept separately at private farm holds. Winter feeding consists of corn straw and hay. Henceforth we could count here also on general sales of about 10,000 t due to the fresh pulp and silage feeding. However, during the campaign period and after it there has to be eliminated for about 30,000 t or 2/3 of the accrued press pulp.

Till the year 2007 all the pulp had been produced as wet sugar beet pulp with the content of solid matter (SM-Content) of about 5-6%, after that it had been sold further or eliminated. Beginning with the campaign of the year 2006 the press pulp would be produced with the SM-Content of about 17-20 %. Anyhow, due to the growing daily production, the three installed pulp pressers are not enough, so that one part of the pulp is to be stored as wet pulp.

2. Legislation of Moldova Republic

According to Moldavian Legislation, all the products that appear during the sugar production process would be determined as by-products or industrial remnants, or other, in case they would be sold for further processing. They include:

- wet or press pulp,
- dried pulp or pellets,
- molasses,
- carbonated limestone,
- scrap metal (metal) and
- limestone chips and charred coal or anthracite.

If the by-products or industrial remnants have to be eliminated and not sold, according to the Legislation No. 1515-XII d/d 16.06.1993 they would be determined as *industrial waste*. During waste elimination there is a fermentation process and emission of gas mixture in the atmosphere, according to the Law No. 1540-XIII d/d 15.02.1998 Moldavian authorities have right to mark up the production waste elimination tariffs.

3. Pulp elimination in the Drochia location

The press pulp, which was not sold, would be transported during all the campaign period with the help of trucks directly to the moulds, situated 4 km away. The percentage of the pulp, being eliminated in the moulds for last three years, is composed in the table No. 1.

Table No. 1: The percentage of the press pulp, eliminated in the moulds/disposal sites

	2006	**2007**	**2008**
Elimination percentage in the moulds/disposal sites (%)	96.2	27.6	74.6

The press pulp would be stacked with the help of a crawler tractor or a bulldozer. There is no any drainage system, any ventilation or mechanic compression. After the filling of a mould it would be covered with sod.

The unpressed pulp would be pumped down into the so called pulp pits during the campaign, the pits being situated on the territory of the factory, there it would be temporary stockpiled and after the campaign it would be transported as well to the above mentioned moulds. At the moment there are 8 moulds with the total volume of 398,411 m^3 at the disposal. The filling of these moulds has begun during the Campaign of year 2008 and, according to the Campaign duration, their volume would be enough for next 3-4 years, approximately till the Campaign of year 2012.

The alternative for the pulp elimination process is fermentation of this biomass in a biogas plant. The obtained biogas would be burnt in the thermal boiler of the sugar factory. The obtained warmth energy would be later used for the vapour production, so necessary in the process of sugar production.

If the biogas production project will not be fulfilled, the accruing press pulp is going to be further moulded, because there is no possibility to sell it as food means. After the today's moulds capacity exhaustion, there will be built new moulds on the own or outside (leased) territory, because the designated for that disposal sites are not available.

Within a radius of 10 km from the factory there are currently about 77 ha of neglected and/or agriculturally useless areas. Out of the mentioned above area, 10 ha (Figure 1; area No. 1) already belong to Südzucker Moldova. The rest 67 ha (Figure 1; area No. 2) Südzucker Moldova has on lease. For the moulds construction fort he future pulp elimination, there are about 20% at the disposal.

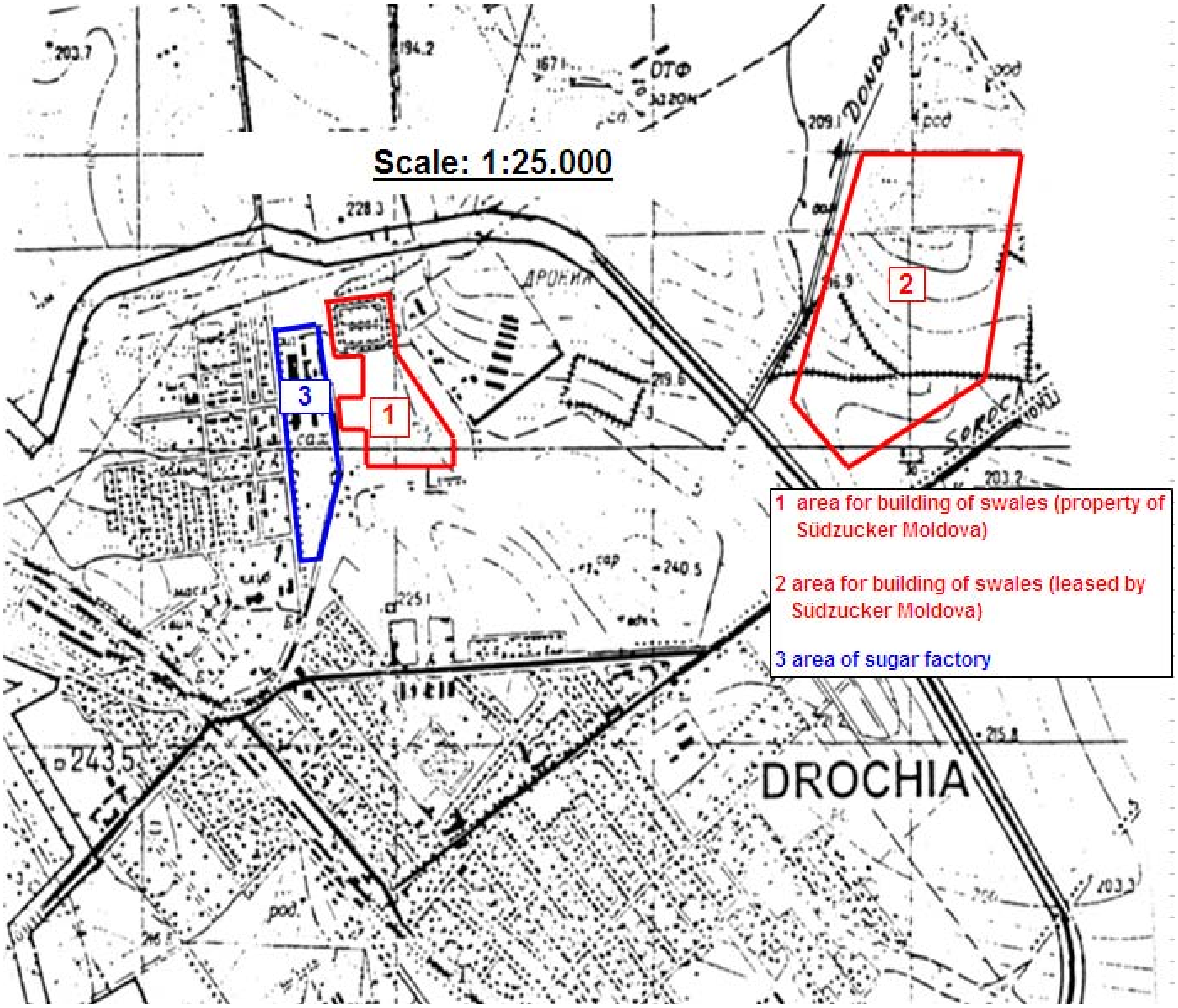

Figure 1. Overview of baseline waste disposal sites

Annex 4

MONITORING INFORMATION

Monitoring Plan for emission reduction verification of Drochia CDM Biogas Project

This Monitoring Plan (MP) prepared for and adopted by the biogas plant of the Drochia CDM Biogas Project in the context of the planned CDM project. The MP defines standards against which the performance in terms of the project's Emission Reductions (ERs) will be monitored and verified, in conformance with all relevant requirements of the CDM of the Kyoto Protocol. This MP will become an integral part of the Drochia CDM Biogas Project Standard Operation Procedure.

I. Use of the Monitoring Plan by the Operator

This MP identifies key performance indicators of the project and sets out the procedures for metering, monitoring, calculating and verifying the ERs generated by the project. Adherence to the instructions in the MP is necessary for the operator of the Drochia CDM Biogas Project to successfully measure and track the impact of the project on the environment and prepare all data required for the periodic audit and verification process that must be undertaken to confirm the achievement of the corresponding ERs. The MP is thus the basis for the production of ERs and accreditation of the ERs within the CDM and will be subject to verification procedures.

The MP can be updated and adjusted to meet operational requirements. The verifying Designated Operational Entity (DOE) approves such modifications during the process of initial or periodic verification. In particular, any shifts in the baseline scenario may lead to such amendments, which may be mandated by the verifier. Amendments may also be necessary as a consequence of new circumstances that affect the ability to monitor ERs as described here or to accommodate new or modified CDM rules.

II. Organizational, Operational, and Monitoring Obligations

Monitoring the project's performance in terms of ERs achievement requires Drochia CDM Biogas Project to first ensure adherence to the standard operational procedures, and second to fulfill operational data collection and processing obligations. Drochia CDM Biogas Project has the primary obligation to calculate the project ERs based on the most recent available information. In addition Drochia CDM Biogas Project should establish an organizational structure in which the roles and responsibilities of monitoring personnel are identified and an quality control procedure provided with this MP. Drochia CDM Biogas Project employees will receive a training on the operation of the equipment of the project activity and the CDM related monitoring.

III. Data Storage

The monitored data will be stored both electronically by means of a PLC system, that simultaneously communicates with the SCADA system. The data will be stored locally on a hard disk. The Drochia CDM Biogas Project will perform regular checks of the monitored data to ensure proper operation of the project. It will apply the procedures of a good practice in the context of monitoring. The monitoring data will be stored until 2 years after the end of the crediting period.