JI MONITORING REPORT
(for reporting period 01.01.2008 – 30.09.2012)

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Director of
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Monitoring report of Joint Implementation Project «Reduction of methane leaks on the gas equipment of the gas distribution points and on the gas armature, flanged, threaded joints of the gas distribution pipelines of PJSC "Krivorijgaz"

Monitoring period: 01/01/2008-30/09/2012

Version: 02 as of 30/10/2012

Contents:

Annex A[1] Supporting document 1 "Calculation of GHG emission reductions under the Joint Implementation Project "Reduction of methane leaks on the gas equipment of the gas distribution points and on the gas armature, flanged, threaded joints of the gas distribution pipelines of PJSC "Krivorijgaz" in period 01, January 2008 - 30, September 2012

[1] Annex A is provided in electronic form

LIST OF ABBREVIATIONS PRESENTED IN PDD

GDN – Gas distribution network
CLS – Conditional leakproof state
SPLNG – Standard physical leak of natural gas
APLNG – Above-standard physical leak of natural gas
PETM – Purposeful Examination and Technical Maintenance
NGLF – Natural gas leak factor
NG – Natural gas
UGSSR – Ukrainian Gas Supply System Safety Rules
GDP – Gas distribution point
CGDP - Cabinet-type gas distribution point
CDM - Clean Development Mechanism
NERC – National Electricity Regulatory Commission
PJSC - Public Joint Stock Company
PDD – Project Design Document
JI – Joint Implementation

SECTION A. General project activity and monitoring information

A.1. Title of the Project

"Reduction of methane leaks on the gas equipment of the gas distribution points and on the gas armature, flanged, threaded joints of the gas distribution pipelines of PJSC "Krivorijgaz".

A.2. Status of JI Project

JI Project "Reduction of methane leaks on the gas equipment of the gas distribution points and on the gas armature, flanged, threaded joints of the gas distribution pipelines of PJSC "Krivorijgaz" was determined by the Bureau Veritas Certification, determination report No. UKRAINE-DET/0617/2012 from 15/08/2012. The Project was approved by the State Environmental Investment Agency of Ukraine (Letter of Approval No.3117/23/7 from 19/10/2012) and Swiss Federal Office for the Environment (Letter of Approval No. J294-0485 from 24/10/2012).

A.3. Brief Description of the Project

As a result of unplanned reconstruction of Gas Distribution Points (GDP), Cabinet-Type Gas Distribution Points (CGDPs), and of gas fittings of gas distribution networks (GDNs) performed by PJSC "Krivorijgaz" in accordance with this Project for the period of 01, January 2008 to 30, September 2012, the reduction of greenhouse gas (GHG) emissions was as follows [2]:

Table 1. GHG Emission Reductions

	2008	2009	2010	2011	01/01/2012 – 30/09/2012
Reduction of methane leaks in the period, m^3	6 074 843	7 817 808	8 530 222	8 542 578	6 363 625
Total GHG emission reductions in the period, tCO2eq	86 871	111 796	121 984	122 161	91 000
Total reduction of	**37 329 076**				

[2] Provided amount of GHG emission reductions are rounded to integers.

methane leaks in the monitoring period, m^3	
Total GHG emission reductions in the monitoring period, tCO2eq.	**533 812**

Within the framework of the JI project in order to repair methane leaks at gas equipment and gas fittings two types of repairs are applied:

1. Complete replacement of old gas equipment and gas fittings with new units.
2. Replacement of sealing elements with the use of modern sealing materials, changing the common practice of maintenance and repair on the basis of paronite packing and gaskets made of cotton fibers with fatty treatment and asbestic and graphite filler.

A.4. Period of the monitoring

Beginning of the monitoring period: 01/01/2008
Completion of the monitoring period: 30/09/2012

A.5. Methodologies Used for Project Activities

A.5.1. Methodology for baseline determination

The proposed project applies a JI specific approach based on the Joint Implementation requirements in accordance with paragraph 9 (a) of the (JI Guidance on criteria for baseline setting and monitoring, Version 03[3]), and the "Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012) that was developed by the Institute of Gas of the National Academy of Sciences of Ukraine (the Methodology) to set the baseline (measurement and calculation of methane leaks). Project participants selected the calculation method for estimation of GHG emission reductions.

The Methodology is based on approved Clean Development Mechanism methodology AM0023, Version 4.0 "Leak detection and repair in gas production,

[3] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

processing, transmission, storage and distribution systems and in refinery facilities"[4] and takes into account the specifics of methane leak detection and repair activities in Ukraine.

The baseline scenario is based on the assumption that prior to establishing the above-standard physical leak of natural gas (APLNG) at the GDN component, the leak shall be deemed normative, and after its elimination, for the purposes of formation of the baseline scenario, the volume of natural gas leaks from the component per hour shall be taken from Table 1 Exhibit A.1 of the Methodology in accordance with the type of the component and its working pressure.

A.5.2. Monitoring Methodology

The proposed Project applies a JI specific approach in accordance with the JI Guidance on criteria for baseline setting and monitoring, Version 03[5], of the (Joint Implementation Supervisory Committee – JISC).
The Monitoring plan was developed for correct and clear calculation of greenhouse gas emissions and preparation of reports on methane emission reductions on the basis of the baseline and project activities. JI specific approach was developed in accordance with "Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012) that was developed by the Institute of Gas of the National Academy of Sciences of Ukraine.

For the purposes of estimation and preparation of reporting on GHG emission reductions, in accordance with the calculation method of the Methodology, the data on leakage of natural gas from GDN was used that are formed based on the normative values of natural gas leakage per each element of GDN, and also of the data received based on the statistical results of the actual measurements of the natural gas leakages before and after activities related to their elimination taking into account the specifics of functioning and operation GDN of Ukraine.

Reduction of methane leak at GDN component in a monitoring period occurs only after the component above-standard leak is repaired and is defined as the difference between NGLFs for APLNG and Standard physical leak of natural gas (SPLNG) for hours when the unit was under pressure.

According to the Methodology, with the purpose of strict monitoring of the state of gas equipment of GDPs and CGDP, and also of the gas armature within the

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[4] http://cdm.unfccc.int/UserManagement/FileStorage/LV8NU1GYWTK06COJPDIXQ35FR2MA47

[5] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

project boundary, the administration of PJSC "Krivorijgaz" made the following registries:

1. Registry of gas distribution points and gas fittings of the JI project "Reduction of methane leaks on the gas equipment of the gas distribution points and on the gas armature, flanged, threaded joints of the gas distribution pipelines of PJSC "Krivorijgaz" (refer to Annex A), which includes detailed information about all GDPs (CGDPs), shut-off and control valves, flanges and threaded connections that are included in the project boundary.
2. Registry to APLNG repairing at GDN components (refer to Annex A).
3. Registry of monitoring of GDN components operating modes - under pressure or under pressureless condition, that is when NGLF is equal to zero (refer to Annex A).

The ambiguous nature of the measurement method was taken into account while calculating GHG emissions (see Section D, PDD Version 02).

A.6. Status of implementation including the schedule of the project's milestones

In accordance with PDD Version 02, the scope of the Project shall include methane leaks at the gas equipment (pressure control valves, valves, filters, break switches, etc.); and at the gas fittings (faucets, valve gates, screw valves, etc.) located at gas pipelines of PJSC "Krivorijgaz". The total number of equipment in the project is 176 GDPs (CGDPs), and 1125 units of gas fittings. In the reporting monitoring period the repairing of 63 components of gas equipment GDPs (CGDPs) components and 450 units of gas fittings were provided. In the reported monitoring period PJSC "Krivorijgaz" has completed repairs of all GDPs (CGDPs) equipment and gas fittings which was included to the JI Project boundary.The number of GDPs (CGDPs) were the equipment was repaired (replaced) and number of repaired (replaced) gas fittings of PJSC "Krivorijgaz" gas distribution networks is provided in Table 2 by periods:

Table 2. The number of repaired GDPs and (CGDPs) and repaired (replaced) gas fittings of the gas pipelines after leaks detection under the project by periods

Period	Number of the GDPs (CGDPs) were the gas equipment was repaired (replaced)	Number of the repaired (replaced) gas fittings of the gas pipelines
2008	26	169
2009	33	281
2010	2	-
2011	2	-

01/01/2012-30/09/2012	-	-
TOTAL	**63**	**450**

Number of repaired/replaced equipment is slightly different on the number mentioned in the determined PDD version 02, it is because PDD is a description of the project, the previous values, and monitoring indicators are a reflection of reality, as evidenced by appropriate documentation. The difference is explained by the fact that the current monitoring period was eliminated 7 units of GDPs (CGDPs) due to lack of need. The list of GDPs (CGDPs) and of gas fittings repaired for the reporting monitoring period is provided in Annex A[6].

Project activities for the current monitoring period (01, January 2008 – 30, September 2012) were also subject to the further Purposeful Examination and Technical Maintenance (PETM) of all gas equipment of GDPs (CGDPs) and gas fittings that was repaired (replaced) off the schedule during the JI project.

The GDP (CGDP) repaired (replaced) in the previous periods, gas equipment and gas fittings will be inspected regularly, as a part of standard monitoring activity, to make sure that they did not become the source of leaks again.

In accordance with the Monitoring plan provided in the PDD Version 02, the current repair of the gas equipment shall be performed once per year, and the technical maintenance shall be performed once every six months.

The volumes of methane leaks from the repaired (replaced) gas equipment of GDPs (CGDPs) and gas armature of pas pipelines of PJSC “Krivorijgaz” shall not exceed the volumes of leaks that were measured after the first repair of the equipment.

Examples of repaired (replaced) gas equipment provided on Figure 1.

[6] Annex A Supporting Document 1. “Calculation of GHG emission reductions under the Joint Implementation Project “Reduction of methane leaks on the gas equipment of the gas distribution points and on the gas armature, flanged, threaded joints of the gas distribution pipelines of PJSC “Krivorijgaz” in period 01, January 2008 - 30, September 2012” provided in electronic form.

Figure 1. Repaired valve, Kriviy Rih city

A.7. Possible deviations from or revisions of the registered version of PDD

Significant deviations from the registered PDD were observed.

According to the JI specific approach which based on the Methodology of GHG emission reduction under this project is calculated according to statistical data, depending on the type of GDP element and its working pressure. Expected calculation values of greenhouse gas amount listed in the determined PDD version 02 are differ from the actual emission reduction in the reporting period by 15%. The reason is that estimate emission reduction which were given in the determined PDD version 02 are preliminary and based on theoretical calculations, the effect of implementation was calculated from the first day of the year, and in the monitoring report in the calculations were used the actual dates of repairs and their actual number.

A.8. Possible deviations from or revisions of the registered plan of monitoring

According to the approved monitoring plan at PJSC "Krivorijgaz" was performed continuous control of GDP elements condition after its replacement or repairing, including:

- monitoring of condition GDP (CGDP) elements gas equipment was carried out every four day, survey results were entered in a log of technical inspection of GDP (CGDP) gas equipment;
- monitoring of gas armature on gas pipelines PJSC "Krivorijgaz" performed once a month, survey results were entered in a log of technical inspection of the gas armature.

Regular testing of gas equipment GDP (CGDP) and gas armature in the reported monitoring period did not reveal any re leakage on the equipment which were replaced under the project, that is because under the project activity the advanced equipment by foreign manufacturers and their foreign counterparts domestic production, which are highly reliability and have a much longer life than the reported monitoring period was set. Based on the above PJSC "Krivorijgaz" decided not to create a Registry of monitoring of GDP elements, on which were eliminating APLNG caused by lack of repeated leaks as such.

There is some difference in the number of repaired/replaced equipment which was provided by the project activity. This is primarily due to the provision of preliminary data at the stage of PDD development, while at the stage of development of the Monitoring Report for the period was determined the exact number of project equipment, which is subject to replacement/repair. Mostly, the implementation plan had not been made in full because of insufficient funding. The difference is explained by the fact that the current monitoring period was eliminated 7 units of GDPs (CGDPs) due to lack of need.

Significant deviations from the approved monitoring plan were observed.

A.9. Persons responsible for the preparation and submission of monitoring report

The persons responsible for the monitoring report on behalf of Bezprozvanyi Yurii Leontiiovych, Chief engineer of PJSC “Krivorijgaz”, Fabian Knodel, Director – CEP Carbon Emissions Partners.

Section B. Key monitoring activities

B.1.1. Equipment used

The system of control and monitoring is subdivided into three parts:

1) Gas equipment inspection which included in the project boundary, methane leaks detection on equipment before the repairing (replacement) conducting;
2) Conducting of equipment repairing (replacement) of gas equipment, calculation of the volume of methane leaks on it;
3) Archiving and processing of the obtained results.

According to the Methodology, estimation of condition of the GDP component – conventional leak proof condition (absence or presence of methane leak), estimate with the help of audio systems, visual and olfactory responses, identification by individual dosimeters in the process of check conducting for the presence of leaks in the process of project activities carrying.
To solve these problems was purchased individual gas indicators Dozor S-P and gas detectors Variotec – 6, specifications on which are given below:

1. **Gas indicator Dozor S-P.**

For methane leak detection in the sample, Dozor S-P gas indicator is used, the image of which is shown on Fig. 2

Fig. 2 Gas indicator Dozor S-P

Technical specifications of gas indicator Dozor S-P provided in Table 3.

Table 3. Gas indicator Dozor S-P specifications

Parameter name	Value
Scale range, % LFL	0-50
Alarm threshold, % LFL	single impulses - 2% uninterrupted signal - 30%

Alarm threshold for pollutant control	Threshold 1 – 1 MAC Threshold 2 – 3 or 5 MAC
Sensitivity limit, %, max	0.1
Absolute error range, % LFL	±5
Working temperature range	from -10 to +50 ° C
Explosion protection mark	1ExibsIIBT4X
Battery life, min	12 h
Number of accumulator charge-discharge cycles, min	500
Dimensions, max	190x90x60 mm
Weight, max	0.48 kg

1. **Gas indicator Variotec – 6, the image of which is shown on Fig. 3**

Fig. 3. Gas indicator Variotec – 6

Variotec – 6 gas indicator specifications provided in Table 4.

Table 4. Variotec – 6 specifications

Parameter name	Value
Explosimeter scale range, % LFL	From 0 to 100
Nominal scale point of the least category, % LFL	0,1
Allowable absolute error range, % LFL	±3
Dimensions, mm	129x192x65
Mass, kg	max 1,5
Device operating time on a single charge, h	max 8

Operation conditions:

External temperature, °C from - 10 to + 40 ° C:

Relative humidity, 5 – 90 %

After leak detection, repair or replacement at relevant GDP (CGDP) gas equipment and gas fittings of gas pipelines is carried out that will include the use of modern sealing materials (GOST 7338-90[7], GOST 5152-84[8] , or GOST 10330-76[9]), and full replacement of the obsolete equipment with the state-of-the-art equipment of the European manufacturers or analogous equipment of the Ukrainian manufacturers.

B.1.2. Calibration

Under current law "On metrology and metrology»[10], all measuring equipment in Ukraine must meet the specified requirements of the relevant standards and be calibrated periodically. Calibration of instrumentation is done in accordance with national standards. The devices subject to calibration and used in the process of methane leakages monitoring:

- Gas indicator Dozor S-P, calibration period – 6 months.
- Gas indicator Variotec – 6, calibration period – 12 months.

Based on results of calibration, certificates shall be issued confirming technically good condition of devices.

B.1.3. Invitation of the third parties

“Kryvbasstandartmetrology” SE.
“Kryvorizkyi Research and Production Center of Standardization, Metrology and Certification" State Enterprise is the enterprise that performs state inspection and calibration of gas analyzers.

B.2. Data collection (data collected for all the period of monitoring).

B.2.1. Structure of governance and management to enable the operator to implement the Monitoring Schedule.

Coordination of activities of all departments and services of PJSC “Krivorijgaz” relating to the JI project implementation is carried out by the Working team that was created by the Order of PJSC “Krivorijgaz” management No. 821 dated 21/09/2012. The structure of the Working team is shown in Figure 4.

[7] “Rubber and Rubber-fabric Planes”
[8] “Sealing Gland”
[9] “Dishevelled flax. Specifications”

[10] http://zakon2.rada.gov.ua/laws/show/113/98-вр

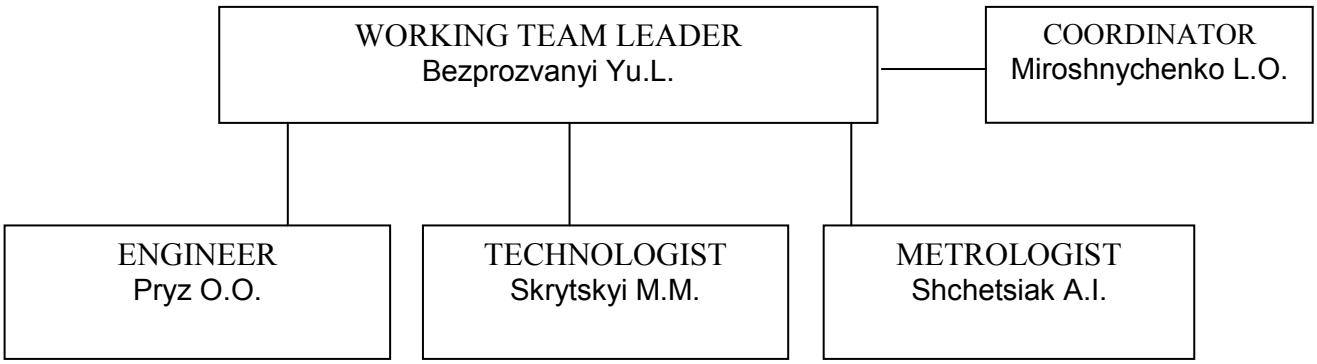

Figure 4. Structure of the Working team

Bezprozvanyi Yu.L. – Working team Leader determines the action plan under the Project and necessary resources based on information received.
Pryz O.O. – Working team Engineer is responsible for organization of monitoring measurements of leaks and its elimination.
Skrytskyi M.M. – Working team Technologist is responsible for collection of all information provided in the Monitoring Plan, and performing all necessary calculations.
Miroshnychenko L.O. – Working team Coordinator is responsible for data the storage, archiving and backup information under the project.
Shchetsiak A.I. – Working team Metrologist provides presence of measuring equipment and technical support.

B.2.2. List of parameters used during calculations

The parameters used during calculations are provided in Table 5.

Table 5. Parameters used for calculating GHG emissions

ID number	Data variable	Source of data	Data unit	How will the data be archived (electronic/ paper)	Comments
1. *i*	Sequence number of GDN component (GDP (CGDP), gas fittings of gas pipeline) included in	Activity on leak measurements	Dimensionless	Electronic and hard copy	All GDPs, CGDPs and gas fittings included in the project boundary are listed in the Registry and tagged correspondingly.

	the project boundary				
2. GWP_{CH_4}	Global Warming Potential of methane	(IPCC Second Assessment Report: Climate Change 1995(SAR) approved by COP. GWP value of methane is provided at the UNFCCC web-site.[11]	tCO2eq/t CH4	Electronic and hard copy	In case of Global warming potential of methane change the baseline and the project lines will be listed in accordance with the new values
3. *h*	Number of activity (replacement/ repair) at GDN component after establishing APLNG at such component	Activity on leak measurements	Dimensionless	Electronic and hard copy	Each activity carried out at GDN component that is included in the project boundary is tagged with an individual number
4. W_y	Average mass fraction of methane in the natural gas in period "y" in the project scenario	The value is calculated on the basis of company's official data on gas net calorific value in	%	Electronic and hard copy	Data of enterprises

[11] http://unfccc.int/ghg_data/items/3825.phphttp://unfccc.int/ghg_data/items/3825.php

		monitoring period			
5. $K^{g}_{i'h}$	Natural gas leak factor from GDN i' component in CLS	Standard values or data from "Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012)	m^3/h	Electronic and hard copy	Company's data or calculations on the basis of company's data
6. $K^{n}_{i''}$	Natural gas leak factor that corresponds to APLNG for GDN i'' component	"Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-	m^3/h	Electronic and hard copy	Calculations on the basis of company's data

		standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00 A816 of 2012)			
7. $H^{g}_{i'hy}$	Time of operation of GDN component under pressure from the beginning of monitoring period "y" to implementation of project activities (repair / replacement) that resulted in the repair of APLNG at such component	Data of the company received during GDN operation and activities aimed at leak repair	h	Electronic and hard copy	Company's data. Calculations for each GDN component for each monitoring period
8. $H^{n}_{i"hy}$	Time of operation of GDN component under pressure from the moment of implementation of project	Data of the company received during GDN operation and activities aimed at	h	Electronic and hard copy	Company data. Calculations for each GDN component where activities on leak repair was carried out; for each monitoring period

	activities (repair / replacement) that resulted in the repair of APLNG at such component to the end of the monitoring period "y"	leak repair			

B.2.3. Leakage

There are no leaks related to this project. (Neither the Methodology according to which GHG emissions were calculated nor AM0023 Methodology version 4.0 which is the basis for the Methodology provide for any leakage).

B.3. Date processing and archiving

All data in electronic and/or hard copies shall be stored until 31/12/2019.

B.4. Extraordinary situations and technical violations

In the current monitoring period (January 2008 – September 2012) no extraordinary situations occurred in gas distribution networks of PJSC "Krivorijgaz".

B.5. Procedures for detecting of defects and repairs of GDPs and GDNs of and liquidation of PJSC "Krivorijgaz".

Detecting, repairing, and registration of defects and extraordinary situations at the shutoff gates of PJSC "Krivorijgaz" shall be carried out in accordance with the Safety Rules of Gas Distribution Systems of Ukraine.

B.6. External data (type, source, access)

The following parameters were used during monitoring:

Data/Parameter	GWP_{CH_4}
Data unit	тCO_2eq/тCH_4
Description	Global Warming Potential of methane
Time of determination/monitoring	During the whole crediting period
Source of data (to be) used	(IPCC Second Assessment Report: Climate Change 1995(SAR) approved by COP. GWP

	value of methane is provided at the UNFCCC web-site[12]
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	N/A
QA/QC procedures (to be) applied	In case of Global Warming Potential of methane change baseline and project scenario will be recalculated according to new values.
Comments	The data which allow to calculate the of greenhouse gas emissions, information will be stored in hard and electronic copies.

Data/Parameter	$K^{g}_{i'h}$
Data unit	m^3/h
Description	Natural gas leak factor from GDN i' component in CLS
Time of determination/monitoring	Every time after activity was carried out at GDN component
Source of data (to be) used	Standard values or data from "Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012) that was developed by the Institute of Gas of the National Academy of Sciences of Ukraine
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Standard values or data from Table A.1 in Annex A to "Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012) that was developed by the Institute of Gas of the National Academy of Sciences of Ukraine are used

[12] http://unfccc.int/ghg_data/items/3825.phphttp://unfccc.int/ghg_data/items/3825.php

QA/QC procedures (to be) applied	N/A
Comments	Data that allow of greenhouse gas emission calculation; information will be archived in paper and electronic form.

Data/Parameter	$K_{i''}^{n}$
Data unit	m^3/h
Description	Natural gas leak factor that corresponds to APLNG for GDN i'' component
Time of determination/monitoring	Once at the beginning of the project for each type of component
Source of data (to be) used	"Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012) that was developed by the Institute of Gas of the National Academy of Sciences of Ukraine
Value of data applied (for ex ante calculations/determinations)	N/A
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Standard values or data from Table A.1 in Annex A to "Methodology for calculation of greenhouse gas emission reductions achieved by eliminating above-standard natural gas leaks at gas distribution networks" (registration number UkrNTI 0112U00A816 of 2012) that was developed by the Institute of Gas of the National Academy of Sciences of Ukraine
QA/QC procedures (to be) applied	N/A
Comments	Data that allow of greenhouse gas emission calculation; information will be archived in paper and electronic form.

B.7. Level of error of measuring equipment

The limits of permissible basic absolute error on proven component of the gas indicator Dozor S-P and gas indicator Variotec – 6 are 5% and 3 % respectively.

Section C. Measures of ensuring quality control and quality guarantees

C.1. Documented procedures and structure of governance

C.1.1. Functions and obligations

The Project is managed by Chief engineer of PJSC "Krivorijgaz". He manages and coordinates activities of all departments.
Structure of data collection and project management is provided in Section B.2 of this Monitoring Report.

C.1.2. Trainings

Training of employees and specialists of PJSC "Krivorijgaz" takes place in accordance with existing practices before starting the project, and if necessary, such as lack of skills for working with equipment that is implemented within the project activities, equipment manufacturers will conduct briefings and training, due to contracts the purchase of equipment.

C.2. Internal audit and control activities

The measurement of all the necessary parameters are carried out by the monitoring plan methane leaks under supervision of PJSC “Krivorijgaz”.
Monitoring measurements are executed by the specially trained personnel in accordance with the Methodology for measurements. Monitoring measurement data are registered on paper immediately while making measurements. As a result, based on the paper data on the measurements, the uniform electronic database of monitoring measurements of leaks is created.

Ordinary maintenance if gas equipment of GDP (CGDP) and gas fittings of gas distribution networks shall be performed once per year, technical maintenance is performed once each six months.

The repaired gas fittings shall be inspected on a regular basis as a part of the standard monitoring activities to make sure that it has not become the sourceof leak again.

C.3. Information on indicators of the project’s social influence and the project’s environmental impact

As a result of the project’s implementation, the quality of the public gas distribution in the region will be improved.
It will also result in reduction of natural gas leakage and emissions that cause greenhouse effect and climate changes. Implementation of this Project let improve safety of operation of gas distribution networks, which in turn will reduce the likelihood of explosions or fires.

Section D. Calculation of GHG emission reductions

D.1. Project emissions

Greenhouse gas emissions in the project scenario according to a specific approach to Joint Implementation projects (calculations by using the tabular method of the Methodology) are calculated according to the formula:

$$PE_y = GWP_{CH_4} \cdot ConvFactor \cdot W_y \cdot P_y \quad (1)$$

where:

PE_y – greenhouse gas emissions in period «y», in the project scenario (t CO_2eq);

GWP_{CH_4} – Global warming potential of methane (tCO_2eq/tCH_4);

W_y – Average mass fraction of methane in the natural gas in period «y», in the project scenario (%);

P_y – volume of natural gas leaks into the atmosphere in period «y», in the project scenario (m^3 natural gas);

$ConvFactor$ – Conversion factor to convert methane leaks from volume units to weight units (t CH_4 / m^3CH_4). Under normal conditions defined as 0 degree Celsius and 0.1013 MPa, $ConvFactor$ = 0.0007168 t/m^3.

[y] – index that corresponds to monitoring period;

[CH_4] – index that corresponds to methane.

Emissions of natural gas (92-95 % methane) in the atmosphere caused by leaks from gas transportation networks are calculated according to the formula:

$$P_y = \sum_{h \in H_{i'}} \sum_{i' \in I'} K^g_{i'h} \cdot H^g_{i'hy} + \sum_{h \in H_{i''}} \sum_{i'' \in I''} K^g_{i''h} \cdot H^n_{i''hy} \quad (2)$$

$K^g_{i'h}$ – natural gas leak factor for GDN component i' that is in CLS (i.e. corresponds to SPLNG) in the project scenario (m^3/h);

$K^g_{i''h}$ – natural gas leak factor that corresponds to SPLNG for GDN component i'' in the project scenario (m^3/h);

$H^g_{i'hy}$ – Time of operation of GDN component under pressure from the beginning of monitoring period “y” to implementation of project activities (repair / replacement) that resulted in the repair of APLNG at such component (h);

$H^n_{i''hy}$ – Time of operation of GDN component under pressure from the moment of implementation of project activities (repair / replacement) that resulted in the repair of APLNG at such component to the end of the monitoring period “y” (h);

[*y*] – index that corresponds to monitoring period;
[*i'*] – index that corresponds to a number of GDN component, which is in a set of elements *I' ((I' + I'') = I*, where I is a set that includes all GDN components that are in the project boundary) where the project activities did not result in any emission reductions (there was no replacement / repair of components) in the reporting monitoring period;
[*i''*] – index that corresponds to a number of GDN component, which is in a set of elements *I'' ((I' + I'') = I*, where I is a set that includes all GDN components that are in the project boundary) where the project activities resulted in emission reductions (there was replacement / repair of components) in the reporting monitoring period;
[*h*] – index that corresponds to a number of activity under the project at GDN component, if more than one activity was carried out at reporting component in the monitoring period (where *H* is a set, which includes all activities in the project scenario at GDN component in the monitoring period);
[*g*] – index that corresponds to SPLNG;
[*n*] – index that corresponds to APLNG.

Estimated project emissions are given in Table 6 [13]

Table 6. Project emissions tCO2eq

	2008	2009	2010	2011	01/01/2012 – 30/09/2012
Project GHG emissions in the period, tCO_2eq.	28 155	28 139	28 126	28 127	21 024
Total amount of project GHG emissions in the monitoring period, tCO_2eq.	**133 571**				

Greenhouse gas emissions in the baseline scenario according to a JI specific approach (which is calculated by using the tabular method of the Methodology) are calculated according to the formula:

$$BE_y = GWP_{CH_4} \cdot ConvFactor \cdot W_y \cdot B_y \qquad (3)$$

Where:
BE_y – greenhouse gas emissions in period «y», in the baseline scenario (t CO_2eq);
GWP_{CH_4} – Global warming potential of methane (tCO_2eq/tCH_4);
W_y – Average mass fraction of methane in the natural gas in period «y», in the project scenario (%);

[13] These amounts of project GHG emissions are rounded to integers.

B_y – volume of natural gas leaks into the atmosphere in period «y», in the baseline scenario (m^3 natural gas);
$ConvFactor$ – Conversion factor to convert methane leaks from volume units to weight units (t CH_4 / m^3CH_4). Under normal conditions defined as 0 degree Celsius and 0.1013 MPa, $ConvFactor$ = 0.0007168 t/m^3
[y] – index that corresponds to monitoring period;
[CH_4] – index that corresponds to methane.

Emissions of natural gas (92-95 % methane) in the atmosphere caused by leaks from gas transportation networks are calculated according to the formula:

$$B_y = \sum_{i' \in I'} \sum_{h \in H_{i'}} K^g_{i'h} \cdot H^g_{i'hy} + \sum_{i'' \in I''} \sum_{h \in H_{i''}} K^n_{i''} \cdot H^n_{i''hy}; \quad (4)$$

Where:
$K^g_{i'hy}$ – natural gas leak factor for GDN component i' that is in CLS (i.e. corresponds to SPLNG) in the baseline scenario (m^3/h);
$K^n_{i''}$ – natural gas leak factor that corresponds to APLNG for GDN component i'' in the baseline scenario (m^3/h);
$H^g_{i'hy}$ – Time of operation of GDN component in CLS under pressure in period «y», in the baseline scenario (h);
$H^n_{i''hy}$ – Time of operation of GDN component from the moment when project activities (repair / replacement) that resulted in the repair of APLNG were implemented to the end of monitoring period «y» (h);
[y] – index that corresponds to monitoring period;
[i'] – index that corresponds to a number of GDN component, which is in a set of elements I' ($(I'+I'')=I$, where I is a set that includes all GDN components that are in the project boundary) where the project activities did not result in any emission reductions (there was no replacement / repair of components) in the reporting monitoring period;
[i''] – index that corresponds to a number of GDN component, which is in a set of elements I''($(I'+I'')=I$, where I is a set that includes all GDN components that are in the project boundary) where the project activities resulted in emission reductions (there was replacement / repair of components) in the reporting monitoring period;
[h] – index that corresponds to a number of activity under the project at GDN component, if more than one activity was carried out at reporting component in the monitoring period (where H is a set, which includes all activities in the project scenario at GDN component in the monitoring period);
[g] – index that corresponds to SPLNG;
[n] – index that corresponds to APLNG.

Estimated baseline emissions (emissions in case of failure to implement reconstructions) are provided in Table 7[14].

Table 7. Baseline emissions tCO2eq.

	2008	2009	2010	2011	01/01/2012 – 30/09/2012
Baseline GHG emissions in the period, tCO_2eq	115 026	139 935	150 110	150 288	112 024
Total amount of baseline GHG emissions in the monitoring period, tCO_2eq	**667 383**				

D.3. Leakage

There are no leaks related to this project. (Neither the Methodology according to which GHG emissions were calculated nor AM0023 Methodology version 4.0 which is the basis for the Methodology provide for any leakage).

D.4. Emission reductions as a result of implementation of JI Project (January 2008 – September 2012)

Emission reductions resulting from the project implementation shall be calculated as the difference between baseline emissions and project emissions.

The number of Emission Reduction Units (ERU) in tCO_2eq shall be calculated according to the formula:

$$ERU_y = BE_y - PE_y \quad (5)$$

Where:
ERU – emission reduction units in period "y" (tCO_2eq);
BE_y – GHG emissions in period "y" in the baseline scenario, (t CO_2eq);
PE_y – GHG emissions in period "y" in the project scenario, (tCO_2eq);
[y] – monitoring period index.

Table 8 provides on emission reductions for the current period of monitoring (January 2008– September 2012) as a result of the project implementation[15].

[14] Baseline amount of GHG emissions are rounded to integers.

Table 8. GHG emission reductions

	2008	2009	2010	2011	01/01/2012 – 30/09/2012
GHG emission reductions in the period, tCO_2eq.	86 871	111 796	121 984	122 161	91 000
Total amount of GHG emission reductions in the monitoring period, tCO_2eq.	**533 812**				

[15] Provided amount of GHG emission reductions are rounded to integers