JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: 15 June 2006

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

"Utilization of sunflower husk for heat generation at Bandursky Vegetable Oil Extraction Plant LLC"

Sectoral Scope[1]: 1 Energy industries (renewable/ non-renewable sources).

Version: 04.

Date: December 26, 2011

A.2. Description of the project:

At the end of 2010 a high-technology production was launched in Mykolaiiv region at one of the biggest oil extracting plants in Ukraine Bandursky Vegetable Oil Extraction Plant LLC (hereinafter - Bandursky VOEP LLC). This event has an essential meaning for economic, industrial and social spheres both for Mykolaiiv region and for the whole Ukraine, the world leader of sunflower oil export. Bandursky VOEP LLC is a part of Kernel Group of Companies, the biggest Ukrainian producer and exporter of sunflower oil. The construction of the plant was launched in 2009. Modern equipment is installed in the enterprise with full automation of production operations, which allows processing 1500 t of sunflower seeds, 900 t of rape seeds and 1180 t of soya beans. The plant reached rated capacities in spring 2011. Quality control system and food safety management system are implemented and successfully operate at the enterprise in compliance with requirements of international standards ISO 9001 and ISO 22000 respectively.

The boiler house of Bandursky VOEP LLC generates heat energy for production and heating needs of the enterprise. The main aim of this project is to decrease greenhouse gas emissions by utilization of sunflower husk (biofuel) as fuel for boiler instead of fossil fuel, which is the most commonly used fuel in Ukraine, and also to decrease methane emission by preventing storage of sunflower husk at the disposal site and respectively its anaerobic decay.

The main activity of Bandursky VOEP LLC is the processing of sunflower seeds, rape seeds and soybeans. Heat energy is necessary for production and heating needs of the enterprise. It is common practice in Ukraine to produce heat energy from fossil fuel combustion (natural gas, coal, heavy fuel oil etc.).

History of the project started when considering the possibility of investments attraction through Kyoto mechanisms, specialists of Kernel Group decided to construct a boiler, which will process sunflower husk for heat generation, what will provide the reduction of greenhouse gases emission into the environment, in comparison with heat generation from fossil fuel, and decrease of methane emissions by preventing sunflower husk disposal at the landfill site and its anaerobic decay.

[1] http://cdm.unfccc.int/DOE/scopes.html

The construction of biofuel boiler house requires more investments than construction of fossil fuel boiler house, including the reason that the enterprise is forced to build a back-up boiler house which will operate on fossil fuel. The necessity of a back-up boiler house construction may be explained by the fact that the boiler house operating on biofuel largely depends on sunflower harvest in Ukraine. Bad sunflower harvest may cause a lack of biofuel to satisfy production and heating needs of Bandursky VOEP LLC.

In order to perform the planned activity for boiler house construction, credit funds of non-resident company and Austrian Investkredit Bank AG are attracted. Construction of biofuel boiler house gives an opportunity to decrease greenhouse gas emissions. These emission reductions can be sold as Emission Reduction Units (ERUs) on international emission reductions trade market.

Prior to joint implementation project activity, the baseline scenario for Bandursky VOEP LLC was heat generation for the enterprise production and heating needs from fossil fuel (diesel fuel) and transportation of waste biomass (sunflower husk) to disposal site for its anaerobic decay. In accordance with baseline scenario emissions were caused by fossil fuel combustion for heat energy generation and methane emissions occurred due to the anaerobic decay of sunflower husk at the disposal site.

Project activity is aiming to produce heat energy for production and heating needs of the enterprise from waste biomass (sunflower husk), what will lead to reduction of greenhouse gas emissions.

A.3. Project participants:

Party involved*	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A Ukraine (host Party)	• Bandursky VOEP LLC	No
Party B		
*Please indicate if the Party involved is a host Party.		

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located on the territory of Bandursky VOEP LLC. Bandursky VOEP LLC is located in the Pervomaisk district of Mykolaiiv region. Geographic location of the project is illustrated in the figure 1.

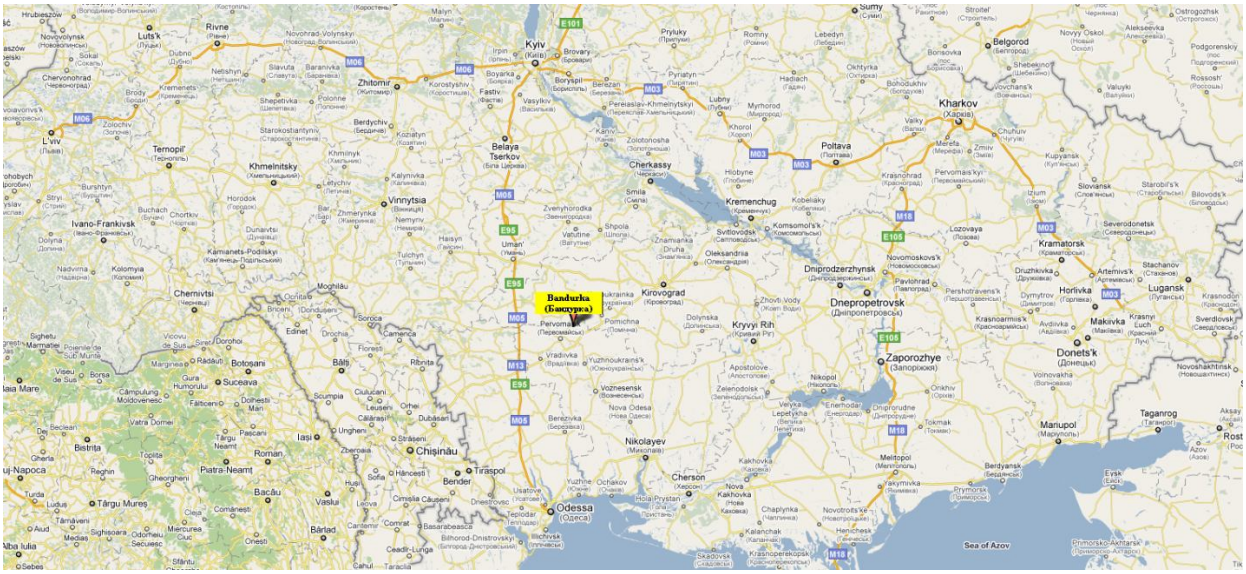

Figure 1 – Geographic location of the project

Geographic coordinates of Bandursky VOEP LLC:
- 48º 07' 30" North latitude;
- 31º 02' 00" East longitude.

A.4.1.1. Host Party(ies):

Ukraine

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

Mykolaiiv region, Pervomaisk district

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

Bandurka Village

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

The project is located on the territory of Bandursky VOEP LLC. Bandursky VOEP LLC is located in the Pervomaisk district of Mykolaiiv region.

Area of production capacity of Bandursky VOEP LLC is illustrated in figure 2.

Figure 2 – Area of production capacity of Bandursky VOEP LLC

A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:

Boiler house, operating on sunflower husk with productivity of 24 tonnes of saturated steam per hour, pressure of 13 bars at a water temperature of 105 °C will be used for heat energy generation at the plant. The equipment is produced by VYNCKE company, Belgium.

The main process of fuel combustion and saturated steam generation runs in a combined water fire-tube boiler house of JNO-HD type, which consists of four main aggregate components:
- furnace;
- a large water-tube radiation system;
- convection part with a single horizontal bundle of fire tubes;
- economizer.

The boiler is illustrated in Figure 3

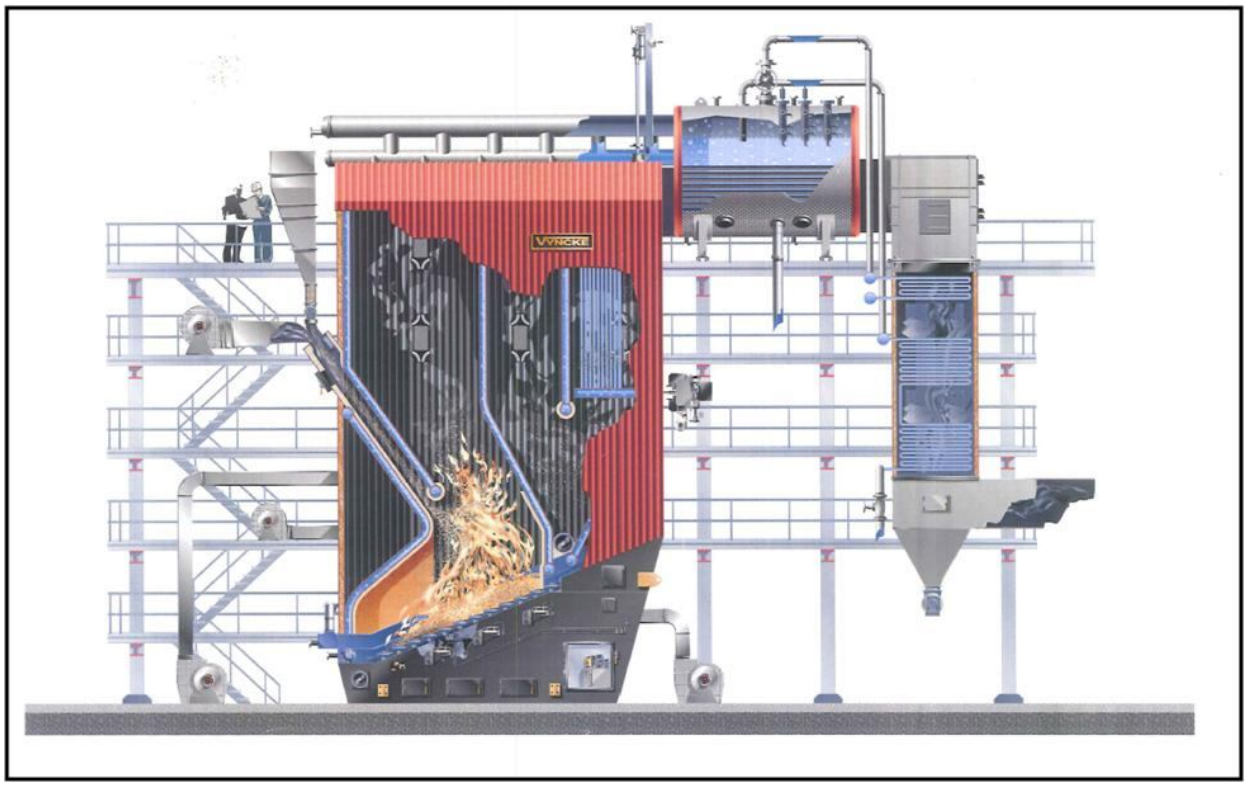

Figure 3 – Fire-tube boiler, type JNO-HD

The furnace for fuel combustion is fully integrated into the boiler: the side walls and roof of the furnace get cooled by membrane walls of the boiler. Membrane walls of the boiler (filled with water) are partially covered with special refractory concrete. Percentage of concrete is minimized aiming to reduce capital and current expenses, and to increase the duration of continuous running of the boiler.

Integration of the furnace into boiler allows controlling the temperature of fuel combustion. Feasibility of creation of ash scurf on the side walls of the furnace decreases. As a result the boiler is effective for fuel combustion with a maximum net calorific value and low ash melting point.

A hatch is installed at the backside of the furnace to provide access to the boiler. A viewing window is also set there for visual monitoring of the combustion process.

Radiation part of the boiler is divided into three cascaded channels by two internal membrane screens. Smoke gases that rise from the fire bar fall into the first channel, where fuel is completely combusted, that is promoted by high-speed injection of secondary air for burning. Further cooling of exhausted combustion gases is carried out in the two following channels.

While being in three channels flue gases are cooled by emitting mechanism to a temperature much lower than the ashes melting point. Thus fire tubes of the convectional part are prevented from deposits. Access to the boiler is through the hatch in the water-tube screen.

The combined boiler contains much more water than the conventional water-tube boiler due to the big convector drum. A large amount of water is a potential energy and a source of constant steam pressure. Pneumatic system of continuous cleaning of mechanisms and aggregates provides extraction of ashes from evaporation beams.

Furnace gases are cooled in heat-tube part by convection mechanism in fire tubes. A quick response to a peak workload of production process is provided by a large capacity of water convection drum, broad surface of evaporation and indiscrete water supply in the whole range of the process. The volume drum provides dry steam production without installation of additional external steam-heated dryers.

Pipes impurity is minimized by the optimal control of fuel combustion and speed options for furnace gases in fire tubes. Access to the internal drum units is provided through the hatch in smoke collector in the drum end.

Economizer is used for further cooling of furnace gases to the out-gassing temperature. Economizer provides better use of the heating surface than the convection drum, as the temperature of power water in the economizer is much lower than the point of water saturation in the convection drum. Linear arrangement of pipes in cross-section flow of gases, unlike chess, allows setting the device for scheduled surface cleaning of economizer's pipes. Linear arrangement of pipes, among other things, is less prone to deposits formation on the pipes.

The working flow is controlled by programmable logic controller (Siemens S7), integrated into Rittal control panel, designed to operate in heavy industrial conditions.
The functions of working flow controlling system are as follows:
- displaying of main process parameters on the monitor (temperature, oxygen concentration in furnace gases, dilution in furnace);
- three-directional automatic regulation of boiler optimal operation:
1 Pressure and steam temperature controller (PIC);
2 Standard steam boiler water level controller (LIC);
3 Controller of dilution in furnace (PIC).
- continuous control of equipment and personnel safety;
- continuous validation of alarm signals.

The principle diagram of boiler house operation is shown in Figure 4.

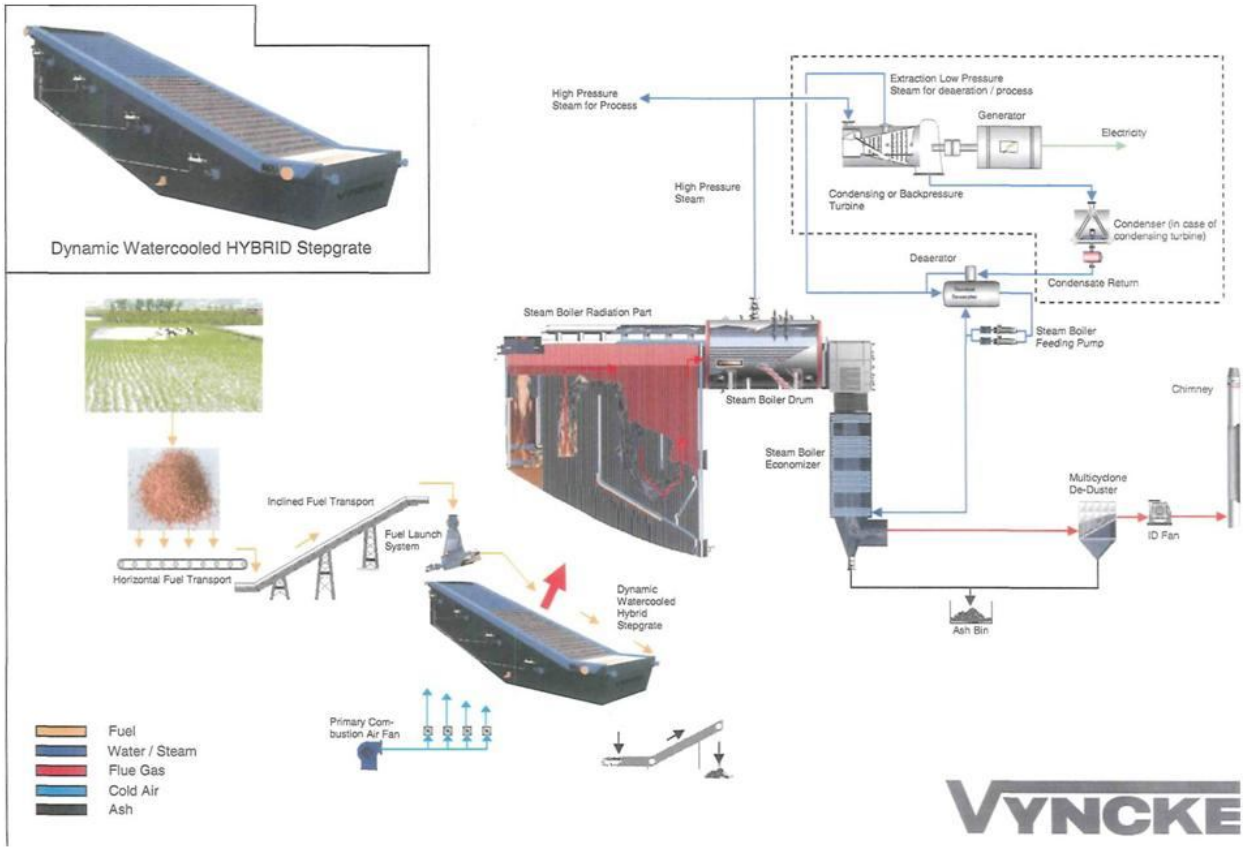

Figure 4 – Principle diagram of boiler house operation

The main emissions of this project are CO_2 emissions generated during fuel combustion for heat energy generation. As the result of the proposed JI Project biofuel (sunflower husk) will be used for heat energy generation, what will provide reduction of greenhouse gas emissions, comparing to those generated by fossil fuel combustion. This JI Project will allow to eliminate methane emission caused by sunflower husk anaerobic decay.
Schedule of this JI project is presented in the table below.

Name of the phase	Start of work	End of work
Construction of the main boiler house that operates on sunflower husk and the back-up boiler house that operates on diesel fuel	30/07/2009	11/11/2010

A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

The main activity of Bandursky VOEP LLC is a processing of sunflower seeds, rape seeds and soybeans. Heat energy is necessary for production and heating needs of the enterprise.

According to the baseline scenario greenhouse gas emissions occur due to:
- fossil fuel (diesel fuel) combustion for heat energy generation for production and heating needs of the enterprise;
- anaerobic decay of the sunflower husk at the disposal site.
The project activity will reduce greenhouse gas emissions by the replacement of fossil fuel by the sunflower husk (biofuel) for the boiler house, it will significantly reduce greenhouse gas emissions in comparison to fossil fuel combustion for heat energy generation and will help to avoid methane emissions from the decay of husk in the landfill site.

There is no valid legislation on reduction of greenhouse gas emissions for existing and new plants, or regulations banning storage of sunflower husk on landfill sites.

In order to perform the planned activity of boiler house construction, credit funds of non-resident company and Austrian Investkredit Bank AG are attracted. Construction of boiler house on biofuel gives an opportunity to reduce greenhouse gas emissions. These emission reductions may be sold as Emission Reduction Units (ERUs) on international emission reductions trade market.

A.4.3.1. Estimated amount of emission reductions over the crediting period:

Crediting period starts in 2010. From the start till the end of crediting period in 2012, the emission reduction units (ERUs) will be generated.

	Years
Length of the crediting period	3
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
2010	787
2011	20 096
2012	24 499
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	45 382
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	15 127

If it is prolonged after the first commitment period under Kyoto Protocol, the crediting period may be extended till the finalization of expected project operational lifetime.

	Years
Length of the crediting period	13
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
2013	26 396
2014	28 236
2015	30 022
2016	31 755
2017	33 437
2018	35 069
2019	36 653
2020	38 190
2021	39 682
2022	41 130
2023	42 535
2024	43 898
2025	45 221
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	472 224
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	36 325

A.5. Project approval by the Parties involved:

Justification materials for the potential joint implementation project, intending to obtain a letter of endorsement by the owner of the source, were sent to the National Environmental Investment Agency of Ukraine. The National Environmental Investment Agency of Ukraine issued for this purpose a Letter of Endorsement №1194/23/7 dated 16/05/2011.

After the procedure of project determination the final version of documentation and the determination report will be submitted to the State Environmental Investment Agency of Ukraine in order to obtain the letter of approval.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

The baseline for this project was set in accordance with "Guidance on criteria for baseline setting and monitoring" (version 3)[1]. According to provisions of this document baseline scenario setting can be based on JI specific approach, applicable only to certain JI project, or on the standard approach, which applies methodologies approved by CDM Executive Board, including methodologies for small-scale projects.

For setting the baseline scenario for this project the JI specific approach was chosen, according to which some principles defined in the approved methodology for baseline setting and monitoring ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (Version 11.2.0)[2] were applied. This methodology is applicable to the project specification as project activity corresponds most closely to the methodology assignment, which is:
- no other biomass residues type than husk shall not be used on the project station and these biomass residues are predominant fuel used at the station (however certain amount of fossil fuel may be combusted);
- for projects that use biomass residues from processing (sugar or wooden paneling production) project implementation should not cause any increase of raw materials processing capacity (e.g. sugar, rice, timber) or other vital changes in the production activity;
- in accordance with the project biomass residues shall not be stored for more than one year;
- any additional significant energy to prepare the waste biomass for fuel combustion isn't required, accept for expenditures on transportation and mechanic processing, in other words, the projects with priority on biomass residues processing rather than combustion (e.g. etherification of waste oils) are not considered under this methodology.

According to the requirements of "Guidance on criteria for baseline setting and monitoring" (version 3) following key factors were applied to set baseline scenario for this JI project:

- sectoral policy and legislation (certain provisions of Ukrainian legislation on biomass wastes treatment (production wastes) in relevant sector (Law of Ukraine "On Wastes"[3] #187/98-BP dated 05/03/1988) were applied);
- economic situation in relevant sector (transportation of biomass wastes into the landfill sites is a common practice in Ukraine due to the low costs and easiness of wastes utilization);
- availability of capital (usage of fossil fuel for heat energy generation is a common practice in Ukraine, heat generation from sunflower husk depends on sunflower harvest in Ukraine. In case of bad harvest, biomass residues may not be enough to meet heating and production needs of the enterprise, that's why not only construction of boiler house operating on biomass residues is required, but also construction of back up boiler house, operating on diesel fuel, which means greater expenses and limited availability of capital);

[1] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf
[2] http://cdm.unfccc.int/methodologies/DB/VREL7OE14N1ACV1JAW0J0G858FBGFN
[3] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=187%2F98-%E2%F0

- availability of technologies (there is no mass production of boilers operating on husk in Ukraine. Each boiler is purposely designed and produced by relevant enterprise. The reason is that design and production of the boilers operating on husk is more expensive than mass-produced fossil fuel boilers);
- fuel prices and availability (usage of fossil fuel for heat generation is a common practice in Ukraine. There is enough fossil fuel in Ukraine to meet heating and production needs of the enterprise, as opposed to biomass residues (sunflower husk) which directly depend on sunflower harvest in Ukraine).
  More detailed information on applying of key factors for baseline setting is provided below.

The baseline scenario was selected by applying the following steps:
1. Identification of realistic and effective alternatives;
2. Rejection of alternatives that do not comply with active legislations and regulations;
3. Rejection of alternatives that include barriers in their achievement.

Step 1. Identification of realistic and effective alternatives

Sub-step 1a. Alternative scenarios for heat energy generation:

H1 – Project activity is not undertaken as a JI project activity

This alternative is realistic and credible.

H2 – Production of heat energy from fossil fuel (diesel fuel)

Production of heat energy is realistic and effective alternative. Fossil fuel is the most widely used for production of heat energy in Ukraine.

H3 – Production of heat energy from fossil fuel (natural gas)

The enterprise is located on the area without gas supply. Taking into account mentioned above this alternative isn't considered to be realistic.

H4 – Heat is supplied from off-site sources (purchase of heat energy from local heating supply company)

There are no external sources of heat energy on the area of enterprise location. Based on mentioned above this alternative isn't realistic.

After analysis of suggested alternatives, alternative H1 and H2 were defined as realistic.

Sub-step 1b. Alternative scenarios for biomass residues treatment:

B1 – Transportation of biomass residues to landfill site for anaerobic decay

Dumping biomass residues into landfill sites is a common practice in Ukraine due to the low costs and easiness of utilization.

B2 – Biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes

Open uncontrolled biomass combustion is forbidden by certain law provisions (Law of Ukraine "On Wastes" dated 05/03/1988, #187/98-BP). Taking into account mentioned above this alternative can't be considered as realistic.

B3 – Biomass residues are used for heat energy generation on project plant

This alternative is realistic and credible.

B4 – Biomass residues are used for heat generation at the plants which are not undertaken as a JI project activity

Usage of fossil fuel for heat energy generation is a common practice in Ukraine. There are no heat generating plants, operating on biomass residues. Taking into account mentioned above this alternative can't be considered as realistic.

B5 – Biomass residues are used for other energy purposes, e.g. biofuel production

Usage of biofuel isn't a common practice in Ukraine. Non of Mykolaiiv region enterprises is interested in biofuel. Technology of sunflower husk processing into liquid biofuel currently isn't economically attractive in Ukraine. Taking into account mentioned above this alternative can't be considered as realistic.

B6 – Biomass residues are used for other non energy purposes, e.g as fertilizer or as feedstock in technological processes.

Sunflower husk isn't applicable as fertilizer and can't be used as feedstock in technological processes. Taking into account mentioned above this alternative can't be considered as realistic

Having analysed suggested alternatives, alternatives B1 and B3 are defined to be realistic and credible.

Step 2. Rejection of alternatives that do not comply with active legislation and regulations

All alternatives defined as realistic and creditable have no conflicts with the current laws and regulations.

Step 3. Rejection of alternatives that include barriers in their achievement

Substep 3a. Financial barriers

Alternative scenarios H2 and B1 have no significant financial barriers. Financial barrier for alternative scenario H2 is boiler house construction. Boiler house construction is essential for enterprise to meet its production and heating demands, therefore it can't be considered as financial barrier for this alternative scenario. Transportation of biomass wastes into the landfill sites (alternative scenario B1) is a common practice in Ukraine due to the low costs.

Alternative scenarios H1 and B3 are not financially sufficient without applying JI mechanisms. Implementation of defined alternatives directly relates to sunflower crop in Ukraine. In case of crop failure, biomass residues may not be enough to meet heating and production demands of the enterprise. Implementation of these alternative scenarios requires construction of an extra boiler house operating on fossil fuel (diesel fuel). Additional investments for extra boiler house construction can be raised only in the case of JI Project activity.

Substep 3b. Technological barriers

Alternative scenarios H2 and B1 have no technological barriers. Heat energy generation from fossil fuel is a common practice in Ukraine. Transportation of biomass residues into the landfill sites is a common practice in Ukraine due to the easiness of wastes utilizing.

Alternative scenarios H1 and B3 meet technological barriers, that primarily relate to lack of studies on usage of sunflower husk for heat energy generation in Ukraine, moreover it requires personnel with high qualification.

Setting the baseline

With the analysis of above 3 steps, only one scenario for heat energy generation and biomass residues treatment was defined as realistic, i.e. alternatives H2 and B1. Alternatives H3, H4, B2, B4, B5 and B6 were removed on the step 1, as they were defined to be non realistic and/or non credible. Alternatives H1 and B3 were removed on the step 3, as alternatives with multiple barriers (financial and technological barriers).

Thereby the scenario assuming heat energy generation for production and heating needs of the enterprise from fossil fuel, and biomass residues are to be transported to the landfill site was selected as the baseline.

Key parameters for baseline implementation are defined in the table below

Data/Parameter	φ
Data unit	-
Description	Model correction factor to account for model uncertainties
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)[1]
Value of data applied (for ex ante calculations/determinations)	0,9
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	f
Data unit	-
Description	Fraction of methane captured at the solid waste disposal site (SWDS) and flared, combusted or used in another manner
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Statistical data on disposal site operation
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Methane isn't captured on disposal site according to statistical data on disposal site operation
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v5.1.0.pdf

Data/Parameter	GWP_{CH4}
Data unit	t CO_2/t CH_4
Description	Global Warming Potential (GWP) of methane
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Revised Guidelines for national inventories of greenhouse gases IPCC, 1996"[1]
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Revised Guidelines for national inventories of greenhouse gases IPCC, 1996" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	OX
Data unit	-
Description	Oxidation factor
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://www.ipcc-nggip.iges.or.jp/public/gl/russian.html

Data/Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	DOC_f
Data unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	MCF
Data unit	-
Description	Methane correction factor
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	W_x
Data unit	th. t
Description	Total amount of husk to be transported to disposal site in a year *x* without the project activity
Time of determination/monitoring	Monthly. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Measurements
Value of data applied (for ex ante calculations/determinations)	Anticipated amount of the husk, calculated on the basis of ex ante data on boiler house energy heat production 2010 – 822,17 t; 2011 – 25 th. t 2012-2025 – 27 th. t per year
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Amount of husk is measured by means of appropriate weight measuring equipment
QA/QC procedures (to be) applied	Applied weight measuring equipment is subject to periodic examination and calibration
Any comment	-

Data/Parameter	DOC
Data unit	-
Description	Fraction of sunflower husk in degradable organic carbon
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	k
Data unit	-
Description	Decay rate for husk
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,03
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	HG_y
Data unit	Tcal
Description	Amount of heat energy produced by the enterprise boiler house per year
Time of determination/monitoring	Monthly. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Measurement
Value of data applied (for ex ante calculations/determinations)	Anticipated amount of heat energy, calculated on the basis of estimated data on plant production 2010 – 2,2344 Tcal; 2011 - 56,5 Tcal; 2012-2025 - 64 Tcal
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Amount of energy is measured by means of appropriate heat meters
QA/QC procedures (to be) applied	Applied measuring equipment is subject to periodic examination and calibration
Any comment	-

Data/Parameter	η_{BC}
Data unit	%
Description	Energy efficiency (KPI) of boiler house according to baseline
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01)[1]
Value of data applied (for ex ante calculations/determinations)	90
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v1.pdf

Data/Parameter	$OXID_{diesel}$
Data unit	std units
Description	Diesel fuel combustion oxidation factor
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"National inventory report of anthropogenic emissions by sources and removals by sinks of GHG's in Ukraine for 1990-2009" dated 06/07/2011[1] (hereinafter – "National Inventory Report of Ukraine"), page 402, table П 2.35
Value of data applied (for ex ante calculations/determinations)	0,99
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"National Inventory Report of Ukraine" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	W_{diesel}
Data unit	t/TJ
Description	Amount of carbon in diesel fuel
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"National Inventory Report of Ukraine", page 370, table П2.5
Value of data applied (for ex ante calculations/determinations)	20,2
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"National Inventory Report of Ukraine" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-nir-08jun.zip

B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:

The baseline scenario source of emissions is boiler house operating on diesel fuel, and the disposal site where biomass residues (sunflower husks) are transported to.

Boiler house emissions relate to combustion of diesel fuel for heat generation to meet production and heating needs of the enterprise. Usage of biomass residues as fuel for boiler house will lead to emission reduction.

Emissions at the disposal site relate to anaerobic decay of biomass residues, that leads to methane emission into the atmosphere. Emission reduction occurs due to applying of biomass residues as fuel for enterprise boiler house instead of transportation to disposal site.

It is important to note that implementation of actions listed above will lead to GHGs emission reduction, into the atmosphere, what can't be achieved without this project. Bandursky VOEP LLC doesn't make any profit from reduction of GHGs emission. Therefore, any reduction of harmful emissions into the atmosphere achieved within JI project will be additional.

Additionality of the proposed project was assessed according to the requirements of "Guidance on criteria for baseline setting and monitoring" (version 3). For assessment of additionality of the proposed project the JI specific approach was chosen, in accordance with which additionality of the proposed JI project was assessed according to "Tool for the demonstration and assessment of additionality" (version 05.2)[1]. This tool applies step-by-step approach to asses additionality.

Step 1. Identification of alternatives to the project activity that comply with valid Ukrainian legislation

Sub-step 1a. Identification of alternatives to the project activity:

As was stated in the section B1, several alternative scenarios, other than proposed JI project activity, were defined for heat generation and residues handling.

H2 – Heat generation from fossil fuel (diesel fuel);
H3 – Heat generation from fossil fuel (natural gas);
H4 – Heat is supplied from off-site sources (purchase of heat energy from local heating supply company);
B1 – Transportation of biomass residues to landfill site for anaerobic decay;
B2 – Biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes;
B4 – Biomass residues are used for heat generation at the plants which are not undertaken as a JI project activity;
B5 – Biomass residues are used for other energetic purposes, e.g. biofuel production;
B6 – Biomass residues are used for non-energy purpose, e.g as fertilizer or as feedstock in technological processes.

[1] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

Alternatives H3, H4, B2, B4, B5 and B.6 were rejected at the step 1, as non-realistic and non-credible alternatives.

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

Remained alternatives defined as realistic are H2+B1 and the project scenario. This alternatives don't contradict the legislation in force.

Reduction of greenhouse gases emission into the atmosphere isn't mandatory according to Ukrainian Law in force. Law of Ukraine "On protection of atmospheric air"[1] #2707-XII dated 16/10/1992 regulates national policy on emission of pollutants. This law doesn't set specific requirements to greenhouse gas emissions in industry. Emission standards for air pollutants from stationary sources are set by the Order of the Ministry of Environment "On approval of standards for maximum allowable emissions from stationary sources"[2] #309 of 27 June 2006.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method.

"Tool for the demonstration and assessment of additionality" (version 05.2) provides three options of investment analysis:
Option I. Application of simple cost analysis;
Option II. Application of comparative investment analysis;
Option III. Application of benchmark analysis.

Heat energy generation is a production need of the enterprise. Heat energy generation creates no advantages for the enterprise but for revenue from the sale of emission reduction units.

It was assumed for this JI project that the enterprise will gain profit from project activity, by means of saving of diesel fuel to be applied for baseline scenario heat energy generation.

In consideration of mentioned above, variant III was determined as eligible analysis method.

Sub-step 2b.Option I. Application of simple cost analysis

Not applied.

Sub-step 2b.Option II. Application of comparative investment analysis

Not applied.

[1] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=2707-12
[2] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0912-06

Sub-step 2b. Option III. Application of benchmark analysis.

Project activity directly depends on sunflower harvest in Ukraine. In case of harvest failure, biomass residues may not be enough to meet heating and production needs of the enterprise. Project activity requires not only construction of boiler operating on biomass residues, but also construction of back-up boiler, operating on diesel fuel, and also provide back-up fuel (diesel fuel) storage in case of biomass residues shortage.

Implementation of the activities given above requires 12,664 million EUR of investment, including:

Activity	Cost, million EUR
Costs associated with construction of the main boiler house that operates on sunflower husk and the back-up boiler house that operates on diesel fuel	10,384
Costs associated with the storage buffer of diesel fuel	2,280
TOTAL for project	**12,664**

Realization of the JI project will allow to avoid usage of diesel fuel for heat energy generation by boiler house of the enterprise. Expected savings of diesel fuel is about 4000 tonnes per year or about 2.5 million Euro per year.

The herein costs, rates and investments are listed without value added tax.

The value of the key parameter was selected in accordance with "Guidelines on the assessment of investment analysis" (Version 5)[1]. In accordance with requirements of the mentioned document, average weighted assets costs were calculated as average arithmetic value of own capital and debt capital in the case of such. Debt capital costs in the form of crediting annual average interest rate in foreign currency on the beginning of crediting period are 10,5%[2] according to the data of National Bank of Ukraine. According to the algorithm provided by the guidelines, own capital costs are equal to a risk free rate, an own capital premium and a risk premium for the host country[3], and come up to 17% accordingly. The key parameter is 13,75% respectively.

On the basis of data mentioned above the internal rate of return (IRR) for the project was calculated for expected crediting period. It made up 12,0%. So the project benchmark is lower than the benchmark chosen. It indicates that the project is not financially attractive.

Estimated inflation rates were applied to calculate estimated costs of energy recourses based on historical data of past years. Since the model was calculated in Euro, historical data of past years for European region were applied. Within 1998-2010 average interest rate was 2,0%[4], future prices on energy recourses are adjusted to 2% per year relatively.

---

[1] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[2] http://www.bank.gov.ua/
[3] http://www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls
[4] http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=tsieb060&tableSelection=1&footnotes=yes&labeling=labels&plugin=1

Sub-step 2c. Calculation and comparison of financial indicators (applied only for options II and III)

Financial indicators, Net Present Value (NPV) and Internal Rate of Return (IRR), were calculated for two options: with and without joint implementation mechanisms.

Discount rate of 13.75% was used for calculation, which was calculated in sub-step 2b. The financial indexes were calculated for the expected crediting period.

Expected income from emission reduction units sale with the price of 8 euro per 1 tonne of CO_{2eq} was calculated to count financial indexes for project activities with application of joint implementation mechanism advantages.

Simple pay-back period without application of joint implementation mechanisms is 8 years and 11 months, with their application it makes up 8 years and 4 months.

The calculations of NPV and IRR for both variants are given in the following table.

	With application of joint implementation mechanisms	Without implementation of joint implementation mechanisms
NPV, million EUR	-1,284	0,058
IRR, %	12,0	13,8

Calculations show that the project isn't financially attractive for investments without JI activity, however JI mechanisms application makes it more financially attractive. Thus we can conclude that the project is additional

Sub-step 2d. Sensitivity analysis (only applicable to options II and III)

Project profitability depends mainly on cost of energy resources in Ukraine, i.e. sensitivity depends on energy resources price fluctuations in Ukraine. For project profitability without application of joint implementation mechanisms to become equal to project with application of joint implementation mechanisms prices on energy resources should rise dramatically. While calculating financial indicators, possible rise of prices on energy resources was taken into account.

Project sensibility was estimated at range of ±10% of energy resources value changes

	-10%	0%	+10%
NPV, million EUR	-2,455	-1,284	-0,112
IRR, %	10,4	12,0	13,6

As the estimation shows the project does not become attractive for investments even if the energy resources price increases in future. So we can conclude, that the project is not additional.

Step 3. Barriers analysis

Sub-step 3a. Identification of barriers impeding the realization of joint implementation project.

1. Financial barriers
Project activity without application of joint implementation mechanisms isn't financially attractive. Project activity directly relates to sunflower harvest in Ukraine. In case of sunflower harvest failure, biomass residues may not be enough to meet heating and production demands of the enterprise Implementation of this alternatives requires construction of back-up boiler, operating on diesel fuel, and respectively storage of back-up diesel fuel to be provided. Additional investments on back-up boiler construction can be raised by application of joint implementation mechanisms.

2. Technical barriers
Project activity faces technological barriers, that include lack of studies on use of sunflower husk for heat energy generation in Ukraine and requires properly trained personnel.

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)

Neither financial barriers, nor technological barriers will not prevent implementation of baseline scenario. Activity under baseline scenario doesn't meet significant financial barriers. Financial barrier for baseline scenario is construction of the boiler house. The construction of the boiler house is a necessary action to meet production and heating needs of the enterprise, therefore can't be considered as financial barrier for this alternative scenario. Transportation of biomass residues into the disposal site is a common practice in Ukraine due to low costs and easiness of utilization.

Step 4. Common practice analysis

Sub-step 4a. Analysis of other projects similar to the proposed joint implementation project.
Heat energy generation from fossil fuel and utilization of biomass residues at the disposal sites is a common practice in Ukraine. There is no mass production of boilers operating on husk in Ukraine. Each boiler is purposely designed and produced by relevant enterprise. The reason is that design and production of the boilers operating on husk is more expensive than mass-produced fossil fuel boilers.

Sub-step 4b. Discuss any similar Projects that are taking place

Three endorsement letters on four similar projects were issued in Ukraine on the moment of this joint implementation project development, but only one project was registered in international transaction registry. This project was implemented on Kirovohradoliya LLC[1].

[1] http://www.carbonunitsregistry.gov.ua/ua/261.htm

Conclusion: Implementation of the project will lead to greenhouse gases emission reduction, what can' t be achieved without the project. Any reduction of greenhouse gas emissions achieved within project scope will be additional.

B.3. Description of how the definition of the project boundary is applied to the project:

Project boundaries of this project were estimated in accordance with requirements of ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0). Boundaries of the given project include:

- boiler house of the Bandursky VOEP LLC where biomass residues are combusted to generate heat;
- landfill site, where in case of absence of project activity anaerobic decay of sunflower husk would occur;
- energy enterprises that produce UETG electricity, which is consumed by the enterprise to secure operating modes of the boiler of Bandursky VOEP LLC.

The source of emissions is the boiler house of the enterprise. Fuel combustion for enterprise heat generation demands causes greenhouse gas emissions.

Emissions under the project scenario are associated with energy consumption from Ukrainian Energy Transmission Grid (hereinafter UETG), what is essential for boiler house operational modes support and methane emission which is associated with burning of sunflower husk in the boiler house for heat energy generation.

Emissions under the baseline scenario are associated with fossil fuel combustion for heat energy generation without project activity and methane emission which is associated with anaerobic decay of the sunflower husk on the landfill site without project activity

In accordance with the requirements of the approved methodology for baseline setting and monitoring ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0) leakages for this project are not calculated.

Reduction of CO_2 emission will be achieved via use of biomass residues instead of diesel fuel for heat energy generation by enterprise boiler house, and also via prevention of storage of sunflower husk at the disposal site, and of its anaerobic decay respectively.

	Source	Gas	Included?	Justification/Explanation
Baseline	Diesel fuel combustion for heat energy generation	CO_2	Yes	Main source of emissions
		CH_4	No	Insufficient emissions
		N_2O	No	Insufficient emissions
	Anaerobic decay of sunflower husk on landfill site	CO_2	No	Insufficient emissions
		CH_4	Yes	Main source of emissions
		N_2O	No	Insufficient emissions
Project scenario	Energy consumption from the UETG	CO_2	Yes	Main source of emissions
		CH_4	No	Insufficient emissions
		N_2O	No	Insufficient emissions
	Burning of sunflower husk for heat energy generation	CO_2	No	Insufficient emissions
		CH_4	Yes	Main source of emissions
		N_2O	No	Insufficient emissions

B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

Date of baseline setting: 16/05/2011.

Persons setting the baseline:

Name of company:	"Climate Protection Bureau LLP" Company
Address:	Suite 2, 23-24 Great James Street
City:	London
Country:	UK
Contact person:	Viktor Khalabuzar
Position:	Managing Partner
Telephone:	+380 67 4090881
Fax:	+380 44 2941495
E-mail:	fin@climate-pb.com

"Climate Protection Bureau LLP" Company is not a project participant listed in annex 1.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Starting date of the joint implementation project is November 11, 2010

C.2. Expected operational lifetime of the project:

Expected operational lifetime of the project is at least 15 years (180 months).

C.3. Length of the crediting period:

15 (fifteen) years and 17 days, what equals to 180 (one hundred and eighty) months and 17 days.

The crediting period starts on December 15, 2010. Emission reduction units (ERUs) will be generated from December 15, 2010 till December 31, 2012, they will relate to the first commitment period of the Kyoto Protocol, duration of this period is 2 years and 17 days (24 months and 17 days).

If it is prolonged after the first commitment period of Kyoto Protocol crediting period may be prolonged until the end of expected operational lifetime of the project.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The monitoring plan for this project was set in accordance with "Guidance on criteria for baseline setting and monitoring" (version 3). According to provisions of this document setting of monitoring plan can be based on JI specific approach applicable only to certain JI project or on the standard approach, which applies methodologies approved by CDM Executive Board, including methodologies for small-scale projects.

For setting the monitoring plan the JI specific approach was chosen, according to which some principles defined in approved methodology for baseline setting and monitoring ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0) were applied to set monitoring plan for this project. This methodology was chosen because project activity most closely corresponds to the application scope of ACM0006 methodology, including:
- no biomass types other than biomass residues are used in the project plant, and these biomass residues are the main fuel used in the project plant (although some amount of diesel fuel may be combusted);
- for projects that use biomass residues from a production process (e.g. production of sugar or wood panels or boards), the implementation of the project does not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in any other substantial changes in this process;
- the biomass residues used by the project facility are not stored for more than one year;
- project does not involve any additional energy consumption to prepare biomass residues for combustion, except for transportation or mechanical processing, in other words this methodology isn't applicable to projects with priority on processing of biomass residues to combustion (e.g. through etherification of waste oils)

Monitoring plan defined for the proposed joint implementation project aims to provide all data required for determination of the level of baseline and project scenarios emissions, and accordingly amount of emission reductions after realization of joint implementation project, described in the sections above.

Measuring equipment included to the State Register of Measuring Equipment of Ukraine is used for monitoring, and is subject to periodic examination and calibration.

D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	2	3	4	5	6	7	8	9
1. EC_y	The amount of electricity consumed by the boiler house from UETG during the year	Production report on boiler shop operation	MWh	m	monthly	1	Electronic/paper	Data is to be kept during the whole crediting period and for two years after the last transfer of ERUs for the project
2. $EF_{co2,elec}$	Indirect specific CO_2 emission factor for energy consumption by the 1 class of consumers	Orders of the National Environmental Investment Agency of Ukraine	tCO_{2eq}/MWh	e	annually	1	Electronic/paper	the same
3. GWP_{CH4}	Global Warming Potential of methane	"Revised Guidelines for national inventories of greenhouse gases IPCC, 1996"	$t\ CO_{2eq}/t\ CH_4$	e	annually	1	Electronic/paper	the same

1	2	3	4	5	6	7	8	9
4. $EF_{biomass}$	Methane emission factor for husk	ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0)	kg CH_4/TJ	e	annually	1	Electronic/paper	the same
5. W_x	Total amount of husk to be combusted in dry weight of a substance in a year	Production report on boiler shop operation	th. tonnes	m	monthly	1	Electronic/paper	the same
6. $NCV_{biomass}$	Husk net calorific value in dry weight of a substance	State SATER Laboratory researches	TJ/thsd t	e	annually	1	Electronic/paper	the same

D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Project emissions were calculated based on formulae defined in approved baseline and monitoring methodology ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0).

Project emissions are calculated as follows:

$$PE_y = PE_{energy,y} + PE_{biomass,y}, \quad (1)$$

Where:
PE_y – project emissions in year *y* (tCO_{2eq});
$PE_{energy,y}$ – emissions from energy consumption for boiler house activity in year *y* (tCO_{2eq})
$PE_{biomass,y}$ – emissions from the combustion of biomass residues during the year *y* (tCO_{2eq});

y – year for which calculations are made.

$$PE_{energy,y} = EC_y \cdot EF_{co2,elec}, \quad (1.1)$$

where:
EC_y – the quantity of electricity consumed from UETG for boiler house activity in a year *y*, MWh;
$EF_{co2,elec}$ – Indirect specific CO_2 emission factor for energy consumption by the 1 class of consumers, t CO_{2eq}/MWh;
y – year for which calculations are made.

$$PE_{biomass} = GWP_{CH4} \cdot EF_{biomass} \cdot W_x \cdot NCV_{biomass}, \quad (1.2)$$

where:
GWP_{CH4} – global warming potential of methane, t CO_2/t CH_4;
$EF_{biomass}$ – methane emission factor for husk t CH_4/TJ;
$NCV_{biomass}$ – husk net calorific value in dry weight of a substance, TJ/th. t;
W_x – amount of husk combusted in a year in dry weight of a substance, th. t

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	2	3	4	5	6	7	8	9
1. φ	Model correction factor to account for model uncertainties	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	-	e	annually	1	Electronic/paper	Data is to be kept during the whole crediting period and for two years after the last transfer of ERUs for the project
2. f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	Statistic data on plant operation	-	e	annually	1	Electronic/paper	the same
3. GWP_{CH4}	Global warming potential of methane	"Revised Guidelines for national inventories of greenhouse gases IPCC, 1996"	t CO_2/t CH_4	e	annually	1	Electronic/paper	the same

1	2	3	4	5	6	7	8	9
4. OX	Oxidation factor	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	-	e	annually	1	Electronic/paper	the same
5. F	Fraction of methane captured at the SWDS gas	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	-	e	annually	1	Electronic/paper	the same
6. DOC_f	Fraction of degradable organic carbon (DOC) that can decompose	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	-	e	annually	1	Electronic/paper	the same

1	2	3	4	5	6	7	8	9
7. MCF	Methane correction factor	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	-	e	annually	1	Electronic/paper	the same
8. W_x	Total amount of husk to be transported to disposal site in a year *x* without project activity	production report on boiler shop operation	th. t	m	monthly	1	Electronic/paper	the same
9. DOC	Fraction of sunflower husk in degradable organic carbon	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	std units	e	annually	1	Electronic/paper	the same

1	2	3	4	5	6	7	8	9
10. k	Decay rate for husk	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)	std units	e	annually	1	Electronic/paper	the same
11. HG_y	Amount of heat energy produced by the enterprise boiler house per year	production report on boiler shop operation	Tcal	m	monthly	1	Electronic/paper	the same
12. η_{BC}	Energy efficiency (KPI) of boiler house under the baseline	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01)	%	e	annually	1	Electronic/paper	the same
13. $OXID_{diesel}$	Diesel fuel combustion oxidation factor	"National Inventory of Ukraine"	std units	e	annually	1	Electronic/paper	the same
14. W_{diesel}	Amount of carbon in diesel fuel	"National Inventory of Ukraine"	t/TJ	e	annually	1	Electronic/paper	the same

D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Baseline emissions were calculated based on formulae defined in approved baseline and monitoring methodology ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0).

Baseline emissions are calculated as follows:

$$BE_y = BE_{heat,y} + BE_{biomass,y}, \quad (2)$$

where:
BE_y – baseline emissions in a year *y*, t CO_{2eq};
$BE_{heat,y}$ – emissions from diesel fuel combustion for heat generation in a year *y*, t CO_{2eq};
$BE_{biomass,y}$ – emission from anaerobic decay of biomass residues on landfill sites in a year *y*, t CO_{2eq};
y – year for which calculations are made.

According to methodology ACM006, emissions from anaerobic decay of biomass on landfill sites are calculated basing on formulae identified in "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0).

$$BE_{biomass,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot 16/12 \cdot F \cdot DOC_f \cdot MCF \cdot \sum_{x=1}^{y} Wx \cdot DOC \cdot e^{-k \cdot (y-x)} \cdot (1-e^{-k}), \quad (2.1)$$

Where:
φ – model correction factor to account for model uncertainties;
f – fraction of methane captured at the SWDS and flared, combusted or used in another manner;
GWP_{CH4} – Global Warming Potential (GWP) of methane, t CO_2/t CH4;
OX – oxidation factor;
F – fraction of methane in the SWDS gas;
DOC_f – fraction of degradable organic carbon that can decompose;
MCF – methane correction factor;
W_x – total amount of organic waste transported to the landfill site in absence of project activity in year *x*, th. t;
DOC – fraction of sunflower husk in degradable organic carbon;
k – decay rate for the husk;
x – year during crediting period, *x* starts from the first crediting year (x=1) and lasts till year *y*, for which calculations are made;
y – year for which calculations are made.

$$BE_{heat,y} = 4{,}1868 \cdot HG_y \cdot EF_{co2,diesel} / \eta_{BC}, \quad (2.2)$$

where:
HG_y – amount of heat generated at the plant in year, Tcal;
$EF_{co2,diesel}$ – emission factor for diesel fuel combustion, t CO_{2eq}/TJ;
η_{BC} – baseline energy efficiency of boiler house;
4,1868 – conversion factor Tcal into TJ.

$$EF_{co2,diesel} = OXID_{diesel} \cdot W_{diesel} \cdot 44/12, \quad (2.2.1)$$

where:
$OXID_{diesel}$ – CO_2 oxidation factor during diesel fuel combustion, std units.;
W_{diesel} – amount of CO_2 in diesel fuel, t/TJ.

D.1.2. Option 2 – Direct monitoring of emission reductions from the project (values should be consistent with those in section E):

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2)*	Data variable	Source of data	Data indicating unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

Not applied to this project.

D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Not applied to this project.

D.1.3. Treatment of leakage in the monitoring plan:

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:								
ID number *(Please use numbers to ease cross-referencing to D.2)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment

It is not applicable for this project. According to requirements of approved baseline and monitoring methodology ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" leakages are not applicable to this project.

D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO_2 equivalent):

Not applicable to this project.

D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Annual emission reduction for the project will be calculated according to the following formula:

$$ER_y = BE_y - PE_y, \quad (3)$$

where:
ER_y – emissions reduction during a year under the project activities, t CO_{2eq};
PE_y – emissions during a year under the project scenario, t CO_{2eq};
BE_y – emissions during a year under the baseline, t $CO_{2eq;}$
y – year for which calculations are made.

D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:

This project provides usage of biomass residues instead of fossil fuel for heat generation what is the common practice in Ukraine, this will prevent anaerobic decay of biomass residues at the landfill site. Project activity will provide greenhouse gases emission reduction. Therefore, general project impact on environment is positive. In the framework of procedures performed on demand of relevant state services, the enterprise reports periodically on environmental data. The enterprise reports on NO_x, SO_x and dust emission.

In respect with Order of the Ministry of Environmental Protection of Ukraine #108 dated 09/03/2006[1], State Administration of Natural Recourses issued the permission for emission, after the volume of emission was justified in accordance with guidelines approved by this order. Documents design, which justifies the volume of emissions are conducted by agencies, organizations and institutions authorized to design such documents and registered in corresponding inventory of the Ministry of Environmental Protection of Ukraine .

Relevant documentation and permissions on pollutants emission are archived and stored by the monitoring group of Bandursky VOEP LLC

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1	2	3
EC_y (D.1.1.1 – 1)	low	Amount of electricity consumed by the boiler house for relevant needs from UETG, estimated by on site measuring with electricity metering units. Measuring equipment applied for measuring of energy amount is subject to periodic review and calibration[2]
$EF_{co2,elec}$ (D.1.1.1 – 2)	low	Indirect specific CO_2 emission factor for energy consumption by the 1 class of consumers, determined according to data of the National Environmental Investment Agency orders. Researches on this factor determination are held annually and registered by a relevant order

[1] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0341-06
[2] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=113%2F98-%E2%F0

1	2	3
GWP_{CH4} (D.1.1.1 – 3, D.1.1.3 – 3)	low	Methane Global Warming Potential is determined according to "Revised Guidelines for national inventories of greenhouse gases IPCC, 1996", this document is subject to periodic revision and submission of relevant corrective data
$EF_{biomass}$ (D.1.1.1 – 4)	high	Methane emission factor for husk is determined according to ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (version 11.2.0). Conservativeness factor was applied to determine this parameter in accordance with methodology requirements
W_x (D.1.1.1 – 5, D.1.1.3 – 8)	low	Amount of husk combusted in a year in dry weight of a substance is determined by on site measuring by means of appropriate weight measuring equipment. Applied weight measuring equipment is subject to periodic examination and calibration
$NCV_{biomass}$ (D.1.1.1 – 6)	high	Husk net calorific value in dry weight of a substance is determined according to data of researchers on this parameter determination performed by the State STER Laboratory. Researches on this parameter determination were performed at the commission of the Kernel Group of Companies for verification of emission reduction units for joint implementation project "Utilization of sunflower seeds husk for steam and power production at the oil extraction plant OJSC "Kirovogradoliya"[1]. Kirovogradoliya OJSC and Bandursky VOEP LLC are members of the Kernel Group of Companies. Results of these researches were determined by Bureau Veritas Certification Holding SAS.
φ (D.1.1.3 – 1)	low	Model correction factor to account for model uncertainties is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
f (D.1.1.3 – 2)	low	Fraction of methane captured at the SWDS and flared, combusted or used in another manner is a fixed value and is determined by collection of statistic data on landfill site operation, where husk to be stored without project activity

[1] http://www.neia.gov.ua/nature/doccatalog/document?id=126992

1	2	3
OX (D.1.1.3 – 4)	low	Oxidation factor is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
F (D.1.1.3 – 5)	low	Fraction of methane in the SWDS gas is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
DOC_f (D.1.1.3 – 6)	low	Fraction of degradable organic carbon that can decompose is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
MCF (D.1.1.3 – 7)	low	Methane correction factor is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
DOC (D.1.1.3 – 9)	low	Fraction of sunflower husk in degradable organic carbon is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
k (D.1.1.3 – 10)	low	Decay rate for husk is determined according to "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0), this document is subject to periodic revision and submission of relevant corrective data
HG_y (D.1.1.3 – 11)	low	Amount of heat generated by boiler house per year, determined by on site measuring with electricity metering units. Measuring equipment applied for measuring energy amount is subject to periodic review and calibration
η_{BC} (D.1.1.3 – 12)	low	Baseline energy efficiency of boiler house is determined according to "Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01), this document is subject to periodic revision and submission of relevant corrective data
$OXID_{diesel}$ (D.1.1.3 – 13)	low	Diesel fuel combustion oxidation factor is determined according to "National Inventory Report of Ukraine" this document is subject to periodic revision and submission of relevant corrective data

1	2	3
W_{diesel} (D.1.1.3 – 14)	low	Amount of carbon in diesel fuel is determined according to "National Inventory Report of Ukraine", this document is subject to periodic revision and submission of relevant corrective data

D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:

Monitoring parameters, defined in previous section, will be recorded within the overall implementation of the project of using sunflower husk for heat energy generation on Bandursky VOEP LLC.

All monitoring parameters provided in sector D.2 are subject to monitoring during whole crediting period.

Process control stuff collect the monitoring data to be measured from measuring units for each specific parameter. Monitoring data is recorded in technologic registers, or shift manager registers by process control stuff in accordance with their duty regulations. Copies of monthly production reports are forwarded to monitoring team. Monthly production reports are the main data source for calculating of emission reduction units and composing the annual monitoring reports. All monitoring data are to be processed and stored electronically or on paper.

Location schemes of electric power, weight and heat measurement units are illustrated in the figures 5, 6 and 7 accordingly.

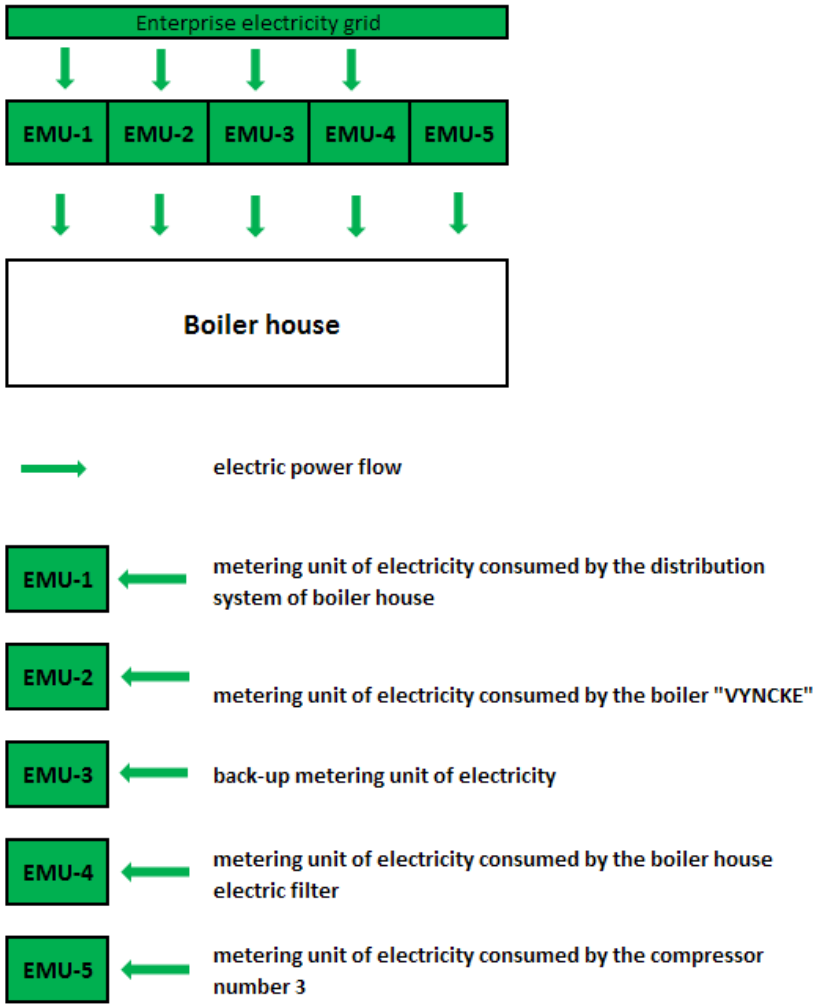

Figure 5 – Location scheme of electric power measurement units (EMU) involved in the project

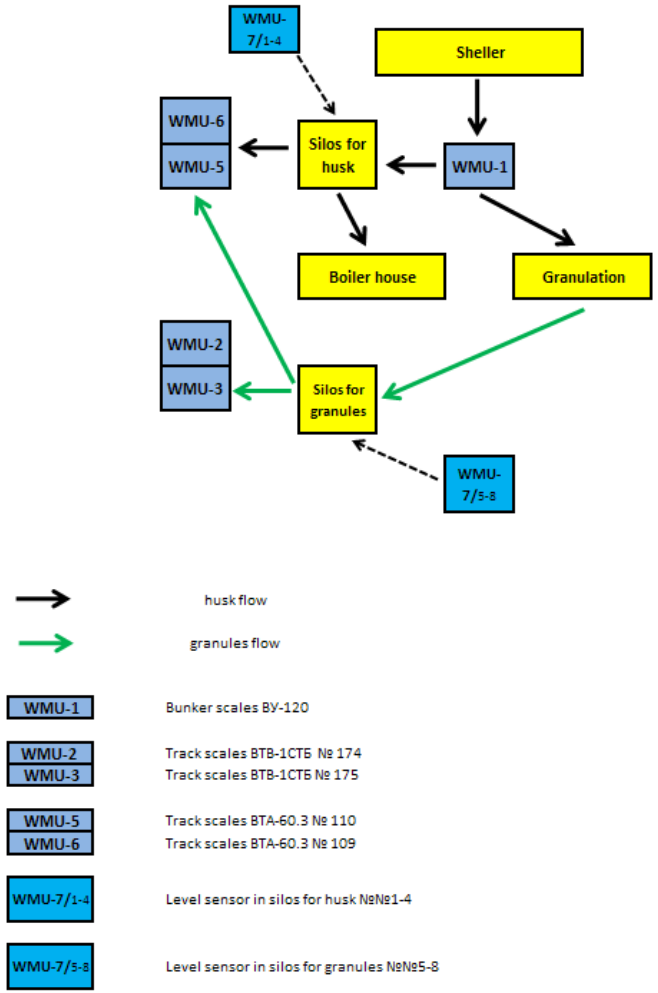

Figure 6 – Location scheme of weight measuring units, involved in the project

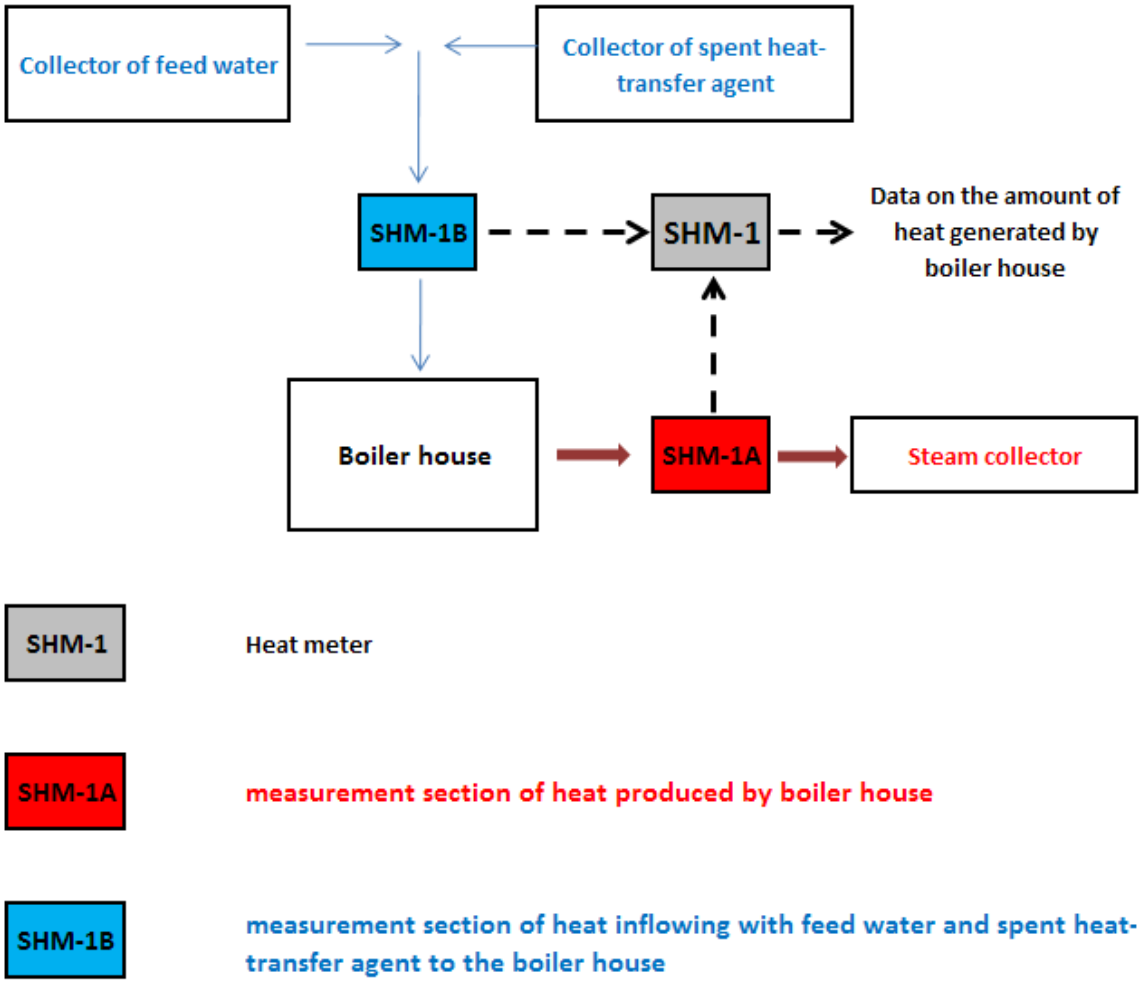

Figure 7 – Location scheme of the sections of heat measurement (SHM) involved in the project.

Director of Bandursky VOEP LLC assigns stuff to duties that include operation and maintenance of technological equipment involved in the project. These functions include also recording of all data required for the monitoring. Chief of electric power department of Bandursky VOEP LLC will be in head of the monitoring team. Monitoring is to be performed in a close communication with process control stuff, and will include monitoring itself, and also analysis and archivation of all data defined in the section above. Organizational activity on calculation of emission reductions will also be in scope of monitoring group activity. On manager's errand joint implementation project developer performs calculations of emission reduction. For proving the authenticity of periodic data on energy consumption, they will be analyzed according to relevant registered parameters, provided by process control stuff. If discrepancies between data appear, their origin is to be defined in cooperation with process control stuff. If inconsistency of data is discovered in monitoring, relevant corrections are to be done in monitoring of the relevant parameter.

All information on monitoring data and corrective actions is to be archived for future verification of emission reductions. Head of the team is responsible for the preparation and archivation of monitoring reports. Director occasionally analyses summarized monitoring data and relevant documentation. Developer of joint implementation project will assist in organization of monitoring if needed.

Scheme of data accumulation and archivation of monitoring data is illustrated in the Figure 8.

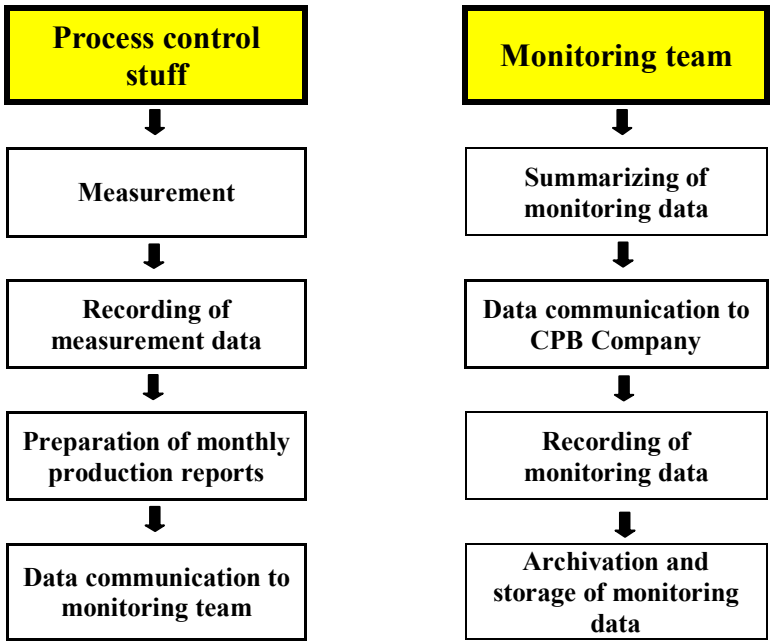

Figure 8 – The monitoring management structure

Scope of responsibilities of process control stuff includes measurement and archivation of measurement results. Process control personnel communicates measurement results to monitoring team for them to arrange calculations of greenhouse gas emissions reduction. On errand of the head of monitoring team developer of joint implementation project performs calculations of greenhouse gas emissions reduction. The scope of responsibilities of joint implementation project includes also collection of data that are not measured but have to be monitored. Monitoring team is obliged to ensure monitoring data back up, data should be stored in isolated place to avoid their loss in the case of force majeure, that can lead to the loss of key monitoring data.

D.4. Name of person(s)/entity(ies) establishing the monitoring plan:

Persons establishing the monitoring plan:

Name of company:	"Climate Protection Bureau LLP" Company
Address:	Suite 2, 23-24 Great James Street
City:	London
Country:	UK
Contact person:	Viktor Khalabuzar
Position:	Managing Partner
Telephone:	+380 67 4090881
Fax:	+380 44 2941495
E-mail:	fin@climate-pb.com

"Climate Protection Bureau LLP" Company is not a project participant listed in annex 1.

SECTION E. Estimation of greenhouse gas emissions reduction

E.1. Estimated project emissions:

Project emissions are estimated according to the formula described in D.1.1.2.

First commitment period of the Kyoto Protocol

Year	Estimated project emissions ($t CO_{2eq}$)
2010	36
2011	1 098
2012	1 207

Post-Kyoto periods

Year	Estimated project emissions ($t CO_{2eq}$)
2013	1 207
2014	1 207
2015	1 207
2016	1 207
2017	1 207
2018	1 207
2019	1 207
2020	1 207
2021	1 207
2022	1 207
2023	1 207
2024	1 207
2025	1 207

E.2. Estimated leakage:

Not applied to this project.

E.3. The sum of E.1. and E.2.:

The sum of E.1. and E.2. is equal to E.1.

E.4. Estimated baseline emissions:

Baseline emissions are estimated according to the formula described in D.1.1.4.

First commitment period of the Kyoto Protocol

Year	Estimated baseline emissions ($t CO_{2eq}$)
2010	823
2011	21 194
2012	25 706

Post-Kyoto periods

Year	Estimated baseline emissions ($t CO_{2eq}$)
2013	27 603
2014	29 443
2015	31 229
2016	32 962
2017	34 644
2018	36 276
2019	37 860
2020	39 397
2021	40 889
2022	42 337
2023	43 742
2024	45 105
2025	46 428

E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

First commitment period of the Kyoto Protocol

Year	Estimated emission reductions ($t CO_{2eq}$)
2010	787
2011	20 096
2012	24 499

Post-Kyoto periods

Year	Estimated emission reductions ($t CO_{2eq}$)
2013	26 396
2014	28 236
2015	30 022
2016	31 755
2017	33 437
2018	35 069
2019	36 653
2020	38 190
2021	39 682
2022	41 130
2023	42 535
2024	43 898
2025	45 221

E.6. Table providing values obtained when applying formulae above:

First commitment period of the Kyoto Protocol

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
2010	36	0	823	787
2011	1 098	0	21 194	20 096
2012	1 207	0	25 706	24 499
Total (tonnes of CO_2 equivalent)	2 341	0	47 723	45 382

Post-Kyoto periods

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
2013	1 207	0	27 603	26 396
2014	1 207	0	29 443	28 236
2015	1 207	0	31 229	30 022
2016	1 207	0	32 962	31 755
2017	1 207	0	34 644	33 437
2018	1 207	0	36 276	35 069
2019	1 207	0	37 860	36 653
2020	1 207	0	39 397	38 190
2021	1 207	0	40 889	39 682
2022	1 207	0	42 337	41 130
2023	1 207	0	43 742	42 535
2024	1 207	0	45 105	43 898
2025	1 207	0	46 428	45 221
Total (tonnes of CO_2 equivalent)	15 691	0	487 915	472 224

SECTION F. Environmental impact

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

Project activity will have positive impact on the environment, as biomass residues will be used for heat generation, that will provide reduction of greenhouse gas emissions into the atmosphere.

Emission reduction occurs as the result of this project implementation, including:

- Reduction of CO_2 emissions under the baseline scenario from diesel fuel combustion for heat energy generation;
- Reduction of CH_4 emissions under the baseline scenario from anaerobic decay of sunflower husk at the disposal site.

Emission reduction achieved by this project implementation has impact on environment of Ukraine, and doesn't influence greenhouse gas emissions outside Ukrainian borders.

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

Under the procedures, undertaken in accordance with relevant state authorities, the enterprise reports periodically on environmental parameters. In accordance with order of the Ministry of Environmental Protection of Ukraine dated 09/03/2006, number #108, State Administration of Natural Recourses of Mykolaiiv region has issued the permission on emissions, after the volumes of pollutants emission were justified in accordance with guidelines approved by this order.

Realization of the proposed project gave the possibility to reduce emission of pollutants from stationary sources. In respect with permissions issued by the State Administration of Natural Recourses of Mykolaiiv region impact on the environment is not significant, but in general it is positive.
Environmental Impact Assessment (EIA)[1] was performed for the proposed project. Environmental characteristics and impact assessment in accordance with EIA are provided below.

1. Geological environment

Construction works and production activity of Bandursky VOEP LLC will not cause any negative changes in geological environment. Endogenous and exogenous processes and phenomena, such as crust deformation, landslides, karst processes are not expected in the result of planned activity.

[1] 652/2007 EIA. Environmental Impact Assessment. Construction of Bandursky VOEP with efficiency of processing sunflower seeds 1500 t per day, soybeans 1180 t per day, rapeseed 900 t per day on the territory of Bandursky Elevator LLC, Bandurka station, Pervomaisk district, Mykolaiiv region.

2. Underground water of the region

Discharge of sewage water into underground aquifers is not anticipated according to the project. Hydro chemical composition of underground waters will not change.

3. Air

Project activity will not lead to formation of abnormal concentration of pollutants in the air within plant protection zone boundaries as well as in the residential area.

4. Noise and vibration level

Noise and vibration characteristics of installed equipment do not exceed requirements of safety guidelines. Employees are provided with personal protection equipment in order to reduce influence on personnel.

Benchmark noise impact does not exceed 27 dB on protection zone boundaries and 16dB in residential area, which does not exceed set standards. That means noise impact will be inconsiderable.

5. Atmospheric pollution by thermal emission, ultrasonic, electromagnetic and ionizing radiation

Production technology is not connected with significant heat emission into the atmosphere. This amount of energy does not influence environment significantly.

There are no sources of ultrasonic, ionization and radiation rays at the enterprise.

The source of magneto-electric impact at the enterprise is electrical machinery. Electromagnetic characteristics are in line with relevant valid regulations in Ukraine. There are no specialized two-way antenna complexes at the enterprise.

6. Climate and microclimate

Greenhouse gases emitted after sunflower husk combustion, does not interfere into local cycles of carbon, nitrogen and oxygen.
Project activity will not have impact on climate, there is no basis for micro climate creation in the object location region.

7. Surface water

Project activity will not cause negative or moreover abnormal impact on surface waters condition.

8. Soil

Project activity will not have adverse effect on soils, if valid rules and regulations on residues treatment are observed.

9. Flora and fauna, reservation areas

Production activity of the enterprise does not involve wrecking of amenity stand and will not cause adverse effect on plant growing conditions, as pollutant emissions are planned to be non-significant.

Noise level produced by enterprise is expected to be within normal limits and, therefore won't interfere into the living conditions of the animals in the enterprise location area.

Conclusion:

In general, perfomed culculations and estimations prove technical, technologial and constructive solutions accepted in the project to be satisfactory.

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the project, as appropriate:

The host Party does not require consultations with stakeholders for joint implementation projects.

Stakeholders' comments will be collected during publishing of the project within the determination procedure.

Annex 1

CONTACT INFORMATION ON THE PROJECT PARTICIPANTS

Organisation:	Bandursky VOEP LLC
Street/P.O.Box:	Tsentralnaya
Building:	40
City:	Bandurka Village
State/Region:	Mykolaiiv region Pervomaysk district
Postal code:	55247
Country:	Ukraine
Phone:	+380 05161 60608
Fax:	+380 05161 60608
E-mail:	j.bulgakov@kernel.ua
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last name:	Bulgakov
Middle name:	Valentinovitch
First name:	Yuriy
Department:	
Phone (direct):	+380 050 4649263
Fax (direct):	+380 05161 60608
Mobile:	+380 050 4649263
Personal e-mail:	j.bulgakov@kernel.ua

Annex 2

BASELINE INFORMATION

Baseline for this project was chosen according to "Guidance on criteria for baseline setting and monitoring" (version 3). According to provisions of this document baseline scenario setting can be based on JI specific approach applicable only to certain JI project or on the standard approach, which applies methodologies approved by CDM Executive Board, including methodologies for small-scale project activities.

For baseline setting of this project the JI specific approach was chosen, in consideration of which some principles defined in the approved methodology for baseline setting and monitoring ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (Version 11.2.0) were applied to set baseline scenario for this project. Description and justification of chosen scenario is provided in section B.1 of this document.

Heat generation from diesel fuel to meet production and heating needs of the enterprise and transportation of biomass residues (sunflower husk) into landfill site was chosen as the baseline scenario.

Baseline scenario emissions are:
- CO_2 emissions from fuel combustion for heat generation by boiler house of the enterprise;
- CH_4 emissions from anaerobic decay of biomass residues (sunflower husk) on the landfill site.

Under the baseline chosen, emissions were calculated according to the formula, given in the section D.1.1.4 of this document.

Annex 3

MONITORING PLAN

Monitoring plan for this project was chosen according to "Guidance on criteria for baseline setting and monitoring" (version 3). According to provisions of this document setting of monitoring plan can be based on JI specific approach applicable only to certain JI project or on the standard approach, which applies methodologies approved by CDM Executive Board, including methodologies for small-scale project activities.

For setting the monitoring plan for this project the JI specific approach was chosen, in consideration of which some principles defined in the approved methodology for baseline setting and monitoring ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (Version 11.2.0) were applied to set monitoring plan for this project.

Monitoring plan is set in section D of this project.

Data (parameters) to be monitored are defined in the table below:

Data/Parameter	EC_y
Data unit	MWh
Description	Amount of electricity consumed by boiler house for relevant needs from UETG
Time of determination/monitoring	Monthly. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Measurement
Value of data applied (for ex ante calculations/determinations)	Expected amount of electricity, estimated basing on forecast data on enterprise production 2010 - 20,503 MWh 2011 - 630 MWh 2012-2025 - 700 MWh per year
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Amount of electricity is measured by means of relevant measuring units
QA/QC procedures (to be) applied	Measurement equipment is subject to periodic examination and calibration
Any comment	-

Data/Parameter	$EF_{co2,elec}$
Data unit	t CO_{2eq}/MWh
Description	Indirect specific CO_2 emission factor for energy consumption by the 1 class of consumers
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	2010 – Order #43 dated 28/03/2011, issued by the National Environmental Investment Agency[1]; 2011-2025– Order #75 dated 12/05/2011, issued by the National Environmental Investment Agency[2]
Value of data applied (for ex ante calculations/determinations)	1,093 – 2010; 1,090 – 2011-2025
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Researches were held under control of the National Environmental Investment Agency
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	GWP_{CH4}
Data unit	t CO_2/t CH_4
Description	Global Warming Potential (GWP) of methane
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Revised Guidelines for national inventories of greenhouse gases IPCC, 1996"
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Revised Guidelines for national inventories of greenhouse gases IPCC, 1996" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[2] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

Data/Parameter	$EF_{biomass}$
Data unit	kg CH_4/TJ
Description	Methane emission factor for husk
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	ACM0006 "Consolidated methodology for electricity and heat generation from biomass residues" (Version 11.2.0)
Value of data applied (for ex ante calculations/determinations)	41,1
Justification of the choice of data or description of measurement methods and procedures (to be) applied	ACM0006 is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	W_x
Data unit	th. t
Description	Total amount of husk to be transported to disposal site in a year *x* without the project activity
Time of determination/monitoring	Monthly. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Measurements
Value of data applied (for ex ante calculations/determinations)	Estimated amount of the husk, calculated on the basis of ex ante data on boiler house energy heat production 2010 – 822,17 t; 2011- 25 000 t 2012-2025 – 27 th. t per year
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Amount of husk is measured by means of appropriate weight measuring equipment
QA/QC procedures (to be) applied	Applied weight measuring equipment is subject to periodic examination and calibration
Any comment	-

Data/Parameter	$NCV_{biomass}$
Data unit	TJ//th. t
Description	Net calorific value of the husk in dry weight of a substance
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Researches of the State SATER Laboratory
Value of data applied (for ex ante calculations/determinations)	19,055
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Researches on this parameter determination were performed by the State SATER Laboratory
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	φ
Data unit	-
Description	Model correction factor to account for model uncertainties
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,9
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	f
Data unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Statistical data on disposal site operation
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Methane isn't captured on disposal site according to statistical data on disposal site operation
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	OX
Data unit	-
Description	Oxidation factor
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	F
Data unit	-
Description	Fraction of methane in the SWDS gas
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	DOC_f
Data unit	-
Description	Fraction of degradable organic carbon (DOC) that can decompose
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	MCF
Data unit	-
Description	Methane correction factor
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,8
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	DOC
Data unit	-
Description	Fraction of sunflower husk in degradable organic carbon
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	k
Data unit	-
Description	Decay rate for husk
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" (version 05.1.0)
Value of data applied (for ex ante calculations/determinations)	0,03
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	HG_y
Data unit	Tcal
Description	Amount of heat energy produced by the enterprise boiler house per year
Time of determination/monitoring	Monthly. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	Measurement
Value of data applied (for ex ante calculations/determinations)	Estimated amount of heat energy, calculated on the basis of estimated data on plant production 2010 - 2,2344 Tcal; 2011 - 56,5 Tcal; 2012 – 2025 - 64 Tcal per year
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Amount of energy is measured by means of appropriate heat meters
QA/QC procedures (to be) applied	Applied measuring equipment is subject to periodic examination and calibration
Any comment	-

Data/Parameter	η_{BC}
Data unit	%
Description	Energy efficiency (KPI) of boiler house according to baseline
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01)
Value of data applied (for ex ante calculations/determinations)	90
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	$OXID_{diesel}$
Data unit	std units
Description	Diesel fuel combustion oxidation factor
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"National Inventory Report of Ukraine", page 402, table П 2.35
Value of data applied (for ex ante calculations/determinations)	0,99
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"National Inventory Report of Ukraine" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameter	W_{diesel}
Data unit	t/TJ
Description	Amount of carbon in diesel fuel
Time of determination/monitoring	Annually. Data must be stored during the whole crediting period and 2 years after the last transfer of emission reduction units
Source of data (to be) used	"National Inventory Report of Ukraine", page 370, table П2.5
Value of data applied (for ex ante calculations/determinations)	20,2
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"National Inventory Report of Ukraine" is subject to periodic revision and submission of relevant corrective data
QA/QC procedures (to be) applied	-
Any comment	-