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:

Collection and Utilization of Methane from Solid Domestic Waste Ground in Luhansk City

Sectoral scope *13: Waste handling and disposal*

Version 02.2

28/06/2011

A.2. Description of the project:

Collection and Utilization of Methane from Solid Domestic Waste Ground in Luhansk City project in Ukraine (hereafter referred to as the "Project") involves the installation of an LFG collection and flaring system to utilize the recovered LFG at Site 1 of the Luhansk Landfill located is Oleksandrivsk Town, Luhansk Region, Ukraine. The Project is developed by "Nedra Luhanshchyny" LLC[1]. The company was established in 2007 and is specialized in engineering and consulting, as well as extraction of fossil fuels and waste utilization.

It is estimated that the Project will lead to the capture and flaring of an average of 802 t/yr of CH_4 in the period 2010 – 2019. This will result in emission reduction of approximately 20,872 tCO_2/yr or 46,962 tCO_2 up to 2012 and 166,015 tCO_2 up to 2019.

History of the Project (including its JI component)

The problem of municipal solid waste (MSW) is one of the most critical environmental problems in Ukraine. As of today, there are almost 1000 landfills across the country, the majority of which were established more than 30 years ago without meeting the requirements of environmental protection and violating the current sanitary and technological regulations. Throughout Ukraine, landfills have typically never installed gas capture systems to date as there is no legal requirement to do so. As of December 2009, there are currently only two small landfills in the Crimea (Yalta and Alushta) which have installed a gas collection system, having been set up under the Joint Implementation of the Kyoto Protocol.

There are 29 landfills for district-centre towns and region-subordinated cities of Luhansk Region and more than 160 rural landfills in Luhansk Region. Total area occupied by landfills in region amounts to approximately 450 ha.

The Luhansk Landfill was established in Kruty Yar Gully, about 2.5 km from Oleksandrivsk Town. Pilot operation of the landfill (currently Site 1) commenced in 1979, and its full-scale operation started on February 26, 1980. The landfill is owned by the Luhansk City Council and is the only place for waste disposal for Luhansk City and the neighboring Yekaterynivsk Village, Yuvileyne Village and Oleksandrivsk Town. It is estimated that a total of 450 thousand people reside in these settlements. Over the years the landfill accepted an average of 69,341 t and approximately 2 million tons of MSW have been accumulated there over a period of 30 years until Site 1's closure in 2007.

The Luhansk Landfill is an unmanaged landfill with significant depth. The bottom of the landfill is covered with a screen of clay and bitumen. The depth of the landfill varies between 14 m and 25 m,

[1] http://nedralugansk.com.ua

depending on the relief. The total area of Site 1 of the landfill is 14.84 ha, out of which 11.68 ha are utilized for MSW disposal. The design size of Site 1 is 1,450 th.m^3.

Figure 1. Luhansk Landfill Site 1

All incoming MSW was directed to special deposition areas, where they were leveled by bulldozers. The landfill is being currently covered with a 3-meter layer of sand and other inert material as part of its closure and rehabilitation activities. Leachate is pumped out from 7-10 m below the upper level and spread over the landfill for faster evaporation. The composition of the MSW in the landfill is shown in Table 1 below[2].

WASTE TYPE	Share
Wood and wood products	3.00 %
Pulp, paper and cardboard	30.00 %
Food, food waste, beverages and tobacco	30.00 %
Textiles	5.00 %
Garden, yard and park waste	0.00 %
Glass, plastic, metal, other inert waste	32.00 %

Table 1. MSW Composition

In 2007, Site 1 of the landfill reached its full capacity and was closed, following the commencement of Site 2 in September 2006.

In 2007, "Nedra Luhanshchyny" LLC., the Project developer, entered into a cooperation agreement (#650/07-006 of 07.09.2007) with the Luhansk City Council for the development and implementation of the Project at Site 1. Site 2 was decided not to be covered by this Project. Under funding from UNDP, Nedra Luhanshchyny developed a feasibility study for the Project in 2007 - 2008. On July 29, 2009, as part of the Project development, pump tests to determine methane concentration in the LFG were

[2] As no reliable data on the MSW composition is available, average data for the former Soviet Union countries is used.

performed. The tests demonstrated that on the average the MSW deposited at Site 1 of the landfill generated 478.5 m^3_{LFG}/h with an average methane concentration of 67.9 %. This translates into approximately 2,846,137 m^3 CH_4 per year[3]. The economic feasibility of two options for LFG utilization, 1) LFG flaring only, and 2) LFG capture and electricity generation, were analyzed. The analysis showed that both options are not economically feasible without JI funding, but will become economically attractive with the sale of ERUs. Based on further deliberations, including the expected volume of methane generation, it was decided to develop the Project with LFG flaring only.

In 2009, National Environmental Investment Agency of Ukraine issued a Letter of Endorsement for the Project. The Project has received all necessary permits to commence construction and operation.

a) Situation existing prior to the starting date of the Project

The MSW deposited at Site 1 decomposes under anaerobic conditions releasing freely methane into the atmosphere. There is currently no legislation in Ukraine, which requires landfill gas operators to flare methane gas for landfills which were established prior to 2005.

In 2005, National Construction Standard DBN V.2.4-2-2005 General Construction Guidelines for Landfills was introduced containing requirements on LFG collection and flaring/utilization. However, these guidelines are not mandatory as long as LFG collection is concerned and apply only to newly constructed landfills, but not to the Project landfill, which opened in 1979. In addition, the existing Ukrainian regulations do not require the capture and utilization of LFG, and no flaring or other equipment is currently installed at the Project site. No other policies on national or local level exist.

b) Baseline scenario

The baseline scenario is the continuation of the situation existing prior to the start of the Project meaning that under business-as-usual there will be no capturing and flaring of landfill gas: LFG is freely released into the atmosphere. Additional information on the procedure for establishing the baseline scenario is provided in Section B.1.

c) Project scenario (expected outcome, including a technical description)

As part of the Project, it is proposed to cover the landfill and install a system for LFG collection and flaring in an enclosed flare, thus chemically transforming methane into carbon dioxide and avoiding release of methane into the atmosphere. The enclosed flare guarantees high levels of methane decomposition, which may reach 99.5% in case of extremely efficient equipment.

.

As part of the Project, LFG will be collected through 30 vertical collectors located at holes 10 – 25 m deep, connected to a central system for collection and utilization of methane. The LFG collection system is planned to cover 80 % of Site 1 of the landfill and will have a collection efficiency of 75 %. Site 2 will not be covered by the Project.

This Project shall contribute to the economic development of Luhansk Region and reduce the amount of methane and odorous gas emissions from organic waste decomposition at landfills. It will also contribute to the improvement of environmental conditions by improving the landfill management, thus preventing the spread of unpleasant odors and infections.

[3] This figure is similar to the estimate that the methane tool provides for LFG generation for 2009. Please refer to section B for details on the method of estimation of LFG generation potential.

The Project will result in knowledge transfer by introduction of a state-of-the art technology for landfill gas collection and destruction in enclosed flares.

In the construction and operation phases the Project will also provide additional employment for skilled and unskilled workers. The number of permanent green jobs estimated to be created by the Project is estimated to be 7, as shown in Table 2 below. A number of temporary jobs for construction and other workers are also expected to be created as part of the Project implementation.

Position	Number of Staff
Unit Supervisor	**1**
Operation and Maintenance Staff	**4**
Security Guards	**2**
Total	***7***

Table 2. New Green Jobs

A.3. Project participants:

Name of Party involved(*) ((host) indicates a host Party)	Private and/ or Public entity(ies) Project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participants (Yes/ No)
Ukraine (host)	"Nedra Luhanshchyny" Limited Liability Company	No

A.4. Technical description of the project:

A.4.1. Location of the project:

The Project location is shown on the maps below.

A.4.1.1. Host Party(ies):

Ukraine

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

Luhansk Region

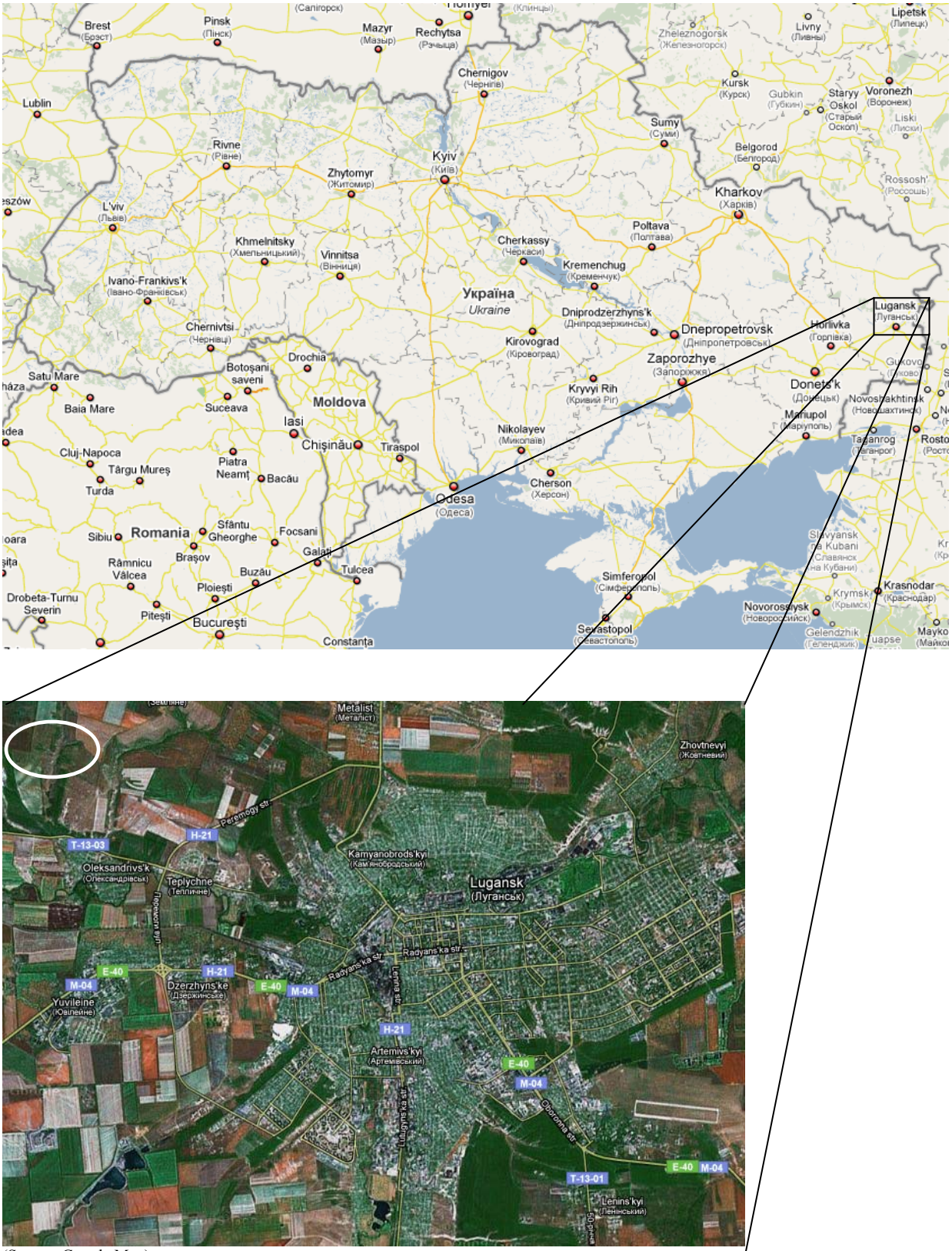
A.4.1.3. City/Town/Community etc.:

Oleksandrivsk Town

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

The proposed JI Project is located approximately 2.5 km from Oleksandrivsk Town, Luhansk Region in Ukraine. Geographical coordinates of the Project site are: 48^{o} 36 '18 " E, 39^{o} 8' 65" N.

The map is provided on Figure 2 below.



(Source: Google Map)

Figure 2. Location of the Project Site

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

LFG will be collected only from Site 1, the area of the landfill that is already closed. 30 gas wells with an average depth of 10 – 25 m will be made across the landfill. They will cover approximately 80% of Site 1 of the landfill.

LFG will be collected through creating a vacuum in the gas well and sucking out the LFG. In order to increase the efficiency of LFG collection, it is expected that a polyethylene or other cover will be spread over the landfill. The expected efficiency of LFG collection is 75 %. The collected gas will be cleansed from impurities before being destroyed in the enclosed flare.

The system is presented on Figure 3 below.

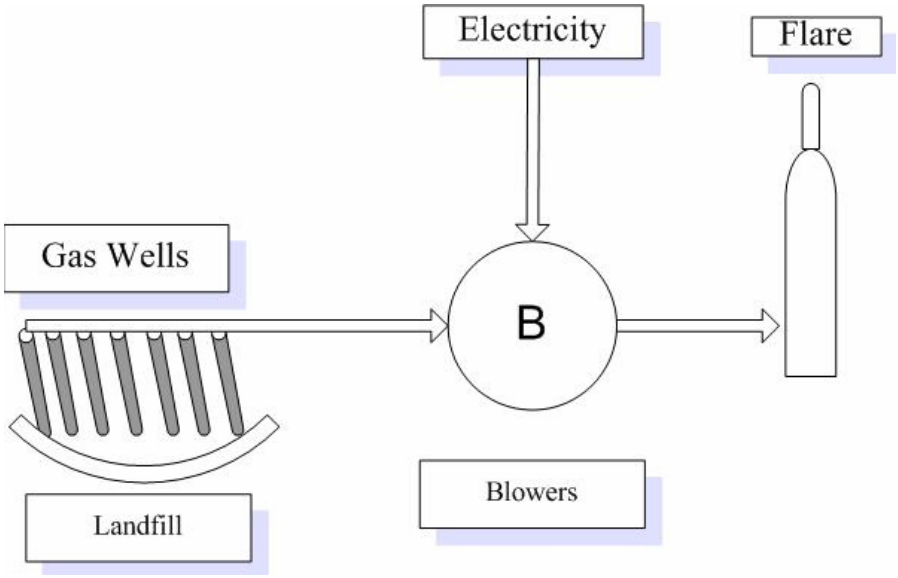


Figure 3. LFG collection and utilization system

The Project implementation schedule is presented in Figure 4 below.

	2009			2010		2011-2019
	Jan - Apr	Apr - Sept	Sept - Dec	Jan-Jun	Jul-Dec	
Design Phase						
1. Signing of Investment Contract						
2. ERPA negotiations						
3. PIN Development						
4. LoE Issuance						
5. PDD Preparation						
6. PDD Determination						
7. LoA Issuance						
Implementation Phase						
8. Construction works						
- gas wells						
- procurement of						

equipment						
- installation of equipment						
- employment of operation staff						
9. Project Operation						

Figure 4. Project Implementation Schedule

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 Project will reduce anthropogenic greenhouse gas (GHG) emissions through the capture and destruction of landfill gas in an enclosed flare.

The Project generates no revenue other than the revenue from the sale of ERUs and it is unlikely, in the absence of JI financing, that it will be implemented and emission reductions would occur. Further details are provided in Section B.2.

In the current situation, LFG is released into the atmosphere, as this Project would not be undertaken under a business as usual scenario and GHG emissions reductions would be unlikely to occur in the business as usual scenario. Ukrainian legislation does not require flaring of gas for landfills which began operation prior to 2005. In addition, the Project will not generate any income in the absence of JI and will become attractive to investors only if it generates revenue from GHG emission reduction.

The Project is expected to lead to emission reductions of approximately 46,962 tCO_2e during the first crediting period (2010-2012) or an average of 20,872 tCO_2e per year through capture and destruction of LFG in an enclosed flare. The Project is expected to generate 166,015 tCO_2e of emission reductions over a period of ten years.

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

Years	Annual estimation of emission reductions in tonnes of CO_2e
2010	5,537
2011	21,177
2012	20,248
Total estimated reductions (tonnes of CO_2e)	**46,962**
Total number of crediting years	3
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	20,872

Years	Annual estimation of emission reductions in tonnes of CO_2e
2013	19,362
2014	18,516
2015	17,709

2016	16,938
2017	16,202
2018	15,499
2019	14,827
Total estimated reductions (tonnes of CO_2e)	**119,053**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	17,008

A.5. Project approval by the Parties involved:

A Letter of Approval for the Project has been issued by the National Environmental Agency of Ukraine.

SECTION B. Baseline

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

Step 1. Indication of and description of the approach chosen regarding baseline setting

Following the JISC Guidance on criteria for baseline setting and monitoring, version 2, the baseline will be established following an existing CDM methodology for baseline determination.

Baseline methodology

The Project will use the following methodology:

- ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities", version 11

The Project will also apply the following tools as referred to in the methodology:

- "Tool for the demonstration and assessment of additionality", version 05.2
- "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site", version 5.1
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", version 1
- "Tool to determine project emissions from flaring gases containing methane", version 1

Step 2. Application of the approach chosen

Applicability

ACM0001 is applicable to the Project, as outlined below:

- The Project is a landfill gas capture project, where the baseline scenario is total atmospheric release of LFG; and
- The project scenario involves utilization of LFG for flaring.

"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" is applicable as outlined below:

- The Project is located at a solid waste disposal site which can be clearly identified, the Luhansk Landfill;
- Hazardous waste is not disposed at the Luhansk Landfill.

"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" is applicable as outlined below:

- The Project will consume electricity from the Ukrainian grid for the operation of the LFG collection and flaring equipment.

"Tool to determine project emissions from flaring gases containing methane" is applicable as outlined below:

- LFG that is going to be flared does not contain gases other than methane, carbon monoxide and hydrogen;
- The LFG to be flared is a result of decomposition of organic materials.

Baseline Determination

The baseline is established as per the stepwise procedure described in ACM0001.

Step 1: Identification of alternative scenarios

Sub-Step 1: Define alternatives to the Project

The following alternatives are defined regarding the disposal and treatment of MSW:

- **LFG1:** LFG is captured and flared *without JI assistance*
- **LFG2:** Free release of LFG in the atmosphere *(continuation of the current situation)*
- **LFG3:** Partial capture and flaring of LFG

Sub-Step 1b: Consistency with mandatory laws and regulations

In 2005, National Construction Standard DBN V.2.4-2-2005 General Construction Guidelines for Landfills was introduced containing requirements on LFG collection and flaring/utilization. However, these guidelines are not mandatory as long as LFG collection is concerned and apply only to newly constructed landfills, but not to the Project landfill, which opened in 1979. No other policies on national or local level exist. Therefore, all three options for LFG utilization are in line with the existing regulations in Ukraine.

Therefore, all of the above identified alternatives for MSW treatment are in line with the mandatory regulations in Ukraine.

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

Step 2 is not applicable as the project does not involve energy generation.

Step 3

Step 2, Investment Analysis, of the version 05.2 of the "Tool for demonstration and assessment of additionality" is applied to assess the alternatives to be excluded from further consideration.

Sub-step 2a: Determine appropriate analysis method.

As the Project and the Project and the proposed activities generate no financial or economic benefits without JI, the simple cost analysis method will be applied.

Sub-Step 2b: Apply simple cost analysis

Regarding, option LFG 1, the initial investment costs, including LFG collection and flaring equipment, construction and installation, amount to approximately USD 592,332. O&M costs are considered to be

approximately 41,021 USD. The project generates no additional financial or economic benefits in the absence of JI, therefore it cannot be implemented without the additional incentives from the sale of ERU.

The same arguments apply to option LFG3, partial flaring of LFG, therefore, it is also not economically attractive without JI revenue.

As for option LFG 2, continuation of the current practice, i.e. free release of LFG into the atmosphere, it involves no additional costs, and therefore remains the only attractive option in the absence of JI financing.

As elaborated further in this PDD, the Project is estimated to generate approximately 46,962 ERU in the period up to the end of 2012, which at 14 USD/ERU is equivalent to an income of 657,468 USD. Further, over a period of ten years, the Project is expected to generate a total of 166,015 ERU, or 2,324,210 USD, which will cover all the investment and operational costs.

The investment analysis above demonstrated that in the absence of JI financing, Option LFG2, continuation of the current practice and free release of LFG into the atmosphere is the only viable option.

Step 4

Not applicable, as only one baseline alternative is identified.

The baseline emissions are, therefore, calculated as the methane emissions from the LFG that would have been released in the atmosphere in the absence of the Project as demonstrated below:

$$BE_y = (MD_{project,y} - MD_{BL,y}) * GWP_{CH4}$$

where:

$BE_{,y}$	baseline emissions in year y (tCO_2e)
$MD_{,project,y}$	the amount of methane that would have been destroyed/combusted during the year, in tonnes of methane (tCH_4)
$MD_{BL,y}$	the amount of methane that would have been destroyed/combusted during the year in the absence of the project due to regulatory and/or contractual requirement, in tonnes of methane (tCH_4).
GWP_{CH4}	the Global Warming Potential value for methane for the first commitment period is 21 tCO_2e/tCH_4

As there are no regulations for methane capture in the baseline scenario, $MD_{BL,y}$ is assumed to be zero, and the above formula is simplified as follows:

$$BE_y = MD_{project,y} * GWP_{CH4}$$

And

$$MD_{project,y} = MD_{flared,y}$$

where

$$MD_{flared,y} = (LFG_{flare,y} * w_{CH4,y} * D_{CH4}) - (PE_{flare,y} / GWP_{CH4})$$

where:

$MD_{flared,y}$	quantity of methane destroyed by flaring
$LFG_{flare,y}$	quantity of landfill gas fed to the flare during the year measured in cubic meters (m^3)
$w_{CH4,y}$	average methane fraction of the landfill gas as measured during the year and expressed as a fraction (in m^3CH_4/m^3LFG)
D_{CH4}	methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4)
$PE_{flare,y}$	project emissions from flaring of the residual gas stream in year y (tCO_2e) determined following the procedure described in the "Methodological Tool to determine project emissions from flaring gases containing methane"

Project emissions from flaring, $PE_{flare,y}$ are calculated according to the "Methodological Tool to determine project emissions from flaring gases containing methane" (the "flaring tool"). In the Project, an enclosed flare is adopted. As per the flaring tool, the following two options are applicable for enclosed flares in order to determine the flare efficiency $\eta_{flare,h}$.

(a) To use default values. Continuous monitoring of compliance with manufacturer's specification of flare (temperature, flow rate of residual gas at the inlet of the flare) must be performed.

(b) Continuous monitoring of the methane destruction efficiency of the flare (flare efficiency).

In the Project, the default values are adopted for the flare efficiency.

Accordingly, Project emissions from flaring, $PE_{flare,y}$, are calculated according to Steps 5~7 of the Flaring Tool.

STEP 5: Determination of methane mass flow rate of the exhaust gas on a dry basis;
STEP 6: Determination of the hourly flare efficiency;
STEP 7: Calculation of the annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

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

The quantity of methane in the residual gas flowing into the flare is the product of the volumetric flow rate of the residual gas ($FV_{RG,h}$), the volumetric fraction of methane in the residual gas ($fv_{CH4,RG,h}$) and the density of methane ($\rho_{CH4,n,h}$) in the same reference conditions (normal conditions and dry or wet basis). The following formula is applied:

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4.RG,h} \times \rho_{CH4,n}$$

where:

$FV_{RG,h}$	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m^3/h) (monitored)
$fv_{CH4,RG,h}$	Volumetric fraction of methane in the residual gas on dry basis in hour h (monitored)
$\rho_{CH4,n}$	Density of methane at normal conditions (0.716 kg/m^3)

Step 6: Determination of the hourly flare efficiency

The Project uses an enclosed flare. The flare efficiency is calculated for each hour of a year based on default values plus operational parameters as follows:

Flare efficiency ($\eta_{flare,h}$)

- **0 %** if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 ^{o}C for more than 20 minutes during the hour *h*.
- **50 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ^{o}C for more than 40 minutes during the hour *h*, but the manufacturers specifications on proper operation of the flare are not met at any point in time during the hour *h*.
- **90 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ^{o}C for more than 40 minutes during the hour h and the manufacturers specifications on proper operation of the flare are met continuously during the hour *h*.

Step 7: Calculation of the annual project emissions from flaring based on measured hourly values or based on default flare efficiencies.

Project emissions from flaring, PE_{flare}, are determined by multiplying the methane flow rate in the residual gas with the flare efficiency for each hour of the year.

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

where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h (kg/h)
$\eta_{flare,h}$	Flare efficiency in hour h

For the ex-ante assessment of $MD_{project,y}$ the following formula is applied:

$MD_{project,y} = (BE_{CH4,SWDS,y}/GWP_{CH4}) * \eta_{LFG\ coll.}$

Where:

$BE_{CH4,SWDS,y}$ =	Methane generation from the landfill in the absence of the project activity at year y (tCO_2e), calculated as per the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site". The tool estimates methane generation adjusted for, using adjustment factor (f) any landfill gas in the baseline that would have been captured and destroyed to comply with relevant regulations or contractual requirements, or to address safety and odor concerns. As this is already accounted for in equation 2, "f" in the tool shall be assigned a value 0
$\eta_{LFG\ coll.}$	Efficiency of LFG collection

Furthermore the following guidance is taken into account:

- In the tool x refers to the year since the landfill started receiving wastes [x runs from the first year of landfill operation (x=1) to the year for which emissions are calculated (x=y)];

- The efficiency of the degassing system which will be installed in the project activity is taken into account while estimating the *ex ante* estimation ($\eta_{LFG\ coll.}$)

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

Where:

$BE_{CH4,SWDS,y}$	=	Methane emissions avoided during the year y from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO2e)
φ	=	Model correction factor to account for model uncertainties (0.9)
f	=	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	=	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	=	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	=	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	=	Fraction of degradable organic carbon (DOC) that can decompose
MCF	=	Methane correction factor
$W_{j,x}$	=	Amount of organic waste type j prevented from disposal in the SWDS in the year x (tons)
DOC_j	=	Fraction of degradable organic carbon (by weight) in the waste type j
k_j	=	Decay rate for the waste type j
j	=	Waste type category (index)
x	=	Year since the landfill started receiving wastes [x runs from the first year of landfill operation (x=1) to the year for which emissions are calculated (x=y)]
y	=	Year for which methane emissions are calculated

The tables below provide the list of parameters and other key information used to establish the baseline:

Data / Parameter	$LFG_{flare,y}$
Data unit	m^3
Description	quantity of landfill gas fed to the flare during the year y
Time of determination/monitoring	Monitored constantly during Project operation
Source of data (to be) used	Calculated.

Value of data applied (for ex ante calculations/determinations)	

Year	Volume
2010	827,022
2011	3,164,493
2012	3,027,448
2013	2,896,641
2014	2,771,776
2015	2,652,569
2016	2,538,753
2017	2,430,072
2018	2,326,284
2019	2,227,158

Justification of the choice of data or description of measurement methods and procedures (to be) applied	Estimated using the Methane Tool and based on the forecast for LFG availability and power generation. Data for annual volumes of waste disposed and waste composition are based on and information note from the Department of Environment of the Luhansk City Council.
QA/QC procedures (to be) applied	As per Ukrainian National Standards
Any comment	-

Data / Parameter	w_{CH4}
Data unit	m^3CH_4/m^3LFG
Description	average methane fraction of the landfill gas as measured during the year and expressed as a fraction
Time of determination/monitoring	Monitored constantly during Project operation
Source of data (to be) used	Nedra Luhanshchyny LLC
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	Default value
QA/QC procedures (to be) applied	As per Ukrainian National Standards
Any comment	-

Data / Parameter	D_{CH4}
Data unit	tCH_4/m^3CH_4
Description	Methane Density
Time of determination/monitoring	PDD production
Source of data (to be) used	ACM0001
Value of data applied (for ex ante calculations/determinations)	0.0007168
Justification of the choice of data or description of measurement methods and procedures (to be) applied	At standard temperature and pressure (0 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH_4/m^3CH_4

QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	$FV_{RG,h}$
Data unit	m^3/h
Description	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h
Time of determination/monitoring	Constantly
Source of data (to be) used	Calculated.
Value of data applied (for ex ante calculations/determinations)	

Year	Nm^3
2010	378
2011	361
2012	346
2013	331
2014	316
2015	303
2016	290
2017	277
2018	266
2019	254

Justification of the choice of data or description of measurement methods and procedures (to be) applied	Based on the estimates of methane availability using the methane Tool. Average hourly rate used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	$\rho_{CH4,n}$
Data unit	$kgCH_4/m^3CH_4$
Description	Methane Density
Time of determination/monitoring	PDD production
Source of data (to be) used	ACM0001
Value of data applied (for ex ante calculations/determinations)	0. 7168
Justification of the choice of data or description of measurement methods and procedures (to be) applied	At standard temperature and pressure (0 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH_4/m^3CH_4
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	$fv_{CH4,RG,h}$
Data unit	-
Description	Volumetric fraction of methane in the residual gas on a dry basis in hour h

Time of determination/monitoring	Monitored constantly
Source of data (to be) used	Nedra Luhanshchyny LLC
Value of data applied (for ex ante calculations/determinations)	0.679
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"
QA/QC procedures (to be) applied	-
Any comment	A default value of 0.5 is recommended by IPCC.

Data / Parameter	GWP_{CH4}
Data unit	tCO_2e/tCH_4
Description	Global warming potential for CH_4
Time of determination/monitoring	Monitored annually
Source of data (to be) used	IPCC
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	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	$\eta_{LFGcoll}$
Data unit	%
Description	LFG collection efficiency
Time of determination/monitoring	PDD production
Source of data (to be) used	Nedra Luhanshchyny LLC.
Value of data applied (for ex ante calculations/determinations)	60%
Justification of the choice of data or description of measurement methods and procedures (to be) applied	75% efficiency of a LFG collection system based on the specification of the manufacturer. The system will cover 80% of Site 1 of the Luhansk Landfill.
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	$\eta_{flare,h}$
Data unit	%
Description	Flare efficiency in hour h
Time of determination/monitoring	Determined for every hour during the monitoring period.
Source of data (to be) used	The default value of "Tool to determine project emissions from flaring gases containing methane"

Value of data applied (for ex ante calculations/determinations)	• **0 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 ^{o}C for more than 20 minutes during the hour *h*. • **50 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ^{o}C for more than 40 minutes during the hour h, but the manufacturers specifications on proper operation of the flare are not met at any point in time during the hour *h*. • **90 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ^{o}C for more than 40 minutes during the hour h and the manufacturers specifications on proper operation of the flare are met continuously during the hour *h*.
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default values of "Tool to determine project emissions from flaring gases containing methane"
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	T_{flare}
Data unit	^{0}C
Description	Temperature in the exhaust gas of the flare
Time of determination/monitoring	Monitored constantly
Source of data to be used	On-site measurements by Nedra Luhanshchyny
Value of data applied (for ex ante calculations/determinations)	500 ^{o}C
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Minimum value to guarantee the highest flaring efficiency.
QA/QC procedures to be applied	Thermocouples should be replaced or calibrated every year
Any comment	An excessively high temperature at the sampling point (above 700 ^{o}C) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.

Data / Parameter	-
Data unit	min/h
Description	Flare operation time in hour *h*
Time of determination/monitoring	Continuously monitored
Source of data (to be) used	Measurements by Nedra Luhanshchyny LLC.
Value of data applied (for ex ante calculations/determinations)	41 min/h
Justification of the choice of data or description of measurement methods and procedures (to be) applied	A minimum value to guarantee maximum efficiency of flaring.

QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	***Other flare operation parameters***
Data unit	-
Description	All data and parameters that are required to monitor to confirm whether the flare operates within the range of operating conditions according to manufacturer's specifications.
Time of determination/monitoring	Monitored continuously.
Source of data (to be) used	Measurements by Nedra Luhanshchyny LLC.
Value of data applied (for ex ante calculations/determinations)	Operating values within the manufacturer's specifications.
Justification of the choice of data or description of measurement methods and procedures (to be) applied	-
QA/QC procedures (to be) applied	-
Any comment	The exact parameters will be listed in the first monitoring report and will be verified during the first verification.

Data / Parameter	φ
Data unit	-
Description	Model correction factor to account for model uncertainties
Time of determination/monitoring	PDD production
Source of data (to be) used	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"
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	Default value of "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"
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	PDD production
Source of data (to be) used	ACM0001
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	Already reflected in $MD_{BL,y}$
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	***OX***
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Time of determination/monitoring	PDD production
Source of data (to be) used	Nedra Luhanshchyny LLC.
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	The proposed Project is not managed solid waste disposal site that is covered with oxidizing material such as soil or compost, therefore 0 is applied.
QA/QC procedures (to be) applied	-
Any comment	Confirmed through a site visit.

Data / Parameter	***F***
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)
Time of determination/monitoring	PDD production
Source of data (to be) used	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
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 dumping waste at a solid waste disposal site"
QA/QC procedures (to be) applied	-
Any comment	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.

Data / Parameter	DOC_F
Data unit	
Description	Fraction of methane in the SWDS gas (volume fraction)
Time of determination/monitoring	PDD production
Source of data (to be) used	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value of data applied (for ex ante calculations/determinations)	0.5
Justification of the choice of	"Tool to determine methane emissions avoided from dumping waste at a

data or description of measurement methods and procedures (to be) applied	solid waste disposal site"
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	***MCF***
Data unit	-
Description	Methane correction factor
Time of determination/monitoring	PDD production
Source of data (to be) used	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
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	The Project is an unmanaged solid waste disposal site, which has depths between 14 and 25 meters depending on the relief, which is greater than 5 meters.
QA/QC procedures (to be) applied	Type of landfill to be confirmed through a site visit and review of the landfill operation documents.
Any comment	The methane correction factor (MCF) accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS.

Data / Parameter:	DOC_j
Data unit:	
Description:	Fraction of degradable organic carbon (by weight) in the waste type *j*
Time of determination/monitoring	PDD production
Source of data (to be) used	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	"Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site"
QA/QC procedures (to be) applied	-

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

Any comment	-

Data / Parameter:	$W_{j,x}$
Data unit:	t
Description:	Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x*
Time of determination/monitoring	PDD production
Source of data (to be) used	Calculated.
Value of data applied (for ex ante calculations/determinations)	See Annex 2, Table 12.
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Estimated using data on the amount of waste deposited at the landfill and waste composition from the Waste Collection Schedule of Luhansk City.
QA/QC procedures (to be) applied	-
Any comment	-

Data / Parameter	k_j
Data unit	-
Description	Decay rate for the waste type *j*
Time of determination/monitoring	PDD production
Source of data (to be) used	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 3.3)

Value of data applied (for ex ante calculations/determinations)	

Waste Type *j*		**Boreal and Temperate (MAT < 20°C)**
		Dry (MAP/PET < 1)
Slowly Degrading	Pulp, paper, cardboard (other than sludge), textiles	0.04
	Wood, wood products and straw	0.02
Moderately Degrading	Other (non-food) organic putrescible garden and park waste	0.05
Rapidly Degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06

Justification of the choice of data or description of measurement methods and procedures (to be) applied	The MAT of Luhansk City is 8.5ºC, MAP is 474mm and PET is 876.5mm. Therefore, MAP/PET<1.
QA/QC procedures (to be) applied	-
Any comment	-

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 Project reduces anthropogenic emissions of greenhouse gases below those that would have occurred in its absence as demonstrated in the following step-wise approach:

Step 1. Indication and description of the approach applied

Additionality is established using the approach described in Annex 1 to the JI Guidelines for baseline and monitoring, Paragraph 2 (b) (i), application of version 5.02 of the "Tool for demonstration and assessment of additionality".

Step 2. Application of the approach chosen

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

Step 1 is completed as part of the process of establishment of the baseline scenario in Section B.1.

Step 2: Investment Analysis

The Project will apply only investment analysis. Step 2 of the Additionality Tool is completed as part of the baseline determination procedure in Section B.1.

The investment analysis above demonstrated that in the absence of JI financing, Option LFG2, continuation of the current practice and free release of LFG into the atmosphere is the only feasible option.

Step 3: Barrier Analysis

Not applied.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity

There is only one project where a LFG collection and flaring system is installed, "Landfill methane capture and flaring at Yalta and Alushta Landfills, Ukraine", but that project is implemented under the JI framework. There are no LFG utilization projects in Ukraine that have been developed without the JI mechanism.

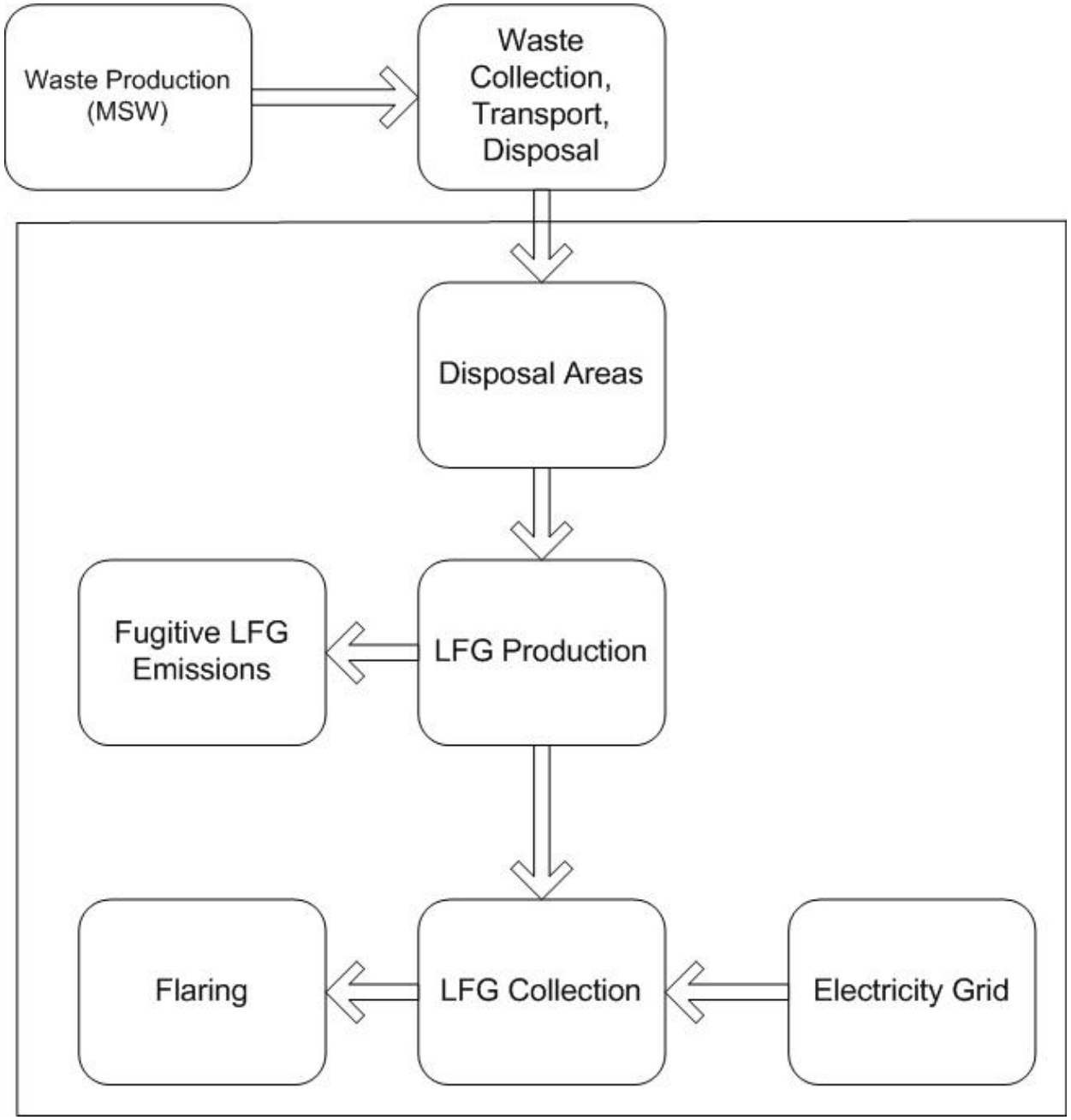
Sub-step 4: Discuss any similar Options occurring

Landfill sites in Ukraine are usually managed by local municipalities, which rely on their income from the state budget. The municipal governments are not required by law and will not allocate any funding for LFG capture and destruction, especially because such projects generate no additional income.

As no similar activities to the Project are observed or are expected to be observed in the future in the absence of JI financing, the Project is additional.

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

The spatial extent of the Project boundary is the landfill site, as well as all power plants connected to the Ukrainian grid, as showed in the figure below.



Emission sources and gases included in or excluded from the Project boundary are listed in the below table:

	Source	Gas	Included?	Justification / Explanation
Baseline	Emissions from decomposition of waste at the landfill site	CH_4	Yes	The major source of emissions in the baseline
		N_2O	No	N_2O emissions are small compared to CH4 emissions from landfills. Exclusion of this gas is conservative.
		CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted
Project Activity	Emissions from on-site fossil fuel use	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	Not applicable
	Emissions from on-site electricity use	CO_2	Yes	An important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.

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

The Baseline Study was completed on 28/06/2011 by:

Clean Energy Finance Committee
Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.
5th Floor, Toyosu Front
3-2-20 Toyosu, Koto-ku, Tokyo 135-0061, Japan
E-mail: watanabe-hajime@sc.mufg.jp

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

19/06/2009[4]

C.2. Expected operational lifetime of the project:

20 years 0 months

[4] For the Project, the starting date is considered to be the date when Investment Contract No. 420/09.001 was signed between the Luhansk City Council and Nedra Luhanshchyny LLC for the implementation of the Project.

C.3. Length of the crediting period:

9 years 3 months

01/10/2010 – 31/12/2019

Under the current JI rules, the crediting period can be extended until the end of the Project lifetime subject to a new agreement replacing the Kyoto Protocol and a decision by the Ukrainian government.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

An outline of the monitoring plan is provided using a step-wise approach:

Step 1. Indication and description of the approach chosen regarding monitoring

In accordance with the JISC Guidelines for baseline and monitoring an approved simplified CDM baseline and monitoring methodology will be used. The monitoring plan is prepared in accordance with ACM0001, "Consolidated Baseline and Monitoring Methodology for Landfill Gas Project Activities", version 11.

Step 2. Application of the approach chosen

The monitoring plan is based on direct measurement of the amount of landfill gas captured and destroyed through flaring. The monitoring plan provides for continuous measurement of the quantity and quality of LFG flared. The main variables that are determined are the quantity of methane actually captured $MD_{project,y}$, and quantity of methane flared ($Md_{flared,y}$). The monitoring plan also measures the grid electricity consumed by the Project.

To determine these variables, the following parameters have to be monitored:

- The amount of landfill gas generated (in m³, using a continuous flow meter), where the total quantity ($LFG_{total,y}$) as well as the quantities fed to the flare(s) ($LFG_{flare,y}$) are measured continuously.

- The fraction of methane in the landfill gas ($w_{CH4,y}$) is measured with a continuous analyzer;

Methane fraction of the landfill gas and LFG flow have to be measured on same basis (either wet or dry). As per the "Tool to determine project emissions from flaring gases containing methane" the standard approaches to convert the flow from wet basis to dry basis are applied.

- The parameters used for determining the project emissions from flaring of the residual gas stream in year *y* ($Pe_{flare,y}$) are monitored as per the "Tool to determine project emissions from flaring gases containing methane";

- Temperature (*T*) and pressure (*p*) of the landfill gas are monitored to determine the density of methane in the landfill gas;

- The quantity of electricity imported, in the baseline and the project situation, to meet the requirements of the project activity, if any;

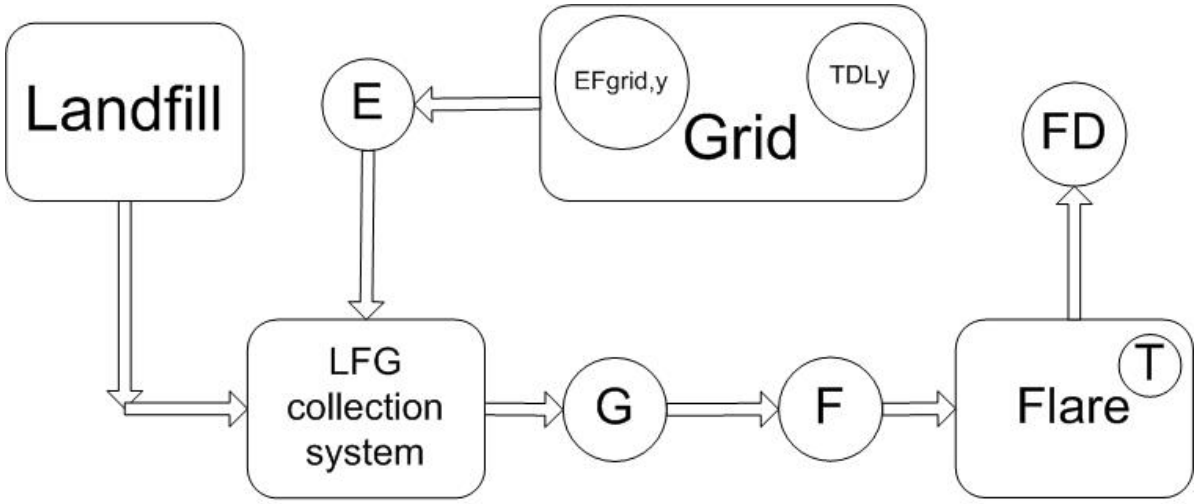
- Relevant regulations for LFG project activities will be monitored and updated at renewal of the credit period. Changes to regulation will be converted to the amount of methane that would have been destroyed/combusted during the year in the absence of the Project ($MD_{BL,y}$).

The measurement equipment for gas quality (humidity, particulate, etc.) is sensitive, so a strong QA/QC procedure for the calibration of this equipment will be implemented as per the Ukrainian national standards.

As per ACM0001, a **continuous monitoring system** for methane fraction of the landfill gas and LFG flow will be installed to continuously acquire data from the process (continuous sampling) in order to process it and deliver the required information (methane fraction of the landfill gas and LFG flow) as an average value in a time interval not greater than an hour. Paired values of the methane fraction of the landfill gas and LFG flow which are averaged for the same time interval will be used in the calculation of emission reductions (i.e. methane fraction of landfill gas averaged at hour x will be used with LFG flow which is averaged at the same hour x).

Project emissions due to electricity consumption in the project are determined in accordance with "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", as the project consumes electricity from the Ukrainian grid. For the determination of the emission factor for electricity generation ($FE_{EL,j,y}$), the default value of 1.3 tCO_2/MWh described in Option A2 is applied, as electricity is consumed only in the Project, but not in the baseline scenario.

The monitoring system is presented in Figure 5 below.



G - Gas analyzer to measure methane fraction in LFG
F - Flow meter to continuously measure the flow of LFG fed to the flare and give the flow at normal conditions
T - Thermal couple to measure the temperature of the Exhaust Gas of the flare
FD - Flame detector
E - Electricity meter to measure the electricity supply from the grid
EFgrid,y - The emission factor for electricity generation from project electricity consumption in year y
TDLy - Average technical transmission and distribution losses in the grid in year y

Figure 5. Monitoring System

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

This section is left blank on purpose as Option 2 is selected.

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

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

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:

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

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:

a) Data and parameters that are not monitored throughout the crediting period but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD:

Data / Parameter:	D_{CH4}
Data unit:	tCH_4/m^3CH_4
Description:	Methane Density
Time of determination/monitoring:	PDD production
Source of data (to be) used:	ACM0001
Value of data applied (for ex ante calculations/determinations):	0.0007168
Description of measurement methods and procedures (to be) applied:	At standard temperature and pressure (0 degree Celsius and 1,013 bar) the density of methane is 0.0007168 tCH_4/m^3CH_4
QA/QC procedures (to be)	-

applied:	
Any comment:	Same monitoring item as $\rho_{CH4,n}$

Data / Parameter:	$EF_{EL,y}$
Data unit:	tCO_2/MWh
Description:	Emission factor for electricity generation in year y
Time of determination/monitoring	PDD production
Source of data (to be) used	Tool to calculate baseline, project and/or leakage emissions from electricity consumption
Value of data applied (for ex ante calculations/determinations)	1.3
Description of measurement methods and procedures (to be) applied:	Conservative default value, when scenario A from the Tool, electricity consumption from the grid applies to project emissions only
QA/QC procedures (to be) applied	-
Any comment	-

b) Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD.

There are no parameters applicable to this category.

c) Data and parameters that are monitored throughout the crediting period:

Data / Parameter	$LFG_{total,y}$
Data unit	m^3
Description	Total amount of landfill gas captured
Time of determination/monitoring	Monitored constantly

Source of data to be used	On-site measurements
Value of data applied (for ex ante calculations/determinations)	

Year	Nm^3
2010	827,022
2011	3,164,493
2012	3,027,448
2013	2,896,641
2014	2,771,776
2015	2,652,569
2016	2,538,753
2017	2,430,072
2018	2,326,284
2019	2,227,158

Description of measurement methods and procedures (to be) applied:	Measured continuously using a flow meter. Data to be aggregated monthly and yearly.
QA/QC procedures to be applied	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment	-

Data / Parameter	$\boldsymbol{LFG_{flare,y}}$
Data unit	m^3
Description	Amount of landfill gas flared
Time of determination/monitoring	Monitored constantly
Source of data to be used	On-site measurements
Value of data applied (for ex ante calculations/determinations)	

Year	Nm^3
2010	827,022

	2011: 3,164,493 2012: 3,027,448 2013: 2,896,641 2014: 2,771,776 2015: 2,652,569 2016: 2,538,753 2017: 2,430,072 2018: 2,326,284 2019: 2,227,158
Description of measurement methods and procedures (to be) applied:	Measured continuously using a flow meter. Data to be aggregated monthly and yearly.
QA/QC procedures to be applied	Flow meters will be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment	-

Data / Parameter	$PE_{flare,y}$
Data unit	tCO_2e
Description	Project emissions from flaring the residual gas stream in year *y*
Time of determination/monitoring	Calculated for each monitoring period
Source of data to be used	As per the "Tool to determine project emissions from flaring gases containing methane"
Value of data applied (for ex ante calculations/determinations)	Year: Nm^3 2010: 622 2011: 2,382 2012: 2,279 2013: 2,180

	2014: 2,086 2015: 1,996 2016: 1,911 2017: 1,829 2018: 1,751 2019: 1,676
Description of measurement methods and procedures (to be) applied:	As per the "Tool to determine project emissions from flaring gases containing methane"
QA/QC procedures to be applied	As per the "Tool to determine project emissions from flaring gases containing methane"
Any comment	-

Data / Parameter	$FV_{RG,h}$
Data unit	m^3/h
Description	Volumetric flow rate of the residual gas in dry basis at normal condition in the hour h
Time of determination/monitoring	Monitored constantly
Source of data to be used	On-site measurement
Value of data applied (for ex ante calculations/determinations)	Year / Nm^3 2010: 378 2011: 361 2012: 346 2013: 331 2014: 316 2015: 303 2016: 290

	2017: 277 2018: 266 2019: 254
Description of measurement methods and procedures (to be) applied:	Measured continuously using a flow meter. Values to be averaged hourly. The same bases (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas ($fv_{i,h}$) when the residual gas temperature exceed 60℃.
QA/QC procedures to be applied	Flow meters will be periodically calibrated according to the manufacturer's recommendation.
Any comment	These values will be used for the calculation of project emissions from flaring of residual gas stream in year y ($PE_{flare,y}$).

Data / Parameter	$w_{CH4,y}$
Data unit	m^3CH_4/m^3LFG
Description	Methane fraction in the landfill gas
Time of determination/monitoring	Monitored constantly
Source of data to be used	On-site measurements
Value of data applied (for ex ante calculations/determinations)	50%
Description of measurement methods and procedures (to be) applied:	This parameter will be measured continuously using a continuous gas analyzer.
QA/QC procedures to be applied	The analyzer will be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check will be performed by comparison with a standard certified gas.
Any comment	The monitored parameter is also used for $fv_{CH4,h}$ in case this parameter is measured continuously using continuous gas analyzer.

Data / Parameter	***T***

Data unit	^{0}C
Description	Temperature of the landfill gas
Time of determination/monitoring	Monitored continuously
Source of data to be used	On-site measurements using thermocouple by the gas flow meter of the flare
Value of data applied (for ex ante calculations/determinations)	-
Description of measurement methods and procedures (to be) applied:	Measured to determine the density of methane D_{CH4}. No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters
QA/QC procedures to be applied	Measuring instruments should be subject to a regular maintenance and testing regime in accordance to appropriate national/international standards
Any comment	

Data / Parameter	***P***
Data unit	Pa
Description	Pressure of the landfill gas
Time of determination/monitoring	Monitored continuously
Source of data to be used	On-site measurements by Nedra Luhanshchyny
Value of data applied (for ex ante calculations/determinations)	-
Description of measurement methods and procedures (to be) applied:	Measured to determine the density of methane D_{CH4}. No separate monitoring of temperature is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters
QA/QC procedures to be applied	Measuring instruments should be subject to a regular maintenance and testing regime in accordance to appropriate national/international standards
Any comment	-

Data / Parameter	$\eta_{flare,h}$
Data unit	%
Description	Flare efficiency in hour h
Time of determination/monitoring	Determined for every hour during the monitoring period.
Source of data to be used	The default value of "Tool to determine project emissions from flaring gases containing methane"
Value of data applied (for ex ante calculations/determinations)	• **0 %** if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 ^{o}C for more than 20 minutes during the hour *h*. • **50 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ^{o}C for more than 40 minutes during the hour h, but the manufacturers specifications on proper operation of the flare are not met at any point in time during the hour *h*. • **90 %**, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 ^{o}C for more than 40 minutes during the hour h and the manufacturers specifications on proper operation of the flare are met continuously during the hour *h*.
Description of measurement methods and procedures (to be) applied:	The default values of "Tool to determine project emissions from flaring gases containing methane" applied based on the monitored results of the operational parameters of the flare.
QA/QC procedures to be applied	-
Any comment	-

Data / Parameter	T_{flare}
Data unit	^{0}C
Description	Temperature in the exhaust gas of the flare

Time of determination/monitoring	Monitored constantly
Source of data to be used	On-site measurements by Nedra Luhanshchyny
Value of data applied (for ex ante calculations/determinations)	500 ^{o}C
Description of measurement methods and procedures (to be) applied:	Temperature will be measured using thermocouples.
QA/QC procedures to be applied	Thermocouples should be replaced or calibrated every year
Any comment	For the sake of PDD production, a minimum value to guarantee the highest flaring efficiency is applied. An excessively high temperature at the sampling point (above 700 ^{o}C) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.

Data / Parameter	**-**
Data unit	min/h
Description	Flare operation time in hour h
Time of determination/monitoring	Continuously monitored
Source of data to be used	Measurements by Nedra Luhanshchyny LLC.
Value of data applied (for ex ante calculations/determinations)	41
Description of measurement methods and procedures (to be) applied:	The operation time will be monitored using a timer.
QA/QC procedures to be applied	The timer should be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment	For the sake of PDD production, the minimal value guaranteeing efficient flare operation is applied.

Data / Parameter	***Other flare operation parameters***
Data unit	-
Description	All data and parameters that are required to monitor to confirm whether the flare operates within the range of operating conditions according to manufacturer's specifications.
Time of determination/monitoring	Monitored continuously.
Source of data to be used	Measurements by Nedra Luhanshchyny LLC.
Value of data applied (for ex ante calculations/determinations)	Proper operating values.
Description of measurement methods and procedures (to be) applied:	As per the manufacturer's specification.
QA/QC procedures to be applied	All measuring equipment should be subject to a regular maintenance and testing regime to ensure accuracy.
Any comment	The exact parameters will be listed in the first monitoring report and will be verified during the first verification.

Data / Parameter	$PE_{EC,y}$
Data unit	tCO_2e
Description	Project emissions from electricity consumption by the project in year *y*
Time of determination/monitoring	Calculated for each monitoring period
Source of data to be used	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Value of data applied (for ex ante calculations/determinations)	

Year	tCO_2e
2010	65
2011	259
2012	259

	2013: 259 2014: 259 2015: 259 2016: 259 2017: 259 2018: 259 2019: 259
Description of measurement methods and procedures (to be) applied:	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
QA/QC procedures to be applied	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Any comment	-

Data / Parameter	$EC_{PJ,y}$
Data unit	MWh
Description	Quantity of electricity consumed by the Project during the year y
Time of determination/monitoring	
Source of data to be used	On-site measurements
Value of data applied (for ex ante calculations/determinations)	175.2 MWh/yr
Description of measurement methods and procedures (to be) applied:	Measured continuously using an electricity meter.
QA/QC procedures to be applied	-
Any comment	Cross check with the invoices for electricity purchase. Assumed that the

	flare operates for 8760 hours per year and has a capacity of 0.02 MW.

Data / Parameter	**-**
Data unit	-
Description	Regulatory requirements relating to landfill gas projects
Time of determination/monitoring	
Source of data to be used	Local/national data
Value of data applied (for ex ante calculations/determinations)	-
Description of measurement methods and procedures (to be) applied:	The information will be recorded annually.
QA/QC procedures to be applied	-
Any comment	-

Data / Parameter:	TDL_y
Data unit:	%
Description:	Average technical transmission and distribution losses for providing electricity to the Project in year *y*
Time of determination/monitoring:	Monitored annually. In the absence of data for the relevant year, most recent figures should be used, but not older than 5 years.
Source of data (to be) used:	State Committee of Statistic of Ukraine
Value of data applied (for ex ante calculations/determinations):	13.5
Description of measurement methods and procedures (to be) applied:	Data from official sources, such as reports by State Committee on Statistics of Ukraine, shall be used.
QA/QC procedures (to be) applied:	Data from official sources will be used to ensure accuracy.

Any comment:	-

No additional parameters have to be monitored in accordance with Ukrainian environmental legislation.

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):

The methodology ACM0001 "Consolidated monitoring methodology for landfill gas projects activities" uses the following formula for estimation of the GHG emissions reductions from the Project:

Emission Reductions

$ER_y = BE_y – PE_y$

where:

ER_y	Emission reductions in year y (tCO2e/yr)
BE_y	Baseline emissions in year y (tCO_2e/yr)
PE_y	Project emissions in year y (tCO_2/yr)

Baseline Emissions

Baseline emissions in a given year "y" (BE_y) are estimated as follows:

$BE_y = MD_{project,y} * GWP_{CH4}$

where:

BE_y	Baseline emissions in year y (tCO_2e)

$MD_{project,y}$ The amount of methane that would have been destroyed/combusted during the year, in tonnes of methane (tCH_4) in project scenario
GWP_{CH4} the Global Warming Potential value for methane for the first commitment period is 21 tCO_2e/tCH_4

where

$MD_{project,y} = MD_{flared,y}$

where:

$MD_{flared,y}$ Quantity of methane destroyed by flaring (tCH_4)

$MD_{flared,y} = (LFG_{flare,y} * w_{CH4,y} * D_{CH4}) - (PE_{flare,y} / GWP_{CH4})$

where:

$LFG_{flare,y}$ Quantity of landfill gas fed to the flare(s) during the year measured in cubic meters (m^3)
$w_{CH4,y}$ Average methane fraction of the landfill gas as measured during the year and expressed as a fraction (in m^3 CH4/m^3 LFG)
D_{CH4} Methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4)
$PE_{flare,y}$ Project emissions from flaring of the residual gas stream in year y (tCO_2e) determined following the procedure described in the "Tool to determine project emissions from flaring gases containing methane"

As explained in the section B.1, an enclosed flaring system is used. As per the guideline in the "Methodological Tool to determine project emissions from flaring gases containing methane", following equations are used to calculate project emissions from flaring of the residual gas ($Pe_{flare,y}$)

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

where:

$TM_{RG,h}$ Mass flow rate of methane in the residual gas in the hour h (kg/h)
$\eta_{flare,h}$ Flare efficiency in hour h

And

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4.RG,h} \times \rho_{CH4,n}$$

where:

$FV_{RG,h}$ Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m_3/h) (monitored)
$fv_{CH4,RG,h}$ Volumetric fraction of methane in the residual gas on dry basis in hour h (monitored)
$\rho_{CH4,n}$ Density of methane at normal conditions (0.716 kg/m_3)

And

Flare efficiency ($\eta_{flare,h}$)

- 90 % - default value
- 50 % - if in a particular hour any of the flare operation parameters are out of the limits of the manufacturer's specifications.
- 0 % - if in a particular the recorded temperature is under 500 ^oC

Project Emissions

Project emissions are the emissions from the net import of electricity from the grid to the Project.

Determination of $CEF_{elec,BL,y}$

Project emissions are calculated as follows:

$PE_{EC,y} = EC_{PJ,y} * FE_{EL,y} *(1 + TDL_y)$

$EC_{PJ,y}$	Quantity of electricity consumed by the Project during the year y (MWh)
$FE_{EL,y}$	Emission factor for electricity generation in year y (tCO_2e/MWh)
TDL_y	Average technical transmission and distribution losses for providing electricity to the Project in year y

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

According to ACM0001, the Project results in no leakage and this section is left blank on purpose.

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:

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

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):

Emission Reductions

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y$

where:

ER_y	Emission reductions in year y (tCO2e/yr)
BE_y	Baseline emissions in year y (tCO_2e/yr)
PE_y	Project emissions in year y (tCO_2/yr)

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:

No additional information has to be collected.

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.
$LFG_{total,y}$	Low	Flow meters will be subject to a regular maintenance and periodical calibration according to the manufacturer's recommendation to ensure accuracy.
$LFG_{flare,y}$	Low	Flow meters will be subject to a regular maintenance and periodical calibration according to the manufacturer's recommendation to ensure accuracy.
$PE_{flare,y}$	Low	All equipment used to collect data will be subject to regular maintenance and calibration according to the manufacturer's recommendation to ensure accuracy.
$FV_{RG,h}$	Low	Flow meters will be periodically calibrated according to the manufacturer's recommendations
$w_{CH4,y}$	Low	The gas analyzer will be subject to a regular maintenance and testing regime to ensure accuracy.
T	Low	The temperature probe should be subject to a regular maintenance and testing regime to ensure accuracy.
P	Low	The pressure gauge should be subject to a regular maintenance and testing regime to ensure accuracy.
T_{flare}	Low	Thermocouples should be replaced or calibrated every year. A zero check and a typical value check will be performed by comparison with a standard certified gas.
Flare operation time	Low	The timer should be subject to a regular maintenance and testing regime to ensure accuracy.
Other flare operation parameters	Low	All measuring equipment should be subject to a regular maintenance and testing regime to ensure accuracy.
TDL_y	Low	Data from official sources will be used to ensure accuracy.
$EC_{PJ,y}$, $PE_{EC,y}$	Low	Electricity meters will be subject to a regular maintenance and testing regime to ensure accuracy.

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

Figure 6 below outlines the operational and management structure that Nedra Luhanshchyny, Ltd. has implemented to monitor emission reductions generated by the Project. Nedra Luhanshchyny, Ltd. has formed an operational and management team, which will be responsible for monitoring of all the parameters

aforementioned. This team composes of a general manager and a group of operators. A group of operators, who are under the supervision of the general manager, are assigned for monitoring of different parameters on a timely basis as well as recording and archiving data in an orderly manner. Operators will be trained in the operation of all monitoring equipment and all readings will be taken under the supervision of management. An operations manual will be developed for the operating personnel.

Quality control and assurance procedures are to be undertaken for data monitored as outlined in the monitoring plan. A database will be maintained to record all relevant data as outlined in the monitoring plan. Monitoring reports are forwarded to and reviewed by the general manager on a monthly basis in order to ensure the Project follows the requirements of the monitoring plan.

All monitoring equipment will be installed by experts using standard methods. Once installed, this equipment will be calibrated to the highest standards by Project staff. Any irregularities or problems with equipment will be reported to management and rectified as soon as possible.

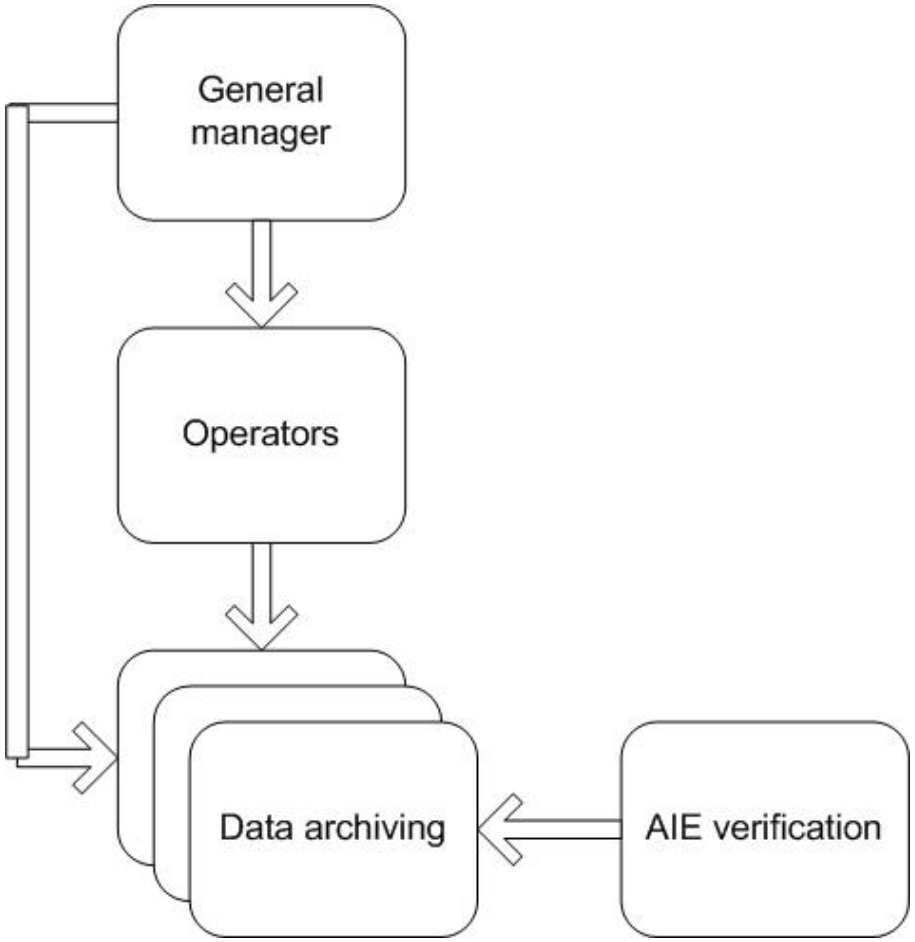


Figure 6. Operating and Management Structure of the Project

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

The monitoring plan was completed on 28/06/2011 by:

Clean Energy Finance Committee
Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.
5th Floor, Toyosu Front
3-2-20 Toyosu, Koto-ku, Tokyo 135-0061, Japan
E-mail: watanabe-hajime@sc.mufg.jp

SECTION E. Estimation of greenhouse gas emission reductions

Following the instructions outlined in the ACM0001, *ex ante* emission reduction estimates for methane gas are estimated for reference purposes only. The emission reductions will be determined on an *ex post* basis by measuring data that is stipulated in the monitoring plan.

E.1. Estimated project emissions:

The only Project emissions are forming the import of electricity from the grid.

$PE_y = PE_{EC,y}$

Where:

PE_y	Project emission in year y
$PE_{EC,y}$	Emissions from consumption of electricity in the Project case. The emissions from electricity purchase from the grid will be calculated using as per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". When electricity is directly supplied from the landfill gas engines no emissions are accounted.

Project emissions and calculated following the latest version of "Tool to calculate project emissions from electricity consumption", as follows:

$PE_{EC,y} = EC_{PJ,y} * FE_{EL,y} *(1 + TDL_y)$

Where

$EC_{PJ,y}$	Quantity of electricity consumed by the Project during the year y (MWh)
$FE_{EL,y}$	Emission factor for electricity generation in year y (tCO_2e/MWh)
TDL_y	Average technical transmission and distribution losses for providing electricity to the Project in year y

$EC_{PL,y} = 175.2$ MWh/year

$FE_{EL,y} = 1.3\ tCO_2e/MWh$

$TDL_y = 13.5\%$

An example of the calculations is given below:

$PE_{EC,,y} = 175.2\ MWh * 1.3tCO_2e/MWh * (1+13.5\%) = 259\ tCO_2$

As the Project starts operation in October 2010, project emissions in 2010 are estimated as follows:

$PE_{EC,,2010} = 43.8\ MWh * 1.3tCO_2e/MWh * (1+13.5\%) = 65\ tCO_2$

E.2. Estimated leakage:

According to ACM0001, leakage from this Project is insignificant and therefore does not need to be taken into account.

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

Table 3. Project Emissions (2010 – 2012)

Year	Project Emissions CO_2 t/y
2010	65
2011	259
2012	259
Total	**582**

Table 4. Project Emissions (2013 – 2019)

Year	Project Emissions CO_2 t/y
2013	259
2014	259
2015	259
2016	259
2017	259
2018	259
2019	259
Total	**1,810**

E.4. Estimated baseline emissions:

ACM0001 stipulates that an Adjustment Factor (AF) for regulatory or contractual requirements shall be used and justified, taking into account the context of the Project. The AF has been set at 0% due to the fact that there are no enforced regulatory or contractual requirements for LFG collection/utilization in Ukraine.

As explained in the section B.1., an enclosed flaring system is selected to combust LFG. As per the guidelines in the "Methodological Tool to determine project emissions from flaring gases containing methane", default values of flare efficiency will be used. For *ex ante* project emission calculation, 90% of flare efficiency will be used.

$BE_y = MD_{project,y} * GWP_{CH4}$

For illustrative purposes, data for 2010 is used

$BE_y = 267\ CH_4\ t/y * 21 = 5{,}602\ CO_2\ t/y$

$MD_{project,y} = MD_{flared,y}$

$MD_{project,y} = 267\ tCH_4\ /y$

$MD_{flared,y} = (LFG_{flare,y} * w_{CH4,y} * D_{CH4}) - (PE_{flare,y} / GWP_{CH4})$

$LFG_{flare,y} * w_{CH4,y} * D_{CH4} = 827{,}022\ m^3/y * 50\% * 0.0007168 = 296\ tCH_4/y$

$PE_{flare,y} = (827{,}022\ m^3/y * 50\% * 0.0007168) * 10\% * 21 = 622\ tCO_2\ t/y$

$MD_{flared,y} = 296\ CH_4\ t/y - 622\ CO_2\ t/y / 21 = 267\ tCH_4\ t/y$

Data for the whole project life is presented in Tables 3 and 4.

Table 5. Baseline Emissions (2010 – 2012)

Year	Baseline Emissions CO_2 t/y
2010	5,602
2011	21,436
2012	20,507
Total	**47,545**

Table 6. Baseline Emissions (2013 – 2019)

Year	Baseline Emissions CO_2 t/y
2013	19,621
2014	18,775
2015	17,968
2016	17,197
2017	16,461
2018	15,758
2019	15,086
Total	**120,866**

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

$ER_y = BE_y - PE_y$

The results of the estimates for the emission reductions are provided below.

Table 7. Emission Reductions (2010 – 2012)

Year	Emission Reductions CO_2 t/y
2010	5,537
2011	21,177
2012	20,248
Total	**46,962**

Table 8. Emission Reductions (2013 – 2019)

Year	Emission Reductions CO_2 t/y
2013	19,362
2014	18,516
2015	17,709
2016	16,938
2017	16,202
2018	15,499
2019	14,827
Total	**119,053**

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

Year	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
2010	5,602	65	0	5,537
2011	21,436	259	0	21,177
2012	20,507	259	0	20,248
Total (tonnes of CO_2 equivalent)	**47,545**	**582**	**0**	**46,962**
Annual Average (tonnes of CO_2 equivalent)	**21,131**	**259**	**0**	**20,872**

Year	Estimated	Estimated project	Estimated	Estimated

	baseline emissions (tonnes of CO_2 equivalent)	emissions (tonnes of CO_2 equivalent)	leakage (tonnes of CO_2 equivalent)	emission reductions (tonnes of CO_2 equivalent)
2013	19,621	259	0	19,362
2014	18,775	259	0	18,516
2015	17,968	259	0	17,709
2016	17,197	259	0	16,938
2017	16,461	259	0	16,202
2018	15,758	259	0	15,499
2019	15,086	259	0	14,827
Total (tonnes of CO_2 equivalent)	**120,866**	**1,810**	**0**	**119,053**
Annual Average (tonnes of CO_2 equivalent)	**17,267**	**259**	**0**	**17,008**

SECTION F. Environmental impacts

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:

The Project has completed all necessary procedures for the assessment and analysis of its environmental impact as per Ukrainian legislation, mainly described in State Construction Standards DBN A.2.2-1-2003. These involve completion of an Environmental Impact Assessment Study, as well as public disclosure of information about the landfill in the media. No public hearings are required.

The implementation of the Project will deliver a number of positive environmental effects. The collection of LFG prevents the accumulation of biogas inside the landfill, which can cause explosions or spontaneous fires. The flaring of landfill will also reduce the emissions of odorous gases, as well as methane, which is a highly potent greenhouse gas.

As a result of this Project the following positive environmental effects will be achieved:

People

Collection and utilization of biogas reduces the risk of explosions and potential negative health effects on nearby residents, as well as on landfill management staff.

Flora and Fauna

Management and closure of landfills create a less favorable environment for growth of parasites and outbreak of diseases. Closed managed landfills also do not attract scavenger birds such as ravens and crows, thus having an additional positive effect on the environment. The Project also will reduce the concentration of methane in the atmosphere that destroys the vegetation in the vicinity of the landfill site.

Air

Highly efficient LFG flaring system guarantees almost complete decomposition of methane and other toxic gases contained in LFG, which would have otherwise been freely emitted into the atmosphere in the absence of the Project.

Landscape

Covering and leveling of the surface of the landfill with sand and inert materials will allow it to fit better with the surrounding landscape. The presence of the flare, blowers and the associated noise and vibration will be minimal and within the limits defined in Ukrainian legislation.

Conclusions

Collection of biogas and its utilization have a significant positive impact on the environment. Reduced emissions of greenhouse gases, mainly methane, and odorous gases will have reduce the occurrence of spontaneous fires, and reduce health and environmental hazards.

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:

The EIA Study concluded that the environmental impacts of project activities are insignificant and no further action is required.

SECTION G. Stakeholders' comments

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

Stakeholder consultations on the Project were held in Luhansk Oblast in cities close to the landfill in the Oleksandrivsk Town on 10th December 2009 and in Luhansk City on 11th December 2009. The list of the participants in the stakeholders' consultation is provided in Annex 4.

Figure 7. Stakeholders' consultation (left: Oleksandrivsk Town, right: Luhansk City)

The consultations were widely publicized in the evening newspaper "Luhansk Evening City" (See Figure 8) and on the local television.


ЕСТЬ ТАКОЙ ГОРОД

ГОРОДСКАЯ ОБЩЕСТВЕННО-ПОЛИТИЧЕСКАЯ ГАЗЕТА

АЛЕКСАНДРОВСК - ДОМ, В КОТОРОМ МЫ ЖИВЕМ !

Читайте в номере:

стр. 6 «...с такой властью жить нельзя!»

стр. 2 Что ожидает Александровск в ближайшем будущем?

стр. 3 Обвинение в адрес привидений, или Жители Александровска против шлакоблочного цеха

Инновационный проект ООН в Украине

на примере Александровска

Общественные слушания на тему «Обсуждение проекта по утилизации свалочного метана Луганского (7) полигона твердых бытовых отходов, расположенного в городе Александровске» вызвали необычайный интерес жителей Александровска. Представитель ООН презентовала Луганский проект по утилизации свалочного газа .

Программа – «САМОЗАЩИТА – мой дом, моя крепость».

НАШ ПРЕЗИДЕНТ

В следующем выпуске:

СТОП! ГЕНПЛАНУ ЛУГАНСКА


2

Проблема КРУПНЫМ планом

ЕСТЬ ТАКОЙ ГОРОД

Что ожидает Александровск в ближайшем будущем?

Инновационный проект ООН в Украине

на примере Александровска

ЛЕГКА ЗДОБИЧ СЬОГОДНІ - НЕБЕЗПЕКА ДЛЯ ЖИТТЯ ЛЮДЕЙ ЗАВТРА

Figure 8. An article about the Project in a local newspaper

Over 47 participants attended the meetings in Oleksandrivsk and Luhansk City Council. The participants including representatives from the United Nations Development Programme (UNDP), the Luhansk Regional State Administration, the Luhansk Municipal Council, the Luhansk Regional State Council, the Department of Ecology in Luhansk Region, the Department of Ecology in Luhansk City, the Public Community of Luhansk City, and the Public Community of Oleksandrivsk Town. Private sector representatives from the companies Nedra Luhanshchyny, Mittalservice Ltd., and United Cargo Transport Company also attended the meetings. In addition, there were representatives from the environmental NGO "Green Wave", as well as local residents from both the Oleksandrivsk and Luhansk communities.

Each of the two consultations started with an introduction about the goals of the project, the benefits it will bring to the local community and the process of project development under JI. The presentations were followed by a Q&A session.

In general, the comments received on the Project were positive. Most of the comments focused on the specific project itself. However, some comments were related to the overall management of the landfill and the landfill site.

Stakeholders's consultation in Oleksandrivsk Town

Mr. O. Omelchenko from the public organization "Est' takoy gorod" commented that it would be preferable, if possible, to use the captured methane gas to produce heat and/or electricity. Nedra Luhanshchyny explained that in the first phase of the project this was not possible, due to low estimates about the amount of methane gas available in the landfill making such an investment likely to not be

economically viable, but that it could be considered at a later stage once the precise volume of gas is known.

Mr. Andrey Dyakov from the Oleksandrivsk community requested additional information on the closure of the second phase of the Luhansk Landfill. It was explained that the closure of the second phase is currently being seriously considered, but is outside the scope of the project. It was added that by implementing the project and capturing methane and flaring this would indeed be the case and that odor from the landfill would be reduced improving local air pollution in addition to the global benefit of reducing greenhouse gas emissions.

Stakeholders' consultation in Oleksandrivsk Town

Ms. Zaza Zakhbaya, a deputy mayor of Luhansk City commented that LFG can be used for production of liquefied gas for municipal transport in Luhansk City. It was explained that this idea can be considered during the ensuing closure of the second phase of the landfill, but after analyzing several different options, Nedra Luhanshchyny decided to flare the captured LFG.

Mr. Sergei Sapho, Head of Luhansk organization of Cultural Sites Protection, requested that Ukrainian environmental legislation which requires at least three meter of soil for capping the landfill, be rigorously applied. It was confirmed that the Luhansk City strictly followed the Ukrainian environmental legislation while closing the landfill.

An additional comment was received by e-mail during the ten day commenting period which focused on the relevance of the project for the Luhansk City and its positive benefits in terms of reducing greenhouse gas emissions.

No further action on the received comments was required.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation:	Nedra Luhanshchyny Limited Liability Company
Street/P.O.Box:	Ul. Kirova
Building:	49
City:	Luhansk
State/Region:	Luhansk
Postal code:	91019
Country:	Ukraine
Phone:	+380-642-52-86-20
Fax:	
E-mail:	NedraLugansk@i.ua
URL:	www.lugansk.com.ua
Represented by:	
Title:	Head of Department
Salutation:	Mr.
Last name:	Kostychenko
Middle name:	Petrovich
First name:	Vadim
Department:	
Phone (direct):	+380-642-52-86-20
Fax (direct):	+380-642-52-86-20
Mobile:	+380-50-422-53-40, +380-95-426-68-76
Personal e-mail:	ekonomik@i.ua

Annex 2

BASELINE INFORMATION

Table 9. Information about the landfill

Parameter	Units	Data
Landfill data		
Year landfill started operation		1979
Waste in place at the beginning of Project	M tons	2.010
Area of site	Ha	11.6
Date gas collection project starts		01.10.2010
Project operational data		
Gas collection efficiency	%	60%
General data		
Methane content of landfill gas (pump tests)	%	67.9%
GWP of CH_4	tCO_2/tCH_4	21
Density of Methane	tCH_4/m^3	0.0007168
Baseline data		
The emission factor for electricity generation from project electricity consumption in year	tCO_2e/ MWh.	1.3
Proportion of methane flared in Baseline (AF)	-	0%

Table 10. Share of Various Types of Waste

WASTE TYPE	Share
Wood and wood products	3.00%
Pulp, paper and cardboard	30.00%
Food, food waste, beverages and tobacco	30.00%
Textiles	5.00%
Garden, yard and park waste	0.00%
Glass, plastic, metal, other inert waste	32.00%

Table 11. Amount of MSW disposed at the landfill

Year	Annual Amount	Wood and Wood Products	Pulp, Paper and Cardboard	Food, Food waste Beverages and Tobacco	Textile	Garden, Yard and Park Waste	Inert Waste	Aggregate Amount
-	*t/year*	*t/year*	*t/year*	*t/year*	*t/year*	*t/year*	*t/year*	*t*
1979	44,000	1,320	13,200	13,200	2,200	0	14,080	44,000
1980	55,132	1,654	16,540	16,540	2,757	0	17,642	99,132
1981	61,666	1,850	18,500	18,500	3,083	0	19,733	160,798
1982	63,888	1,917	19,166	19,166	3,194	0	20,444	224,686
1983	67,166	2,015	20,150	20,150	3,358	0	21,493	291,852
1984	70,576	2,117	21,173	21,173	3,529	0	22,584	362,428
1985	71,588	2,148	21,476	21,476	3,579	0	22,908	434,016
1986	72,226	2,167	21,668	21,668	3,611	0	23,112	506,242
1987	72,710	2,181	21,813	21,813	3,636	0	23,267	578,952
1988	72,568	2,177	21,770	21,770	3,628	0	23,222	651,520
1989	73,744	2,212	22,123	22,123	3,687	0	23,598	725,264
1990	74,162	2,225	22,249	22,249	3,708	0	23,732	799,426
1991	74,690	2,241	22,407	22,407	3,735	0	23,901	874,116
1992	74,866	2,246	22,460	22,460	3,743	0	23,957	948,982
1993	73,744	2,212	22,123	22,123	3,687	0	23,598	1,022,726
1994	71,478	2,144	21,443	21,443	3,574	0	22,873	1,094,204
1995	68,564	2,057	20,569	20,569	3,428	0	21,940	1,162,768
1996	69,388	2,082	20,816	20,816	3,469	0	22,204	1,232,156
1997	68,772	2,063	20,632	20,632	3,439	0	22,007	1,300,928
1998	68,310	2,049	20,493	20,493	3,416	0	21,859	1,369,238
1999	66,286	1,989	19,886	19,886	3,314	0	21,212	1,435,524
2000	59,400	1,782	17,820	17,820	2,970	0	19,008	1,494,924
2001	63,404	1,902	19,021	19,021	3,170	0	20,289	1,558,328
2002	71,037	2,131	21,311	21,311	3,552	0	22,732	1,629,365
2003	74,052	2,222	22,216	22,216	3,703	0	23,697	1,703,417
2004	75,163	2,255	22,549	22,549	3,758	0	24,052	1,778,580
2005	76,290	2,289	22,887	22,887	3,815	0	24,413	1,854,870
2006	77,435	2,323	23,231	23,231	3,872	0	24,779	1,932,305
2007	78,596	2,358	23,579	23,579	3,930	0	25,151	2,010,901
2008	0	0	0	0	0	0	0	2,010,901
2009	0	0	0	0	0	0	0	2,010,901

Annex 3

MONITORING PLAN

The monitoring plan is a document used as a standard by the Project staff that are assigned to collect and archive relevant data necessary for determining the baseline and measuring project emissions. It must be utilized in a complete and accurate manner until the end of the crediting period (with archiving only ending 2 years after the end of the crediting period). Its effective use will facilitate accurate and consistent monitoring of the Project's ERUs.

Monitoring staff

"Nedra Luhanshchyny" LLC. will form and operational and management team, which will be responsible for monitoring/ acquisition and recording for JI purposes. This team composes of a general manager and a group of operators. Operators will be trained in the operation of all monitoring equipment and all readings will be taken under the supervision of management. Quality control and assurance procedures are to be undertaken for data monitored as outlined in Section D. of this PDD. A database will be maintained to record all relevant data as outlined in the monitoring plan.

Monitoring equipment

All monitoring equipment will be installed by experts using standard methods. Once installed, this equipment will be calibrated to the highest standards by Project staff. Any irregularities or problems with equipment will be reported to management and rectified as soon as possible.

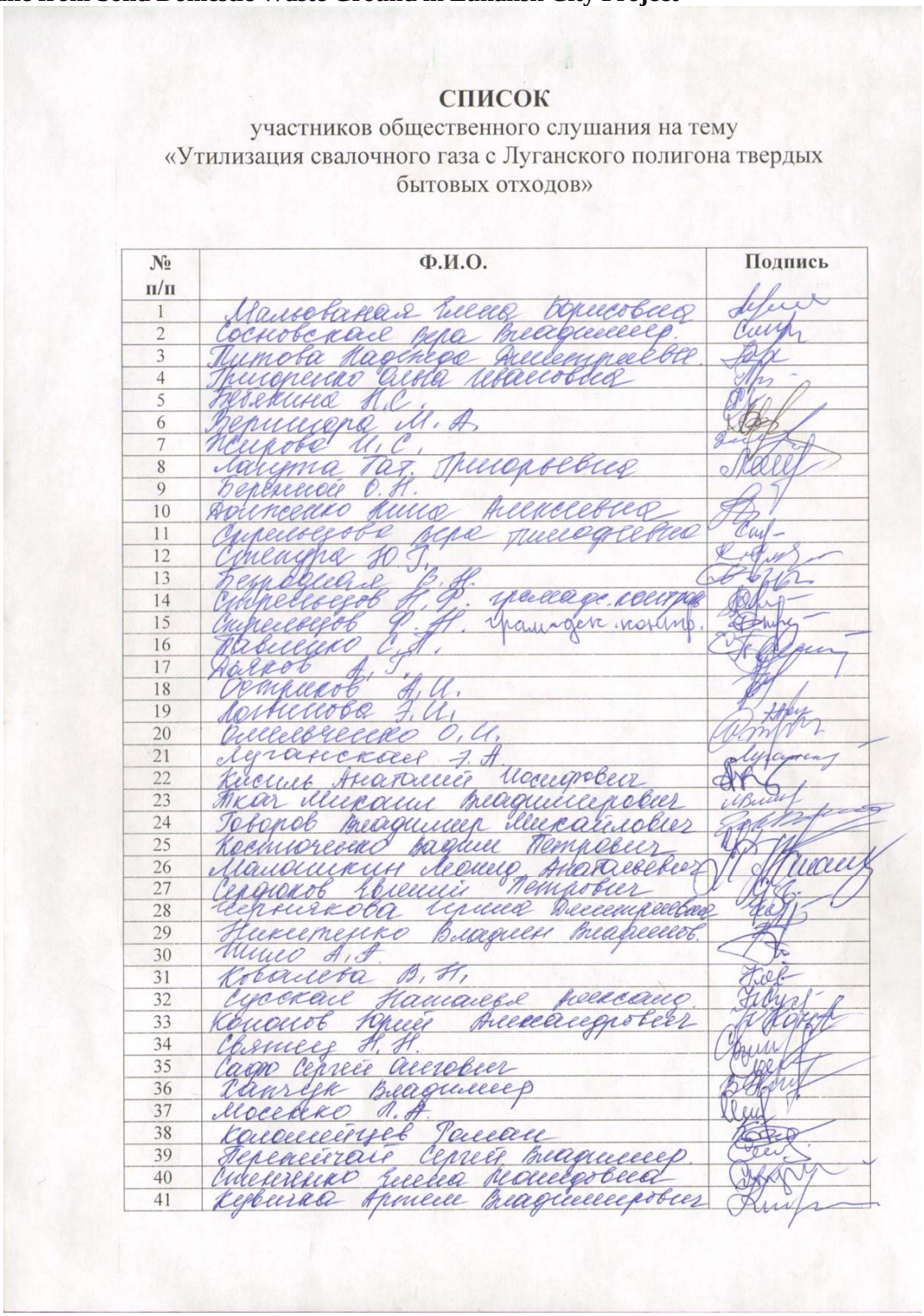
Items to be monitored and archived

Data is to be collected and archived as directed in section D.1.2. of this JI-PDD

Annex 4

List of the Participants in the Stakeholders' Consultations

Fig. A4-1 List of the Participants in the Public Consultation for "Collection and Utilization of Methane from Solid Domestic Waste Ground in Luhansk City Project"



СПИСОК

участников общественного слушания на тему
«Утилизация свалочного газа с Луганского полигона твердых бытовых отходов»

№ п/п	Ф.И.О.	Подпись
1	Малованая Елена Борисовна	
2	Сосновская Вера Владимировна	
3	Литова Надежда Дмитриевна	
4	Григоренко Елена Ивановна	
5	Брежкина Н.С.	
6	Берлизова М.А.	
7	Петрова Н.С.	
8	Лапута Тат. Григорьевна	
9	Бервицкая О.Н.	
10	Долженко Нина Алексеевна	
11	Стрельцова Вера Николаевна	
12	Стеняра Ю.Г.	
13	Безродная Е.Н.	
14	Стрельцов В.Ф. гражд. защита	
15	Стрельцов Ф.Н. гражд. защита	
16	Павленко С.А.	
17	Лагно А.Г.	
18	Остроков А.И.	
19	Колесова З.И.	
20	Олейникова О.И.	
21	Луганская Г.Н.	
22	Кисиль Анатолий Петрович	
23	Ткач Михаил Владимирович	
24	Говоров Владимир Михайлович	
25	Костюченко Вадим Петрович	
26	Малашкин Леонид Анатольевич	
27	Сердюков Евгений Петрович	
28	Чернякова Ирина Александровна	
29	Никитенко Владимир Валериевич	
30	Тишо А.Г.	
31	Ковалева В.Н.	
32	Сурская Наталья Николаевна	
33	Коновалов Юрий Александрович	
34	Свитнев Н.Н.	
35	Сало Сергей Алексеевич	
36	Ганчук Владимир	
37	Моисеенко Л.Ф.	
38	Калошенцев Данила	
39	Переяславец Сергей Владимирович	
40	Стеценко Елена Валерьевна	
41	Кравцова Артем Владимирович	

Fig. A4-2 List of the Participants in the Public Consultation for "Collection and Utilization of Methane from Solid Domestic Waste Ground in Luhansk City Project"

СПИСОК

участников общественного слушания на тему
«Утилизация свалочного газа с Луганского полигона твердых бытовых отходов»

№ п/п	Ф.И.О.	Подпись
1	Нещерет Татьяна Александровна	
2	Воронкина Алена Валерьевна	
3	Жерова [illegible]	
4	Костенко Денис Владимирович	
5	Лебедев Анатолий Васильевич	
6	Васильева Андрей Владимирович	
7	Демешкин Анна Васильевна	
8	Владимиров Алексей Андреевич	
9	Анисимова Елена Васильевна	
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
