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

CONTENTS

Annexes

LIST OF ABBREVIATIONS USED IN PROJECT DESIGN DOCUMENTATION

GDP – Gas-distributing point
JIM – Joint Implementation Mechanism
CDM - Clean Development Mechanism
NCER – National Commission of Energy Regulation
PJSC - Public joint-stock company
UGSSR – Ukrainian Gas Supply System Safety Rules
PDD – Project Design Documentation
JI – Joint Implementation
PETM – Purposeful Examination and Technical Maintenance
CGDP - cabinet-type gas-distributing point

SECTION A. General description of the project

A.1. Title of the project

Reduction of methane emissions on the gas equipment of gas-distributing points and on the gas armature of gas-distributing networks of PJSC «Mariupolgaz»

Scope 10. Volatile emissions from fuels (solid, liquid fuels and gases).

Version of Project Design Documentation: 05.

Date: July 21, 2011.

A.2. Description of the project:

The purpose of the project is reduction of the natural gas emissions at gas-transport and gas-distributing infrastructure of PJSC «Mariupolgaz», which are the result of leakage from gas equipment and gas armature. The basic sources of emissions, included into the project scope are:

- gas equipment (reducing gears, valves, filters, turning off devices and others like that), flanged and screw-thread connections which are in gas-distributing points (GDP) and cabinet-type gas-distributing points (CGDP) PJSC «Mariupolgaz»;
- gas armature (faucets, bolts, valves and others like that), screw-thread and flanged connections located on gas pipelines PJSC «Mariupolgaz».

General quantity of GDP included into the boundary of the project is 138 units, CGDP – 106 units, number of of gas armature on gas pipelines is 6481 units.

Main reason of natural gas emissions is death of sealing elements of equipment as a result of action of temperature vibrations and moisture. Basic component of natural gas, methane (92 - 95%), is greenhouse gas. Removal of sources of natural gas will result in reductions of emission of greenhouse gases. In future, for determination of sources of natural gas emissions «emissions of methane» is used, as instrumental measurings of emissions refer to methane directly.

Situation before the start of the project

PJSC «Mariupolgaz» is an enterprise that provides transporting and supply of natural gas for industrial (205 enterprises), public-service (1003 economies) users and population (182 725 apartments) and individual estate owners at t. Mariupol, t. Novoazovsk, in 7 settlements of city type, in 56 villages of Novoazovsky, Volodarsky and Pershotravnevy districts of Donetsk Region.

The structure of existent tariffs for transporting of gas, which are regulated by the state, does not take into account the depreciation and investment necessities of gas-distributing enterprises. It results in the shortage of finances for repair works and modernization of gas networks, purchase of the proper technological equipment and component parts, and, as a result, influences the insrease of natural gas emissions at PJSC «Mariupolgaz» facilities.

Before the beginning of this project realization application of Joint Implementation mechanism was foreseen, stipulated by Kyoto Protocol. December, 2004 a preliminary investment contract was signed in relation to the JI project between company VEMA S.A. (Switzerland) and PJSC «Mariupolgaz».

Baseline scenario

Before the project start (2004) PJSC «Mariupolgaz» carried out only the exposure of methane emissions by detectors in accordance with Ukrainian Gas Supply System Safety Rules[1], with the purpose of avoidance of emergency and explosive situations. Measurings of methane emissions volumes, their registration and accounting were not conducted, and the proper measuring devices were absent. Theoretical calculations of volumes of methane emissions on the basis of the conducted base measurings of natural gas emissions as a result of leakage of equipment, gas armature, flanged and screw-thread connected gas pipelines, PJSC «Mariupolgaz» amounted in about 27,4 million m^3 per year.

Project scenario

Project measures consist of reduction of methane emissions that occur in the gas equipment of GDP (CGDP) and gas armature of gas pipelines of PJSC «Mariupolgaz».

Within the framework of JI project with the aim of elimination of methane emissions on gas equipment and on the gas armature there are three types of repairs used:

1. Complete substitution of out-of-date and morally threadbare gas equipment and gas armature by new units.
2. Repair of gas equipment components and gas armature;
3. Replacement of pressure-sealing elements with the use of modern sealing materials, changing practice of service and repair, that has become common, on the basis of paronite gaskets, and also sealing stuffing of cotton fibres with fatty impregnation and asbestos-graphite filler.

The existent practice of service and repair that has become common, on the basis of paronite gaskets, and also the sealing stuffing of cotton fibres with fatty impregnation and asbestos-graphite filler does not give long-lasting effect of methane emissions reduction. As a result of activities due to JI project in addition to methane emissions reduction there will be natural gas technical losses reduced and contribution to ecological situation improvement, the risk of emergency and explosive situations will be reduced.

Activity in accordance with the project will include:

- Introduction of Purposeful Examination and Technical Maintenance (PETM) of gas equipment of GDP (CGDP) and gas armature flanged and threaded joints - modern and most economically-effective practice, that allows not only to find out the places of emissions but also to determine their volumes (i. e. potential volume of reduction of gas losses). This key information is necessary for grounding of efficiency of repairs and priority choice of its objects, which is important at the insufficient financing for the removal of all emissions. This activity will include purchase and calibration of modern measuring equipment, corresponding studies of workers, monitoring of every gas equipment and gas armature, flanged and threaded connection, creation of the system of collection and storage of methane sources and also input of internal audit and system for providing of removal quality and account of methane emissions volumes.
- Exposure and methane emissions measuring: monitoring system of emissions on all gas equipment of GDP (CGDP), on gas armature (bolts, faucets, valves), on flanged and threaded connections, including the removed methane emissions (repaired components of equipment). Monitoring will be performed on regular basis by the specially taught personnel. The found out

[1] The Order of The State Committee of Ukraine on supervision of a labour safety Nr. 254 on 01.10.1997, registered in the Ministry of Justice of Ukraine Nr. 318/2758 on 15.05.1998.

emissions will be properly marked by individual numbers, the volumes of methane emissions will be measured and registered in a database.

- Removal of found out emissions: repairs of gas equipment of GDP (CGDP) and gas armature on gas pipelines with emissions within the framework of this project will be varied from replacement of sealing elements or pressure-sealing, to major repairs and replacement of gas equipment and gas armature by a new, modern equipment. The repaired components of gas equipment GDP (CGDP) and gas armature of gas pipelines will be inspected regularly, as component part of standard monitoring activity, to ascertain, that they did not become the source of emissions again.

The project was initiated in December, 2004:

In December, 2004 there was inspection of gas equipment of GDP (CGDP) and gas armature, flanged and threaded joints of gas pipelines PJSC «Mariupolgaz» performed and primary measuring of emissions done, the results of which made the basis for setting the project baseline.

A preliminary investment contract was signed on December, 10, 2004 in relation to JI project between company VEMA S.A. (Switzerland) and PJSC «Mariupolgaz». It was also foreseen by the contract, that company VEMA S.A. develops the monitoring program of emissions and JI Project Design Documentation (PDD).

On December, 30, 2004 - the Working group was organized with the basic tasks of provision of JI project implementation.

On January, 10, 2005 by the participants of project PDD was approved (version 01), which included the program of emissions monitoring.

January, 2005 - beginning inspection and repair works of gas equipment GDP (CGDP) and gas armature, flanged and threaded joints of gas-distributing networks of PJSC «Mariupolgaz».

Durations of project is unlimited, as PETM program, monitoring and emissions removal ptograms were aimed at becoming a component part of PJSC «Mariupolgaz» day by day work. Reduction of CO2-equ emissions is confirmed for the period of 13 years in accordance with modality and procedures of JI Mechanism.

A.3. Project participants:

Party involved	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host Party)	PJSC «Mariupolgaz».	No
Switzerland	VEMA S.A.	No

A.4. Technical description of the project:

A.4.1. Location of the project:

The Project is located on the territory of Mariupol and Novoazovsk, 7 settlements of city type, 56 villages of Novoazovsky, Volodarsky and Pershotravnevy districts of Donetsk region, Ukraine (Pic.1).

Pic. 1. The map of Ukraine with indication of placement of Donetsk Region and Mariupol.

A.4.1.1. Host Party (-ies)

The project is located on territory of Ukraine.

Ukraine is a country in the East Europe, which has ratified Kyoto Protocol to UN Framework Convention as of February 04, 2004, enters the list of countries given in the Annex 1, and meets the requirements for participation in Joint Implementation projects.

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

The project is located in Mariupol and adherent to the city territories of Donetsk Region.

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

Mariupol, Novoazovsk, 7 settlements of municipal type and 56 villages of Novoazovsk, Volodarsky and Pershotravnevy districts of Donetsk region, Ukraine.

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

The geographical coordinates of Mariupol town is:
Width: 47° 6'N
Longitude: 37° 33'E
Time zone: GMT +2:00

The town of Mariupol, Donetsk region, is located in the southeast of Ukraine on the beach of Azov Sea in estuary of the rivers Kalmius and Kal'chik, at the distance of 110 kilometers to South of the regional center - Donetsk. The population (taking into account the settlements of municipal type Old Crimea, Sartana, Talakovka, Kamyansk, which are part of the city) is about 500 thousand people. The location of Mariupol on the map of Ukraine is given above on Picture1.

Mariupol is one of major centers of metallurgy, engineering, large marine port, climatic and balneological resort. Mariupol belongs to the ten largest cities of Ukraine and is one of the important industrial and economic centeres of the country.

At the same time Mariupol holdes one of the first places in Ukraine in volumes of emissions into the air of harmful substances by industrial enterprises. The biggest air pollutants in the city are metallurgical plants of "Azovstal" with its coke-chemical production and metallurgical plant in the name of Illich, especially agloplant and high furnace. Not the last role in contamination of the air of Mariupol belongs to harmful substances of marine port that carries out the overload of bulk goods.

Complete list and addresses of gas-distributing points (138 units), cabinet-type gas-distributing points (106 units) and gas armature (6481 unit), that is included into the project, may be found in an accompanying document 1 - Register of gas-distributing points and gas armature of Joint Implementation project "Reduction of methane emissions on the gas equipment of gas-distributing points and on the gas armature of gas-distributing networks PJSC "Mariupolgaz"[2].

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

1. Development and introduction of method of methane emissions measuring

The measurements of methane emissions volumes are made on the basis of technology of the "calibrated bag" that is described in the approved CDM methodology AM0023 version 3.0 «Leak reduction from natural gas pipeline compressor or gate stations»[3]. One of the problems of the use of this methodology is difficulty of armature volume calculation used for measuring, and also the initial volume of air, at determination of gas volume that entered the "bag".

[2] Accompanying document 1 is Register of gas-distributing points and gas armature of Joint Implementation project "Reduction of methane emissions on the gas equipment of gas-distributing points and on the gas armature of gas-distributing networks of PJSC "Mariupolgaz"" is executed in an electronic form and submitted to the State Enviromental Investment Agency of Ukraine and project inspectorate - company Bureau Veritas Certification Holding SAS.

[3] AM0023 "Leak reduction from natural gas pipeline compressor or gate stations", version 3.0 (http://cdm.unfccc.int/UserManagement/FileStorage/JY2L0XEKMB3HD18T7RPO6ZSFCQINGA)

To solve these problems a special setting was made on the base of plastic tank of the known volume (0,11 m3), a package, plastic hose and manometer (see Annex 3, Pic.7). All connections are executed hermetically.

Pic. 2. Photo of quantitative measuring of methane emissions device.

Gas analyzer EX - TEC® HS 680. For determination of methane concentration in this case a high-fidelity gas analyzer of EX - TEC® HS 680 is used.

Pic. 3. Photo to the gas analyzer EX - TEC® HS 680.

The Gas analyzer has protection from an explosion (CENELEC).
Application to the gas analyser and ranges of measuring are brought in Table 1.

Application	Range of measuring
Above-ground check-up	From 0 ppm to 10 volume percent (%) CH_4
Measuring in deepening of trenches of underground pipelines	from 0,0 to 100 volume percent (%) of CH4 from 0 to 30 volume percent (%) of CO2
Verification is in the closed spaces	From 0 ppm to 10 volume percent (%) of CH4
Verification in apartments	From 0 ppm to 10 volume percent (%) of CH4
Notification about the presence of explosive gases	From 0 ppm to 10 volume percent (%) of CH4
Measuring of amount of mixtures in gases	From 0,0 to 100 volume percent (%) of CH4
Analysis of ethane	CH, CH4, C2H6, C3H8 (additionally)

Table 1. Application and ranges of measuring of gas analyzer EX - TEC® HS 680

A relative error amounts in 10% that corresponds to the standard EN 50054/57[4]

After an exposure and emission measuring repair or replacement of gas equipment GDP (CGDP) and gas armature of gas pipelines is executed with the use of modern materials of sealers (GOST 7338-90[5], GOST 5152-84[6] or GOST 10330-76[7], Gore - Tex).

More detailed information on means of measuring, that were used for monitoring of emissions is presented in Annex 3.

2. Introduction of modern sealers for liquidation of emissions.

Sealers (sealing agents) GOST 7338-90 are oil-and-petrol-resistant plates used for making of rubber-technical wares that serve for the compression of immobile connections, prevention of friction between metallic surfaces, for perception of the single shock loadings, and also as gaskets, flooring and other sealing wares.

Greasing of locking devices and compression of the threaded connections by a fibre of flax GOST 10330-76 and by oil Plitol-M (TU U 25404313.004-2201)

Sealing stuffing GOST 5152-84. Asbestine wattled sealing stuffing is used for the compression of sealing of stuffing chambers of armature, centrifugal and piston pumps, and also different devices at working temperatures from - 70 to 300˚C.

Wattled sealing stuffing is the most widespread type of sealing materials, used to seal stuffing-boxes of armature chambers, centrifugal and piston pumps, different vehicles used for filling. This stuffing is used to complete more than 80% of armature. They differentiate both in materials they are made of and methods of making (by a structure). Both factors substantially influence operating properties of stuffing. The important components of stuffing are different types of impregnations and fillers that give necessary properties to them.

[4] Electrical apparatus for the detection and measurement of combustible gases). General requirements and test methods.
[5] Standart "Rubber and Rubber-fabric Planes"
[6] Standart "Sealing Stuffing"
[7] Standart "Flax dishevelled. Specifications"

Sealing material Gore - Tex is plastic self-lubricating material that removes emissions on stock and serves practically forever. It is simple in use and forms an integral cylinder as a gasket round the corresponding element of equipment. In most cases of its use, dismantling of working equipment is not needed. This material is not apt to destruction during great while of the use, has a subzero coefficient of friction, and perfectly serves in the large range of temperatures from - 260 ^{0}C to 340 ^{0}C. This material is inert in relation to most ordinary chemicals and does not absorb gases. It prevents the wear of stocks.

3. Replacement of locking-regulating armature.

Locking - regulating armature. Within the framework of project it is planned also to conduct replacement of technically and morally out-of-date gas equipment GDP (CGDP) and locking-regulating armature of the USSR production, by the armature of the European producers and their analogues of home production.

4. Establishment of the centralized system of natural gas emissions registration.

During realization of project the producers of gas equipment that is used for prevention of methane emissions can be changed depending on the market entry by more modern and perfect technologies and equipment.

The choice of devices and materials will depend on the size, source of emissions and system components working schedule, on which this emission was found by the use of modern PETM of gas-distributing networks, including:

- research of base terms - at the use of measuring devices that are described above;
- registration of results and determination of priority of removal of emissions, that provides most efficiency of this work at the limited nature of facilities on repairs;
- analysis of data and estimation of natural gas losses reduction and volumes of emissions reduction;
- development of plan of future inspections, and further monitoring of gas equipment of GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines of PJSC "Mariupolgaz", apt to the emissions, and also realization of monitoring of the already eliminated emissions.

Implementation Schedule

1. Drawing of primary register of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines. Realization of inspection of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines and primary monitoring measuring. Signing of previous investment agreement in relation to the Joint Implementation project. Organization of the Working group. Development of monitoring Plan, PDD of project version 1. (December 2004 - January 2005).
2. Introduction and realization of the program PETM, repair (replacement) of gas equipment 49 GDP (CGDP) and 1300 units of gas armature (February - December 2005)
3. Realization of the program PETM, repair (replacement) of gas equipment 97 GDP (CGDP) and 2590 units of gas armature (January - December 2006)
4. Realization of the program PETM, repair (replacement) of gas equipment 98 GDP (CGDP) and 2591 units of gas armature (January - December 2007)
5. Continuation of realization of the program PETM, realization of regular monitoring supervisions and measuring of the already repaired gas equipment GDP (CGDP) and gas armature of gas pipelines, emissions elimination on the already repaired equipment, if such emissions take place (January 2008 - December 2017).

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:

Project activity includes:
- repair (replacement) of gas equipment GDP (CGDP), gas armature, pressurizing of the threaded and flanged connections of gas pipelines of PJSC "Mariupol'gas" with the use of modern equipment of the European producers and their analogues of home productions, by the use of modern sealing materials;
- monitoring of methane emissions aimed at the exposure of methane emissions through the leakage;
- next renewal of leakage of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines.

Reduction of natural gas emissions will result in reduction of methane that is greenhouse gas. Absence of project activity means that all equipment, including the old is morally threadbare, but yet capable of working with less leak-proofness than it is foreseen by the project activity, will be exploited long in the ordinary mode that makes impossible the possibility of methane emissions reduction.

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

In the process of project implementation the estimated emissions reduction of greenhouse gases in tones of CO2 equivalent is given in Table 2.

Length of crediting period	Years
2005-2007	3
Years	Estimate of annual emission reductions in tons of CO_2 equivalent
2005	48 775
2006	170 711
2007	317 035
Total estimated emission reductions over the crediting period 2005 - 2007	536 521
Annual average of estimated emission reductions over the crediting period (in tons of CO_2 equivalent)	178 840

Length of the crediting period	Years
2008-2012	5
Years	Expected annual emission reductions in tons of CO_2 equivalent
2008	365 810
2009	365 810
2010	365 810
2011	365 810
2012	365 810
Total estimated emission reductions over the crediting period 2008 - 2012	1 829 050
Annual average of estimated emission reductions over the crediting period (in tons of CO_2 equivalent)	365 810

Length of the crediting period under post-Kyoto Mechanism	Years

2013-2017	5
Years	Expected annual emission reductions in tons CO_2 equivalent
2013	365 810
2014	365 810
2015	365 810
2016	365 810
2017	365 810
Total estimated emission reductions over the crediting period 2013 - 2017 in total	1 829 050
Annual average of estimated emission reductions over the crediting period (in tons CO_2 equivalent)	365 810

Table 2. Estimated amount of CO_2 emission reduction.

A description of formula that was used to count of reduction of emissions is drawn in part D.1.4.

Functioning of the emissions exposure and removal system, and also further support of non-leakage of gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas pipelines of PJSC "Mariupolgaz", that is created within the framework of Project, does not have limitations on duration. Therefore Project will give reduction of methane emissions after completion the period of crediting.

A.5. Project approval by the Parties involved:

The project is already supported by the representative office of Government of Ukraine, namely by State Environmental Investment Agency of Ukraine, which has issued a Letter of Endorsement for the JI Project № 1636/23/7 of 23.06.2011 Therefore organizational risks for the JI project has been minimized.

On receipt of Determination Report from the Accredited Independent Entity project documentation will be presented to the State Environmental Investment Agency of Ukraine for the obtaining of the Letter of Approval. The second Letter of Approval will be received from the other project participant.

SECTION B. Baseline

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

1. Baseline determination approach.

Baseline setting (measurement and calculation of natural gas leaks) has been done using JI Specific Approach on the basis of the approved baseline methodology AM0023 version 3.0 «Leak reduction from natural gas pipeline compressor or gate stations». The modification of methodology AM0023 version 3.0 is caused by application of more exact method of measuring of methane leakages.

Methodology AM0023 version 3.0 is applicable for the projects on reduction of emissions of natural gas on the compressor, gas-distributing stations in the system of main gas pipelines, as well as for the equipment of the gas-distributing systems, including the stations that regulate gas pressure.

Legitimacy of the use of JI Specific Approach, based on this methodology, for this project comes out from the next analysis.

In accordance with Methodology AM0023 version 3.0 three next conditions must be executed:

1. Companies - operators of gas-distributing networks at the moment of realization of the project do not use the system that allows systematic discovery and removal of methane emissions;
2. The losses (emissions) of methane can be found out and exactly measured;
3. There can be the implemented a system of supervision that allows to make sure that the removed losses of methane will not arise up repeatedly.

The project fully satisfies the second and third conditions.

In relation to the *first condition*, before the beginning of the project PJSC "Mariupolgaz" provided only the exposure of emissions by means of detectors in accordance with Rules of safety of the systems of gas-supplying of Ukraine in order to avoid emergency and explosive situations. For measuring of the emissions volumes, their registration and accounting do not take place, and corresponding measuring devices were absent. The theoretical calculations of volumes of emissions on the basis of the executed measuring amounts in about 27.4 million m3 a year.

But foregoing measures do not give understanding of the real volumes of emissions mainly through the use of morally threadbare equipment and out-of-date sealing materials. The project does not foresee more frequent checks of gas equipment but foresees the use of modern sealing material, replacement of morally threadbare gas equipment by the new, modern equipment of European production, their analogues of home producers and implementation of the monitoring measuring of methane emissions volumes.

According to international experience and the data received from the regions, where new sealing materials and gas equipment were used, it can be said that their use considerably reduced the volumes of methane emissions.

Moreover, because of absence in the national legislation on sanctions for the emissions of natural gas, the effective program on an exposure and removal of methane emissions could not be applied without project measures. Companies that are mainly motivated by the terms of safety fixed the presence of emissions only but did not measure their volumes.

So the practice that existed in PJSC "Mariupolgaz" at the beginning of realization of this Project was not able to remove the emissions included into this Project.

In relation to *the second condition*. The purchase of modern equipment on an exposure and measuring of volumes of emissions and direct measuring of emission volume on the gas equipment GDP (CGDP) and gas armature showed that at application of modern practices and gas equipment the emissions may not only be discovered but also exactly measured.

In relation to *the third condition*. Introduction of step-by-step procedures, creation of all-embracing database and application of system approach will allow conducting the reliable monitoring of the repaired gas equipment GDP (CGDP) and gas armature of gas pipelines and find out the repeated emissions, if they take place (see Annex 3). The studies of personnel at sites and introduction of quality control on all stages of project activity will allow to realize the Monitoring Plan.

2. Application of selected approach in baseline determination

Initial conditions

Only two options of initial terms can be examined as possible and reliable alternatives for the Project:

1. Keeping the current system for detection and elimination of leaks – business as usual alternative;
2. Implementation of this Project not as JI project.

Arguments are presented in this PDD (see Paragraph B.2) prove that maintenance of the existent system on exposure and elimination of emissions is the most credible scenario for development in condition of the Project absence.

Thus, this scenario can be accepted as the Initial conditions.

Emission Reductions

Method of determination of emissions volumes in correspondence with Methodology AM0023 version 3.0 consists of the preliminary estimation of emissions with next determination of the actual volume.

In accordance with Methodology AM0023 version 3.0 , the level of emissions reduction is determined in the next sequence:

1. Current practice of exposure and removal of losses of natural gas are estimated and described. The clear and transparent criteria of determination are set, if methane emissions exposure and removal will be conducted upon the conditions of absence of this Project.
2. The terms of replacement of equipment are determined on condition of absence of this Project.
3. During realization of the Project the data about emissions are gathered.
4. Efficiency of repair is checked up during monitoring.
5. Based on the collected during the previous steps data the actual methane emissions volume is calculated.

These steps are below described for this Project.

Step 1. Estimation and description of current practice of exposure and removal of extrass.

Methodology AM0023 version 3.0 stipulates that "during the calculation of emissions volumes reduction only those types of emissions are taken into account which do not appear and are not removed in accordance with the used at this time in practice". As mentioned above, the accepted methodology of the project corresponds to the original version of methodology AM0023 not fully, but it was worked out based on methodology AM0023. The difference of the offered methodology from the original methodology AM0023 consists in methodology of methane emissions volumes measuring. Methodology of methane emissions volumes measuring that is used in this Project is presented in Step 3 below and in Annex 3 to this PDD.

In accordance with Methodology AM0023 version 3.0 all gas equipment GDP (CGDP), gas armature, the flanged, threaded connections of gas pipelines were included in the project, i.e. were examined, repaired or substituted, without regard that they are regularly inspected and repaired within the framework of the existent system of service. On the other hand, on a project there is all gas equipment of GDP (CGDP), gas armature, the flanged, threaded connections of gas pipelines will be repaired or transferable with the use of modern equipment of the European production and new making more compact materials, not taking a that fact into account, was found out a source or not, with the purpose of to prevent a source in future.

In the beginning of the project implementation, traditional material used for implementation of repair works provided the temporal short-term removal of sources of methane only, at that time as the approach foreseen by Project provides the reliable removal of sources of methane on the protracted term.

Step 2. Term of replacement of equipment

Beginning from 2005 at the exposure of methane emissions repair or replacement of gas equipment GDP (CGDP), gas armature of gas pipelines is executed with the use of modern equipment and materials, in accordance with project activity. Including of any parallel instances of potential replacement of components with application of materials and equipment that was used in the project practice into the calculations of reduction methane emissions is beside the purpose, as there is no substantial influence on the result of the Project, i.e. on the level of reduction of methane emissions. Here it is also important to indicate that within the framework of this Project all gas equipment GDP (CGDP), gas armature, flanged and threaded connections of gas pipelines will be repaired or replaced, even if emissions are found only on part of them.

Step 3. Data collection during realization of the project

Collection of data on these volumes of methane emissions is conducted together with realization of repairs (replacements) of gas equipment of this Project. Exposure of natural gas emissions is executed by means of gas analyzers that operate on the basis of catalytic oxidization/heat-conducting. Repair works (replacement of equipment) are conducted after measuring of volumes of methane emissions were carried out. For measuring of volumes methane emissions (in composition of the natural gas) the methodology worked out by a company VEMA S.A. in 2005is used. Methodology is based on usage of a device in composition of a leakage-proof tank of the known volume, gas analyzers EX - TEC® SR5 or EX - TEC® HS 680, plastic package and connecting hoses (see Annex 3).
On its principle the methodology of company VEMA S.A is the most close to the method of the "Calibrated bag" that was applied in methodology AM0023 version 3.0. After approval of methodology AM0023 version 3.0 (October, 2009) it was decided to adhere to earlier used methodology of the company VEMA S.A. due to the next reasons:

- Method is presented in methodology AM0023 version 3.0 does not take into account the volume of equipment that is a measuring object;

- Use of impermeable package (sack) does not allow to conduct the exact measuring in connection with extraordinarily difficult determination of initial volume of package in the blown away state;
- Use of impermeable package (sack) by the method described in methodology AM0023 version 3.0 does not allow constantly to control the concentration of methane in it, that can result in formation of explosive mixture of methane and air, the work with it being dangerous even at the use of anti-static package.

After realization of repair (replacements) of gas equipment the new measuring is executed, to make sure in the removal of methane emissions.
The data collected are included into the reports on fulfilling the monitoring plan. All data are kept in a database. Every report on fulfilling the monitoring plan will include complete information from such database (Annex 3 to this PDD).

Step 4. Requirements to procedures of monitoring

At Step 4 during Project supervision of objects of Project for verification of the non-repeated emissions methane is conducted. A monitoring plan for this Project refers to all repaired (transferable) gas equipment GDP (CGDP), gas armature, flanged and the threaded connections of gas pipelines. Frequency of measures in relation to exposure and measuring of emissions, where they were already removed, is specified in the Plan of monitoring.

For gas equipment, where methane emissions found repeatedly do not exceed the volumes of the emissions measured after the first repair (replacements) of equipment, the methane emissions from such equipment will be considered equal to the volumes of the emissions measured after the first repair (replacements) for all the period after the last verification/ monitoring.

For gas equipment, where the repeated methane emissions are found, volume of which is more than the volume of methane emissions, measured after the first repair (replacements), such equipment will be excluded from the calculations of reduction of methane emissions for corresponding monitoring period, then it will be considered that on this equipment there was no reduction of methane emissions during this period from the date of the last monitoring of methane emissions measuring. Such position corresponds to the requirements of methodology AM0023 version 3.0. Such equipment will be repaired (or replaced) repeatedly after which measuring of methane emissions will be again done whereupon.

The monitoring measuring of methane emissions is conducted with the use of measuring equipment, exactness of measuring of which is not worse than exactness of measuring equipment, which was used to measure methane emissions during the preliminary research.

The collected data will be included into the regular reports on fulfilling of the monitoring plan. All data are kept in a database. Every report on fulfilling the monitoring plan will include complete information from such database (Annex 3 to this PDD).

Step 5. Calculation of methane emissions reduction

The reduction of methane emissions, obtained as a result of realization of the Project, is defined as the difference between the emissions measured before realization of repair (Step 3), and after repair (Step 4). In case that emissions after repair will be more than the measured before the repair, for the corresponding component there will be negative reduction of methane emissions. Otherwise speaking, the used Methodology foresees a case, in which the emissions of methane during implementation of the Project exceed emissions indicated by certain initial terms.

Description of the baseline and explanation of its choice are presented in the section B.2 below.

Key information for determination of the baseline is presented in Table 3 below.

Data/Parameter	i
Unit	dimensionless
Description	Sequence number of gas equipment GDP (CGDP), gas armature of gas pipeline where methane emissions were found
Periodicity of measuring/ of monitoring	One time at the beginning of project
Source of data that was (will be) applied	Activity of emissions measuring
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Personnel will have corresponding qualification for fixing of results.
Comments	List of gas equipment GDP (CGDP), gas armature, flanged, threaded connections is presented in the accompanying document 1

Data/Parameter	Ti
Unit	hours
Description	The amount of hours of exploitation of equipment on which emissions were found during a year
Periodicity of measuring/ of monitoring	Constantly
Source of data that was (will be) applied	Records of results of inspections
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology AM0023
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Personnel will have corresponding qualification for fixing of results.
Comments	Amount of hours of exploitation of equipment during a year from the moment of its repair (replacements)

Data/Parameter	GWP_{CH4},
Unit	Tons of equivalent CO2
Description	Potential of global warming
Periodicity of measuring/ of monitoring	Constantly
Source of data that was (will be) applied	IPCC
The value of data (for ex - ante calculations/ determinations)	21
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	-

Procedures of management of quality / providing of quality of measuring that were (will be) applied	The responsible for monitoring person checks the data annually.
Comments	The project developer monitors any changes in the potential of global warming for methane, published IPCC and approved by COP

Data/Parameter	$F_{CH4,i}$
Unit	m^3 CH4/год.
Description	Speed of methane emissions for each emission found
Periodicity of measuring/ of monitoring	Annually
Source of data that was (will be) applied	Calculation
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Calculation according to Methodology AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	The equipment is calibrated and checked in accordance with the procedures of quality management. The current service is performed according to technical specifications.
Comments	-

Data/Parameter	t_i
Unit	^0C
Description	Gas temperature
Periodicity of measuring/ of monitoring	Constantly / Periodically
Source of data that was (will be) applied	Mercury glass thermometer of type TL-4, GOST 8.279[8]
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Equipment is calibrated and tested according to the management of quality procedures. Current service is conducted in accordance with technical specifications.
Comments	Measured for determination of closeness of CH4. Note: In spite of measuring is not expected in many variants, because the temperature on different stages is accepted as permanent.

Data/Parameter	P_i
Unit	MPa
Description	Gas pressure
Periodicity of measuring/ of monitoring	Constantly / Periodically

[8] Standart “Glass, liquid, workers Thermometers. Methods and checking means”

Source of data that was (will be) applied	Manometer "D-59N - 100-1.0 6 kPa", GOST 12997"[9]
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Equipment is calibrated and tested in accordance with the management of quality procedures. Current service is conducted in accordance with technical specifications.
Comments	Measured for determination of closeness of CH4. Note: In spite of measuring is not expected in many variants, because pressure on the different stages accepted to be permanent.

Data/Parameter	*Vbag*
Unit	m^3
Description	Tank capacity
Periodicity of measuring/ of monitoring	Once at the project beginning
Source of data that was (will be) applied	Expenditures measuring device - flowmeter
The value of data (for ex - ante calculations/ determinations)	0.11 m^3
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Equipment is calibrated and tested in accordance with the management of quality procedures. Current service is conducted in accordance with technical specifications.
Comments	The tank capacity is filled with water. Amount of water that is taken into account by a flowmeter will be the tank capacity. Measuring showed that the tank capacity is 0.11 m3.

Data/Parameter	$w_{sampleCH4,i}$
Unit	%
Description	Methane concentration in the sample
Periodicity of measuring/ of monitoring	Periodically
Source of data that was (will be) applied	Gas analyzers EX-TEC® SR5 or EX-TEC® HS 680
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Equipment is calibrated and tested in accordance with the management of quality procedures. Current service is conducted in accordance with technical specifications.

[9] Standart "Products of the state system of industrial devices and automation means. The general specifications."

Comments	Concentration of methane in the tank of emissions is the difference between the concentration of methane in a tank at the beginning and in the end of measuring. The concentration is measured by means of gas analyzers EX - TEC® SR5 or EX - TEC® HS 680.

Data/Parameter	τ_i
Unit	second
Description	Time during which methane concentration reaches a certain level
Periodicity of measuring/ of monitoring	Periodically
Source of data that was (will be) applied	Seconds measuring device «SOS pr-2б-2», GOST 5072-72[10]
The value of data (for ex - ante calculations/ determinations)	-
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology of AM0023 version 3.0
Procedures of management of quality / providing of quality of measuring that were (will be) applied	Equipment is calibrated and tested in accordance with the management of quality procedures. Current service is conducted in accordance with technical specifications.
Comments	-

Data/Parameter	URi
Unit	%
Description	Factor of vagueness of equipment of emissions measuring
Periodicity of measuring/ of monitoring	Annually
Source of data that was (will be) applied	IPCC
The value of data (for ex - ante calculations/ determinations)	95
Confirmation of data choice or description of method and measuring procedures that were (will be) applied	Methodology of AM0023
Procedures of management of quality / providing of quality of measuring that were (will be) applied	The responsible for monitoring person checks the data annually
Comments	Estimated where possible, 95% confidence interval, advice of IPCC presented in division 6 of *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000*[11]. If the producer of equipment of emissions measuring declares the area of vagueness without clarification of confidence interval, it can be accepted 95%

Table 3. Key information for the baseline determination.

[10] Standart «Mechanical seconds measuring devices»

[11] IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000: http://www.ipcc-nggip.iges.or.jp/public/gp/english/6_Uncertainty.pdf

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

1. Approach to demonstration that the project generates reduction of emissions from sources, that are additional to those that would take place in case of its absence

Methodology AM0023 version 3.0, and also the last release "Tool for the demonstration and assessment of additionality " ver. 05.2[12], ratified by CDM Executive Board, used for the proving the additionality of this project.

This approach can be applied for this project because it was worked out exactly for the projects of such type. The account of local terms and legislation will allow objectively to estimate its additionality.

2. Application of the selected approach. Proofs of the project additionality

Step 1. Identification of alternatives for the project activity consistent with current Ukrainian laws and regulations.

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

Only two options of initial terms can be examined as acceptable to Project:

Option 1: The continuation of the current situation;

Option 2: Measures foreseen by Project will be carried out without the use of the mechanism set by the article 6 of Kyoto protocol of UN Framework Convention On Climate Change.

Option 1: Continuation of the current situation of exposure and removal of natural gas losses, AND accordingly, of methane emissions is the most realistic and reliable alternative of the Project realization, because it does not require additional investment from PJSC "Mariupolgaz".

PJSC "Mariupolgaz" gets no financial benefit from reduction of methane emissions. The existing in Ukraine system of forming of tariffs on natural gas stipulates the decline of tariff on natural gas in case of reduction of losses. The set at this time payment for the emissions of methane within the fixed limits, is difficult or impossible to charge in connection with absence of measuring technologies and by the greater amount of the insignificant emissions spread on large territory.

Option 2: According to the Methodology AM0023 version 3.0, to determine the probably variant of initial conditions it is necessary to determine “if similar efforts have been made or are expected to be made to reduce methane leaks from key components such as unit valves, blow down valves, rod packing and pressure relief valves, using similarly capable leak detection and measurement technology as described in this methodology”.

12 “Tool for the demonstration and assessment of additionality”, ver. 05.2: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

PJSC "Mariupolgaz" before the beginning of the project realization did not conduct measures in relation to direct inspection and technical service that would go beyond the scope of the requirements of accident prevention set by norms.

The type and volumes of technological losses in the Ukrainian gas-distributing networks were mainly unknown to the moment of realization of the first direct inspections and prophylactic reviews, carried out for the estimation of marketabilities of projects within the framework of the mechanisms set by the article 6 of Kyoto protocol up to Scope convention of UNO about the change of climate.

Estimations of clean volume of gas consumption and its losses were approximate, because there were no gas-meters of most end-user (60 % economies), and the invoicing is executed on the basis of norms.

Moreover, PJSC "Mariupolgaz" before the beginning of realization of the Project had neither stimuli nor resources for realization of the measures foreseen by the Project, in absence of its support by the mechanisms set by the article 6 of Kyoto Protocol to UN Framework Convention On Climate Change (step 1.2, step 2 and step 3 farther). The project stipulates additional charges on measuring devices, on the new gas equipment of the European producers and their analogues of home production, on modern sealing materials and studies of personnel.

To carry such charges for realization of this Project or analogical measures financial stimuli are absent for PJSC "Mariupolgaz", except possible receivabless, that can be obtained within the framework of the mechanism set by the article 6 of Kyoto Protocol to UN Framework Convention On Climate Change.

Outcome of Step 1a: PJSC "Mariupolgaz" will not provide investments for implementation of the Option 2. Thus, the most realistic and reliable alternative is Option 1.

*Sub-step 1b: Consistency with mandatory Ukrainian laws and regulation*s

Option 1: Current practice of exposure and removal of natural gas losses and accordingly, emissions of methane corresponds to the current legislation of Ukraine. The legislation assumes the losses of natural gas, and, accordingly, emissions of methane at transporting of natural gas. Norms set periodicity which the gas-distributing organizations must execute verifications of equipment with the aim of exposure of losses of natural gas only. Practice of exposure of losses of natural gas in PJSC "Mariupolgaz" corresponds to the indicated norms. Control of observance of norms if performed by implementation of annual revisions by the authorized bodies.

The project also answers existent normative requirements of Ukraine in relation to the exposure of losses of natural gas and emissions of methane on gas-distributing objects, and also any to other applied legislative norms, existing at this time.

The program of PJSC "Mariupolgaz" on the planned exposure of losses of natural gas will be realized in parallel with application of modern methods of exposure and measuring of losses of natural gas and, accordingly, emissions of methane, and also measures on the long-term removal of losses of natural gas and, accordingly, emissions of methane, that are foreseen by this Project.

Outcome of Step 1b: The selected realistic, conservative variant that deserves trust (Option 1) fully corresponds to obligatory requirements and norms of legislation of Ukraine.

Since Additionality Tool gives option to choose either investment or barrier analysis, the last one was chosen.

Step 3 - Barrier Analysis.

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

For PJSC "Mariupolgaz" the Project is the first project of such type, and in this connection a few types of barriers took place at the beginning of realization of the Project. PJSC "Mariupolgaz" ran into serious financial barriers, and also with insufficient experience on the use of new approaches and measuring devices for an exposure and removal of gas missions on its objects, including:

- Organizational barrier.

Insufficient potential of labour and technical resources of PJSC "Mariupolgaz", to inculcate and carry out purposeful inspection and technical maintenance of gas equipment. It is related to absence of skilled personnel : in the last few years PJSC "Mariupolgaz" ran into considerable outflow of skilled employees, and the newly collected workers do not have sufficient experience and knowledge yet.

- Absence of the special technical knowledge.

At the beginning of the project, there skilled personnel did not have experience on the use of measuring equipment for measuring of volumes of gas emissions : gas detectors that were used at PJSC "Mariupolgaz" provides the exposure of emissions only, but the volume of emissions is not measured and not fixed. In connection with it, introduction of the project requires time for acquisition of practical experience of measuring of natural gas emissions volumes.

- Financial barrier.

Realization of Project requires charges additional to the existent charges on realization of measures in relation to exposure and removal of natural gas emissions, and, accordingly methane emissions.

Additional charges on realization of the Project include charges on:

- Purchase and use of modern measuring devices for exposure and measuring of emissions of methane (gas analyzer EX - TEC® HS 680);
- Purchase and installation of sealing materials of different type and diameter;
- Substituting of out-of-date standards of gas equipment GDP (CGDP) and locking-regulating armature by the new gas equipment of the European producers;
- Studies of personnel, realization of direct prophylactic review and technical service;
- Systematic collection of data and their management;
- Systematic and long-term control of efficiency of removal of found out natural gas losses.

During realization of the project modern sealing material is used. In accordance with the previous results of researches, the sealing materials are concordant with GOST 7338-90, GOST 10330-76 and GOST 5152-84 and are far more effective, but at the same time more expensive than sealing materials that are used in current practice. In existent practice of PJSC "Mariupolgaz" does not extract an additional benefit in case of reduction of natural gas emissions. Thus, for PJSC "Mariupolgaz" there are no stimuli for purchase and use of more expensive sealing material.

In the beginning of the Project on networks of PJSC "Mariupolgaz" morally out-of-date gas equipment GDP (CGDP) and locking-regulating armature of the USSR production were used mostly, that considerably yield to in impermeability the new standards of the European producers, are threadbare, but

considerably cheaper. In connection with it, setting of new gas equipment in the gas pipelines of the European producers and their analogues of home production could not prevail through the shortage of facilities.

Application of mechanisms of JI projects to this Project does these measures economically advantageous and is the only way of their introduction.

Outcome of Step 3a: it goes out from the all above-mentioned, that this project is economically not attractive without registration of project as JI Project, that specifies on additionality of this project.

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

Financial barriers are related also to the structure of the existent tariffs on transporting and distribution of gas, that is regulated by the state and does not take into account the depreciation and investment necessities of gas-distributing enterprises. Such state of business results in the permanent shortage of money and impossibility of timely implementation of major repairs, providing of exploitation of equipment, investing in modernization and development of gas-distributing infrastructure.

PJSC "Mariupolgaz" will get no line of economic profit from reduction of methane emissions that is reached during realization of the Project without the account of receivables from the sale of units of reductions, as at the existent tariff system all losses of gas in gas pipelines are on end-users of natural gas, that is the less are gas expenditures, the less tariffs are for consumers.

Also, it should be taken into account that in Ukraine methane is not included in the list of ecologically harmful gases and not punished by ecological fines. In connection with it, no sanctions are applied to PJSC "Mariupolgaz" in connection with the sources of methane on gas pipelines and PJSC "Mariupolgaz" gets no financial fee for reduction of natural gas emissions.

As reduction of methane emissions does not bring economic profit to PJSC "Mariupolgaz" and realization of this Project does not bring economic profit to other participants of the Project, including the declarant of the Project, except that it will appear within the framework of JI Project, a conclusion is made that realization of the Project without the receipt of profits within the framework of the JI Project, is a barrier to the investments.

Step 4: Common practice analysis

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

Absence of the financial stimuli, described in Step 2 and the barriers, described in Step 3 are typical not only for PJSC "Mariupolgaz" but also for other companies that exploit gas-distributing networks in Ukraine. In connection with the existent practice of exposure and removal of methane emissions, presented in the variant of initial terms, selected for this Project, are general for Ukraine.

On the whole, almost in all Ukraine the same methods of exposure of losses of natural gas are used, as well as on gas pipelines of PJSC "Mariupolgaz" before beginning of realization of the Project. Sealing materials that are used for reduction of losses also little differentiates in regions. The gas enterprises of Ukraine in major part do not have equipment for measuring of volumes of losses of natural gas. Programs of exposure and removal of losses of natural gas that are used in Ukraine, in major part are aimed at implementation of requirements safety and prevention of accidents.

Sub-step 4b: Discuss any similar Options that are occurring:

Except this Project and other projects, realized within the framework of the mechanism set by the article 6 of Kyoto protocol up to UNFCCC (United Nations Framework Convention on Climate Change), in Ukraine other programs of direct exposure and removal of losses of natural gas will not be realized in gas-distributing networks. The project foresees the use of modern technologies and equipment for exposure and measuring of losses of natural gas.

The prospects of receipt of financing for Project within the framework of the mechanism set by the article 6 of Kyoto protocol up to UNFCCC allowed its developer to prepare this Project. Thus, it is possible to consider that any actions, analogical to those which are foreseen by this Project, are developed and realized in Ukraine, expecting the receipt of benefit in accordance with the mechanisms set by the article 6 of Kyoto protocol up to UNFCCC.

Conclusion: Measures analogical to the measures of this Project, at current time can be conducted only on condition of receipt of predictable profit from realization of the mechanism set by the article 6 of Kyoto protocol up to UNFCCC. Thus, this Project is considered such that satisfies the criterion of additionality.

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

PJSC "Mariupolgaz" is a legal user of GDP (CGDP) and gas pipelines on the basis of Agreements on transfer of right for using of state property № 04/01-836 of 28.12.2001 and № 14/1071/08 of 31.12.2008.

In the legal use PJSC "Mariupolgaz" there are gas-distributing points (cabinet-type gas-distributing points) and gas pipelines the list of which is formed on results of property inventory that is taken into account on balance of PJSC "Mariupolgaz", and that is ratified by Order of Ministry of fuel and energy of Ukraine dated 30.09.2009 №482.

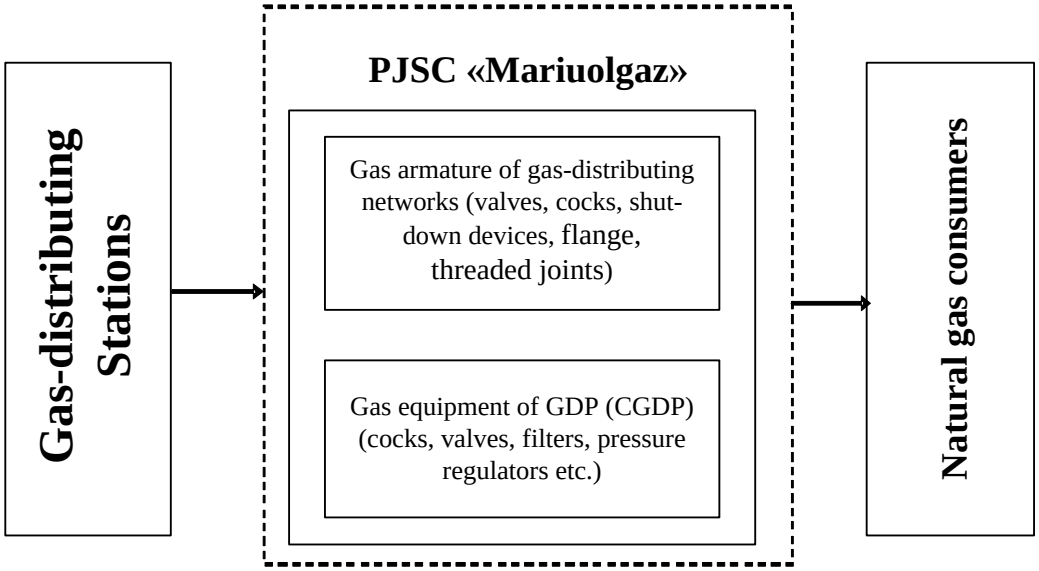
There are three types of methane emission sources in the JI Project:

(i) Under the control of the project participants: technological methane emissions during plan repair of gas pipeline;
(ii) Reasonably attributable to the project: methane emissions от gas fittings of house distribution networks;
(iii) Significant:
- leaks on gas equipment (reducing gears, valves, filters and others like that) of gas-distributing points (cabinet-type gas-distributing points) and
- leaks on gas armature (faucets, bolts and others like that), threaded and flanged connections that are located on gas-distributing networks of PJSC "Mariupolgaz".

Only methane emissions sources type (iii) are including to the JI project boundary:
- leaks on gas equipment of gas-distributing points (cabinet-type gas-distributing points);
- leaks on gas armature, threaded and flange joints that are located on gas-distributing networks of PJSC "Mariupolgaz".
Complete list of gas-distributing points (138 units), cabinet-type gas-distributing points (106 units) and gas armature (6481 unit), that are including into the JI project boundary, are set in the Accompanying document 1.

Sources of leaks of type (i) - technological leaks of gas at repair of pipes of gas pipelines - are not included in project boundary as PJSC "Mariupolgaz" does not apply technology which allow not to suppose such leaks.
Sources of leaks of type (ii) - gas leaks in house distributing networks - are not included in the JI project boundary as first, volumes of such leaks it is much less, than volumes of leaks of sources of type (iii), and secondly, sources of these leaks, as a rule, are in private houses (apartments).

The JI project boundary for a base scenario are outlined by the dotted line on Pic. 4



Pic. 4.Project boundary

Geographically GDP (CGDP) and gas pipelines of PJSC"Mariupolgaz" are located in Mariupol, Novoazovsk, in 7 settlements of municipal type, in 56 villages of Novoazovsky, Volodarsky and Pershotravnevy districts of Donetsk region.

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

Date of baseline setting: 10/01/2005
Baseline was determined by company VEMA S.A.
Company VEMA S.A. is the participant of the project

Company VEMA S.A.
Address: 45 Route of de of Thonon, Geneva, PC 170 CH-1222, Switzerland
Telephone: + 41 (22) 855 09 69
Fax: + 41 (22) 855 09 79
E-mail: info@vemacarbon.com
web Page: www.vemacarbon.com
Contact person: Fabian Knodel

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Project activities starting date: 10.12.2004 – date of signing of preliminary investment agreement with regard to JI Project between company VEMA S.A. (Switzerland) and PJSC «Mariupolgaz».

C.2. Expected operational lifetime of the project:

Functioning of the system of exposure and removal of emissions, and also further support of leakage-proof of gas equipment that is created within the framework of the Project, does not have limits in duration, as periodic repair (replacement) of gas equipment GDP (CGDP) and gas armature, threaded and flanged connections of gas pipelines will be constantly performed. Following the principle of conservatism, for further calculations we accept the life cycle, and also corresponding period of crediting – 13 years / 156 months (2005-2017).

C.3. Length of the crediting period:

The JI project refers to the first commitment period and presents 5 years / 60 months (from January, 1, 2008 till December, 31, 2012).

By the initial date of crediting period the date of the first feasible measures were on Project on gas pipelines of PJSC "Mariupolgaz", namely on January, 10, 2005 was taken, Crediting period will be 8 years /96 months.

If after the first commitment period according to Kyoto Protocol its action will continue, a crediting period of a project will continue till December, 31, 2017. The general period of crediting (before the period of crediting, period of crediting and after completion the period of crediting) will amount in 13 years /156 months.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

With the aim of quantitative estimation and preparation of reports on reduction of methane emissions on the basis of baseline and project activity used JI Specific Approach on the basis of the approved baseline methodology AM0023 version 3.0 «Leak reduction from natural gas pipeline compressor or gate stations» with modification (see division B.1 higher) that improves accuracy of methane emissions volumes measuring.

After exposure and measuring of methane emissons the monitoring program was worked out for all gas equipment GDP (CGDP), locking-regulating gas armature, flanged and threaded connections of gas pipelines of PJSC "Mariupolgaz". Implementation of such program is component part of the project activity. Monitoring embraces both emissions from the sources of leakages that appear again and control after the already repaired gas equipment, on which methane emissions were observed before. Within the framework of JI Project a working group of PJSC "Mariupolgaz" the Register of gas-distributing points and gas armature of JI project "Reduction of methane emissions" was drawn for the gas equipment of gas-distributing points and on the gas armature of gas-distributing networks of PJSC "Mariupolgaz" (see the Supporting document 1), that includes complete information about all GDP (CGDP), locking-regulating gas armature, flanged and threaded connections that enter the limits of the Project. All corresponding data related to the calculation of reduction of methane emissions are kept in an electronic database. Every monitoring report will include all necessary information from this database. Data and documents on a project in a paper and/or electronic kind, in accordance with the Heads of PJSC "Mariupolgaz"Orders of 30.12.2004 № 243 and of 26.05.2011 № 132a are kept till 31.12.2019.

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

At the moment of beginning of the project there was no only methodology of measuring and monitoring of methane emissions in Ukraine. In this connection PJSC "Mariupolgaz" there was a previous investment agreement concluded in relation to the JI project of 10.12.2004 with company VEMA S.A. in accordance with that except that company VEMA S.A. assumed an obligation to work out the Plan and program of monitoring of methane emissions. The monitoring plan was worked out on the basis of methodology AM0023 version 3.0 «Leak reduction from natural gas pipeline compressor or gate stations» with some assumptions in relation to the method of measuring of methane emissions volume described in point B.1 higher, also more thorough monitoring methodology is described in Annex 3.

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

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
1. i	Number. The sequence number of gas equipment GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Activity on measuring of emissions	Sizeless	m	Once	100%	Electronic	A corresponding number is appropriated for every emission found on a device. A list of gas equipment is presented in an accompanying document 1. Verification is conducted after repair.
2. Ti	Time	Records of inspections results	Number of hours of exploitation of its equipment on which emissions were observed during a year	m	Constantly	100%	Electronic	The number of hours of exploitation of equipment for a year from the moment of its replacement (repair)
3. Data	Date	Data on repair (reconstructions) and monitoring (register)	Date of repairs (reconstruction) and monitoring	m	Constantly	100%	Electronic	Date of reconstruction that is used together with the number of hours of exploitation of equipment for determining of the total amount of hours of exploitation. In case of repetition of emissions the accepted date of the last verification that showed absence to the emissions is used.

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
4. GWP_{CH4}	Potential of global warming	IPCC	Tons equivalent in CO2	c	Constantly	100%	Electronic	The developer of the project will conduct monitoring of any changes in potential of the global warming for methane published IPCC and accepted COP
5. $F_{CH4,i}$	Speed of emissions for every found source	Activity on emissions measuring	m3 CH4/hour.	c	Annually	100%	Electronic	Calculated with application of the maximum rejection of error of the device (10% for gas analyzer)
6. t	Temperature	Data of measuring by the thermometer of mercury glass type TL-4	^{0}C	m	Constantly / Periodically	100%	Electronic	Measured for determination of density of CH4.
7. P	Gas pressure	Manometer "Д-59N - 100-1.0 6 kPa".	MPa	m	Constantly / Periodically	100%	Electronic	Measured for determination of density.
8. URi	Factor of vagueness of emissions measuring equipment	Information of producer and/or IPCC GPG	%	m or e	Annually	100%	Electronic	Is estimated where possible, 95% of trust interval, advice of Good Practice Guidance presented in Division 6 2000 IPCC. If a producer of emissions measuring equipment declares the area of vagueness without clarification of confidence interval, it can be accepted 95%

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
9. *Vbag*	Tank capacity	Data of measuring of flowmeter	$м^3$	m	Once	100%	Electronic / paper	A tank is filled with water. Amount of water that is taken into account by a flowmeter will be the tank capacity. Measuring showed that the tank capacity is 0.11 м3.
10. $w_{sampleCH4,i}$	Methane concentration in a sample	Data of measuring of gas analyzer EX - TEC® SR5 or EX - TEC® HS 680	%	m	Each time while measuring	100%	Електронному	Concentration of methane in the sample (in a capacity) of emission is the difference between the concentration of methane in a sample at the beginning and in the end of measuring. Theconcentration is measured by means of gas analyzers EX - TEC® SR5 or EX - TEC® 680.
11. τ_i	Period during which methane concentration in a tank reaches a certain level	Data of measuring of second measuring devices "SOS pr-2б-2"	Seconds	m	Each time while measuring	100%	Electronic	Time during which the concentration of methane in a capacity arrives at a certain level is determined by means of stop-watch. Measuring begins from the moment of opening of faucet on a lid of the tank and is finished at the achievement of concentration of methane in the capacity of certain level.

Table 4. Data which will gather for monitoring of leaks of methane under the JI project

According to the current legislation, all measuring equipment in Ukraine must satisfy the set norms and corresponding standards and pass periodic verification (one time per year).

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

Using the method of measuring of emissions volume by means of leakage-proof tank, the volume of methane emissions from one gas equipment (armature) after repair (replacements) is possible to calculate according to the formula:

$F^{+}_{CH4,i} = Vbag * w_{sampleCH4,i} * 3600 / \tau_i$, where (1)

$F^{+}_{CH4,i}$ - speed of methane emissions (emission volume) through leaking equipment and after the repair (substitution) (m³/hour.);
Vbag - leakage-proof tank volume for measuring (m³);
$w_{sampleCH4,i}$ - methane concentration in the emission sample, which is the difference of concentrations at the beginning and the end of measuring (%);
τ_i - average duration of filling the tank for emission and up to the determined concentration (seconds).

Adjustment of speed (volume) of methane emissions till normal conditions:
Received as the result of measuring the speed (volume) of methane emissions is agjusted to the normal conditions ($P_н$ = 0,1013 МПа, $T_н$ = 273 К) as per the formula:

$$F_{CH_4,i,P} = \frac{F^{+}_{CH_4,i} \cdot 273 \cdot P}{0{,}1013 \cdot (273+t)}$$, where (2)

$F_{CH_4,i,P}$ – speed (volume) of project (after repair, substitution) of methane emission for i- equipment, adjusted to the normal conditions (m^3/hours.);
P – gas pressure in the tank, MPa;
t – temperature of gas in the tank, °C.

Annual project methane emissions (emissions after repair, equipment substitution) are calculated as per the formula:

$Q_{yP} = ConvFactor * \Sigma[F_{CH_4,i,P} * Ti,y * URi] * GWP_{CH4} * 0,9$, where (3)

QyP - methane emissions during the period y, for equipment, which was repaired (substituted) (tCO2eq);
ConvFactor - coefficient of transformation m³CH4 in tCH4. Under normal conditions (0 °C and 0.1013 MPa) it equals 0.0007168 tCH4/m³CH4;
URi - coefficient which takes into account the vagueness of measuring method (equals to 95%);
Ti,y - time (in hours) for i-equipment, which functioned during period **y** (period of monitoring) being repaired (substituted);

GWP_{CH4} - Global Warming Potential for methane (equals to 21 tCO2eq/tCH4);
0,9 - coefficient which takes into account the error of measuring devices.

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
1. i	Number. The sequence number of gas equipment GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Activity on measuring of emissions	Sizeless	m	Once	100%	Electronic	A corresponding number is appropriated for every emission found on a device. A list of gas equipment is presented in an accompanying document 1. Verification is conducted after repair.
2. Ti	Time	Records of inspections results	Number of hours of exploitation of its equipment on which emissions were observed during a year	m	Constantly	100%	Electronic	The number of hours of exploitation of equipment for a year from the moment of its replacement (repair)

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
3. Data	Date	Data on repair (reconstructions) and monitoring (register)	Date of repairs (reconstruction) and monitoring	m	Constantly	100%	Electronic	Date of reconstruction that is used together with the number of hours of exploitation of equipment for determining of the total amount of hours of exploitation. In case of repetition of emissions the accepted date of the last verification that showed absence to the emissions is used.
4. GWP_{CH4}	Potential of global warming	IPCC	Tons equivalent in CO2	c	Constantly	100%	Electronic	The developer of the project will conduct monitoring of any changes in potential of the global warming for methane published IPCC and accepted COP
5. $F_{CH4,i}$	Speed of emissions for every found source	Activity on emissions measuring	m3 CH4/hour.	c	Annually	100%	Electronic	Calculated with application of the maximum rejection of error of the device (10% for gas analyzer)
6. t	Temperature	Data of measuring by the thermometer of mercury glass type TL-4	^{0}C	m	Constantly / Periodically	100%	Electronic	Measured for determination of density of CH4.
7. P	Gas pressure	Manometer "Д-59N - 100-1.0 6 kPa".	MPa	m	Constantly / Periodically	100%	Electronic	Measured for determination of density.

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
8. URi	Factor of vagueness of emissions measuring equipment	Information of producer and/or IPCC GPG	%	m or e	Annually	100%	Electronic	Is estimated where possible, 95% of trust interval, advice of Good Practice Guidance presented in Division 6 2000 IPCC. If a producer of emissions measuring equipment declares the area of vagueness without clarification of confidence interval, it can be accepted 95%
9. *Vbag*	Tank capacity	Data of measuring of flowmeter	$м^3$	m	Once	100%	Electronic / paper	A tank is filled with water. Amount of water that is taken into account by a flowmeter will be the tank capacity. Measuring showed that the tank capacity is 0.11 м3.
10. $w_{sampleCH4,i}$	Methane concentration in a sample	Data of measuring of gas analyzer EX - TEC® SR5 or EX - TEC® HS 680	%	m	Each time while measuring	100%	Електронному	Concentration of methane in the sample (in a capacity) of emission is the difference between the concentration of methane in a sample at the beginning and in the end of measuring. Theconcentration is measured by means of gas analyzers EX - TEC® SR5 or EX - TEC® 680.

ID number *(Please, use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
11. τ_i	Period during which methane concentration in a tank reaches a certain level	Data of measuring of second measuring devices "SOS pr-2б-2"	Seconds	m	Each time while measuring	100%	Electronic	Time during which the concentration of methane in a capacity arrives at a certain level is determined by means of stop-watch. Measuring begins from the moment of opening of faucet on a lid of the tank and is finished at the achievement of concentration of methane in the capacity of certain level.

Table 5. The data necessary for definition of a base line of GHG emissions

.

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

Using the method of measuring of volume of emissions by means of impermeable capacity, the volume of base methane emissions from one equipment is calculated by the formula:

$\bar{F}_{CH_4,i}$ = Vbag * $w_{sampleCH4,\ i}$ * 3600 / τ_i , where (4)

$\bar{F}_{CH_4,i}$ speed (volume) of methane emissions through leaking equipment and before repair (м³/hours);

Vbag volume of impermeable tank for measuring (м³);

$w_{sampleCH4,\ i}$ concentration of methane in the sample of emission *i* that is the difference of concentrations at the beginning and at the end of measuring (%);

τ_i average duration of filling to the tank for emissions i before its repair(seconds).

The speed (volume) of methane emissions got as the result of measuring is corrected to the normal conditions ($P_Н$ = 0,1013 МПа, $T_Н$ = 273 К) as per the formula:

$$F_{CH_{4,i,B}} = \frac{\bar{F}_{CH_{4,i}} \cdot 273 \cdot P}{0{,}1013 \cdot (273+t)}$$, where (5)

$F_{CH_{4,i,B}}$ is speed (volume) of base methane emission for i -element, corrected to the normal conditions (m3/hours);
P is pressure of gas in a tank, MPa;
t is a gas temperature in a tank, °C.

The annual base methane emissions are calculated as per the formula:

QyB = ConvFactor *Σ[* Ti, y * of URi]*GWPCH4*0,9 , where (6)

QyB base extrass of methane on gas equipment for the period y (tCO2 equivalents);
ConvFactor coefficient of counting of m³of CH4 in tCH4 at normal conditions (0 degrees celsius and 101.3 kPa). It equals 0,0007168 tCH4/m³ CH4;
URi coefficient that takes into account the vagueness of method of measuring;
Ti, y time (in hours) for the equipment of i, that functioned during the considered period y (monitoring period) before its repair (replacements);
GWP_{CH4} Potential of Global Warming for methane (21 tCO2eq/equals tCH4);
0,9 coefficient that takes into account the error of measuring devices.

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

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

The direct monitoring of emissions reduction is not used.

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 direct monitoring of emissions reduction is not used.

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

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
-	-	-	-	-	-	-	-	-

No emissions.

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

No emissions.

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):

The amount of Emission Reduction Units extrass (ERU) in CO2e is calculated as per the formula:

$$ERU = \sum[Q_{yB} - Q_{yP}] \quad \text{, where} \qquad (7)$$

ERU– Emissions unit reduction, t CO_2;
Q_{yP} – project emissions, t CO_2;
Q_{yB} – base emissions, t CO_2.

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:

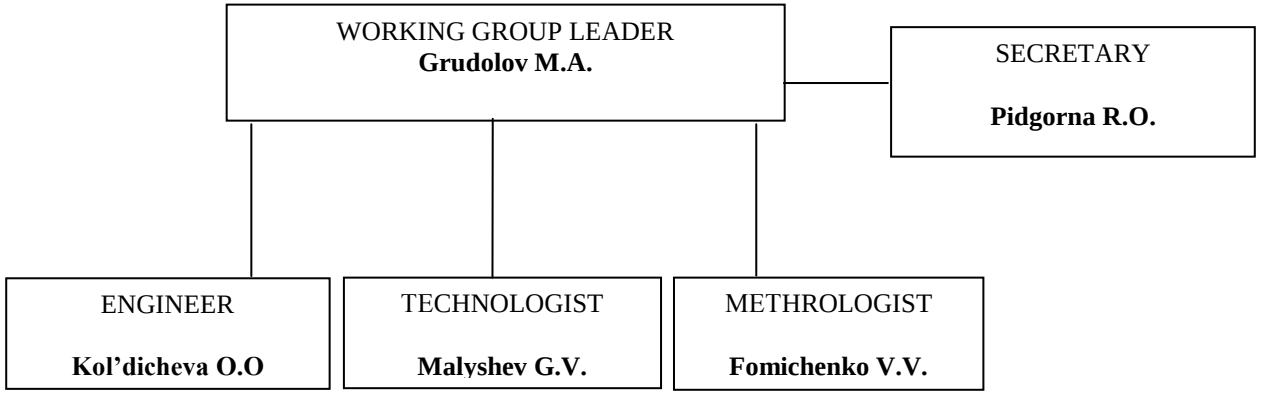
Introduction of this Project does not foresee negative influence on an environment (see the division F below), that is why the collection of data in relation to influence of Project on environment is not required. In Ukraine there are no laws or normative documents that would require collection of similar information.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Determine the table and identity number)*	**Data uncertainty level (High/Middle/Low)**	**Please explain whether any QM/QA procedures have been scheduled for these data, or why there is no need to perform such procedure**
1.	Low	Every emission must be marked with a number and after repair there must monitoring conducted with the aim of determination of additional emissions
2.	Low	The magazine of data must be set there where for the equipment that often becomes disconnected, with the aim of measuring of the use hours
3.	Low	Working orders, instructions and other records must be kept in the additional magazine of repair
4.	Low	The participants of the project will keep the records of any new values for greenhouse gases of accepted COP
5.	Low	The level of emissions will be measured and twice tested before repair - basic disparities will be warned by the third test. Otherwise speaking, if a gas analyzer is used for measuring of level of emissions, and if the results of two tests will considerably differ one from other, verification must proceed until then, when results of two measuring will be near to each other (to decrease any disparities in the process of testing). If a gas analyzer or any other equipment require re-calibration, to confirm exactness, the participants of project must accept necessary measures for this purpose.
6.	Low	The records of data about equipment that is calibrated and checked up take place on regular basis.

7.	Low	The records of data about equipment that is calibrated and checked up take place on regular basis.
8.	Average/Low	IPCC GPG will be consulted in the relation of the expected disparities.
9.	Low	Volume of impermeable tank does not change in course of time, therefore permanent verification of its volume is not obligatory.
10.	Low	Gas analyzers EX - TEC® SR5 and EX - TEC® HS 680 correspond to the requirements of the European standard EN50054/57 and pass annual calibration/check.
11.	Low	A stop-watch is a simple device and is not included in the list of devices, that must pass an annual check. There will be a stop-watch COC pr-2б-2 used, which corresponds to GOST 5072-72 .

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

Co-ordination of work of all departments and services of PJSC "Mariupolgaz" is carried out in relation to introduction of JI project by the Working group created by Order of Chairman of Board of PJSC "Mariupolgaz" № 243 of 30.12.2004. The update structure of the Working group was approved by Order of General director of PJSC “Mariupolgaz” №132a of 26.05.2011 and is presented on Pic. 5



Pic.5. Structure of the Working group.

Responsible for collection of all information foreseen by the monitoring plan, and also implementation of all necessary calculations is Kol'dicheva O.O. Responsible for storage and archiving of all got information as a result of the conducted measuring and calculations is Pidgorna R.O. On the basis of the received information the leader of the working group Grudolov M.A. determines the plan of measures on Project and the volume of necessary resources. Technical support of the Project is performed by Malyshev G.V. Fomichenko V.V. provides the presence of trusted measuring equipment.

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

Company VEMA S.A.
Address: 45 Route of de of Thonon, Geneva, PC 170 CH-1222, Switzerland
Telephone: + 41 (22) 855 09 69
Fax: + 41 (22) 855 09 79
E-mail: info@vemacarbon.com
web Page: www.vemacarbon.com
Contact person: Fabian Knodel

Company VEMA S.A. is the project participant.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

The estimation of project emissions was performed on the basis of the data received according to the plan of monitoring presented in point D.1.1.2 and Annex 3. The results of measuring and calculations conducted by company VEMA S.A. (see Supporting document 2[13]) according to the certain plan of monitoring of emissions, resulted in Table 4

Year	Estimated project emissions (tons CO_2 equivalent)
2005	6 224
2006	21 783
2007	40 455
Total 2005 - 2007	68 462
2008	46 679
2009	46 679
2010	46 679
2011	46 679
2012	46 679
Total 2008 - 2012	233 394
2013	46 679
2014	46 679
2015	46 679
2016	46 679
2017	46 679
Total 2013 - 2017	233 394
Total (tons CO_2 equivalent)	535 250

Table 6. Estimated project emissions

E.2. Estimated leakage:

No leakage found.

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

As there is no leakage, the sum of E.1. and E.2. will be equal to E.1. (see Table 6).

[13] Supporting document 2 – "Calculation of methan emissions reduction on the gas equipment of GDP (CGDP), on the gas armature, flange, threaded joints of gas-distributing networks made on the basis of initial monitoring measurements", executed in an electronic form and submitted to the State Environmental Investment Agency of Ukraine and project inspectorate - company Bureau Veritas Certification Holding SAS.

E.4. Estimated baseline emissions:

Analogous to the project, using formulas given in paragraph D.1.1.4, the basic emissions were also estimated, as it is given in Table 7.

Year	Estimated baseline emissions (tons CO_2 equivalent)
2005	54 998
2006	192 495
2007	357 490
Total 2005 - 2007	604 983
2008	412 489
2009	412 489
2010	412 489
2011	412 489
2012	412 489
Total 2008 - 2012	2 062 443
2013	412 489
2014	412 489
2015	412 489
2016	412 489
2017	412 489
Total 2013 - 2017	2 062 443
Total (tons CO_2 equivalent)	4 729 869

Table 7. Estimated baseline emissions

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

The estimation of annual reduction of greenhouse gases project emissions is calculated as per the formula:

Estimated Project reduction of emissions = Estimated baseline emissions – (Estimated project emissions + Estimated leakage) (7)

All results of estimation of reduction of project emissions are in Table 8 below.

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

Year	Estimated baseline emissions (tons CO_2 equivalent)	Estimated leakage (tons CO_2 equivalent)	Estimated project emissions (tons CO_2 equivalent)	Estimated emission reductions (tons CO_2 equivalent)
2005	54 998	0	6 224	48 775
2006	192 495	0	21 783	170 711
2007	357 490	0	40 455	317 035
Total 2005 - 2007	604 983	0	68 462	536 521
2008	412 489	0	46 679	365 810
2009	412 489	0	46 679	365 810
2010	412 489	0	46 679	365 810
2011	412 489	0	46 679	365 810
2012	412 489	0	46 679	365 810
Total 2008 - 2012	2 062 443	0	233 394	1 829 049
2013	412 489	0	46 679	365 810
2014	412 489	0	46 679	365 810
2015	412 489	0	46 679	365 810
2016	412 489	0	46 679	365 810
2017	412 489	0	46 679	365 810
Total 2013 – 2017	2 062 443	0	233 394	1 829 049
Total (tons CO_2 equivalent)	4 729 869	0	535 250	4 194 619

Table.8. Expected emission reductions CO_2.

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:

According to the ecological norms of Ukraine the emissions of natural gas to the atmosphere are not pollutants. Therefore no ecological permissions on transporting and supply of natural gas are needed. The only influence on environment by the project implementation is reduction of emissions of natural gas to the atmosphere.

Introduction of this project will allow promoting safety of exploitation of gas-distributing networks that will decrease probability of explosions or fires.

Transboundary influence by the project activity, in accordance with their determination in text of the "Convention on transboundary contamination at long range", ratified by Ukraine, will not occur.

The Project activity does not cause harmful influence to the environment.

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 project implementation does not foresee any harmful influence on the environment.

SECTION G. Stakeholders' comments

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

Consultations were conducted with the specialists of Institute of General Energy of NAS of Ukraine. Comments from local Stakeholders were not received. The project activity does not foresee negative influence on the environment and negative social effect.

ANNEX 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

The Supplier:

Organization:	PJSC «Mariupolgaz»
Street, number and/c:	Mykolayivska str.
House:	16
City:	Mariupol
State/region	Donetsk Region
Postal code	87515
Country	Ukarine
Telephone	+(0629) 33-41-16
Fax	
Address of site	www.margaz.com.ua
Who presented	
Position	General director
Address name	
Surname	Veremeenko
Patronymic	Volodymyrovych
Name	Mykhylo
Department	
Direct fax	
Direct telephone	
Mobile telephone	
Personal e-mail	pto@margaz.com.ua

Partner – the Buyer

Organization:	VEMA S.A. (Registered in Switzerland 26 September 1994)
Street, number and/c:	Route de Thonon
House:	45
City:	Geneva
State/region	
Postal code	Case postale 170 CH-1222 Vésenaz
Country	Switzerland
Telephone	+41 (22) 855 09 69
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Address of site	info@vemacarbon.com
Who presented	www.vemacarbon.com
Position	Director
Address name	Mister
Surname	Knodel
Patronymic	
Name	Fabian
Department	
Direct fax	
Direct telephone	+41 (22) 855 09 79
Mobile telephone	+41 (22) 855 09 69
Personal e-mail	

ANNEX 2

BASELINE INFORMATION

To determine the basic line the following parameters are used:

№	Parameter reference	Name to the parameter	Data measuring units
1.	i	The sequence number of gas equipment GDP (CGDP), gas armature, where methane emissions are found , removed, and then checked	Sizeless
2.	Ti	The amount of hours of exploitation of equipment on which emissions were found during a year	Hour
3.	-	Time of repair (reconstruction)	Month and year
4.	GWP_{CH4}	Potential of the global warming for methane	Tons equivalent CO2
5.	$F_{CH4,i}$	Emission speed for each found emission	m^3 (CH4)/hour
6, 7	t, P	Temperature and gas pressure	^{0}C i MPa
8.	URi	Vagueness factor of emission measuring equipment	%
9.	*Vbag*	Tank capacity	m^3
10.	$w_{sampleCH4,i}$	Methane concentration in a tank	%
11.	τ_i	Time when methane concentration reaches a certain level	second

The detailed specification of parameters for determination of the baseline is presented in tables of section B.1.

Calculation of the baseline is performed as per formulas (4), (5) and (6) (section of D.1.1.4).

ANNEX 3

MONITORING PLAN

The monitoring plan includes such divisions:

1. The program of the initial monitoring measuring of methane emissions on the gas equipment of GDP (CGDP), on gas armature, on the threaded and flanged connections of gas-distributing networks of PJSC "Mariupolgaz".
2. Map of monitoring of methane emissions on the gas equipment GDP (CGDP), on gas armature, threaded and flanged connections of gas-distributing networks of PJSC "Mariupolgaz".
3. Methodology of realization of measuring of methane emissions.
4. Guidance on collection and storage of these monitoring measuring.

I. PROGRAM

Of initial monitoring measuring of methane emissions on the gas equipment GDP (CGDP), gas armature, threaded and flanged connections of gas-distributing networks of PJSC "Mariupolgaz".

The aim of the initial monitoring measuring of methane emissions is:

1. Receipt of a more reliable estimation of volumes of methane emissions from the gas-transport system (AFTER EXCEPTION of the emissions, related to exploitation, technical service or emergency situations) and determination of potential profit from JI Project, and, thus, the volume of necessary repair works/replacements of gas equipment, that may be needed, on condition of attractive term of return on the invested funds.
2. ERUs estimate during JI project realisation.
3. Definition of the potential income of the project and volume of repair work which are necessary under condition of an attractive time of recovery of outlay of the enclosed investments
4. Determination of priorities in relation to works, that must be executed on gas equipment.
5. Piling up of initial experience at the use of measuring equipment, determination of questions, that must be solved or improved (such as additional measuring equipment, degree of exactness of devices, necessity of studies of corresponding workers) before the beginning of the project, to provide him the proper work.

The JI project has the following stages:

- determination of list of objects on which methane emissions are observed;
- measuring of volumes of methane emissions on objects;
- removal of methane emissions on objects by repair of gas equipment or replacement of pressure-sealing materials, or complete replacement of equipment;
- monitoring of emissions on the already repaired (substituted) equipment.

On the primary stages the most essential questions are the receipt of model of methane emissions on GDP (CGDP) gas equipmebt and on gas armature of the gas-distributing networks. If realization of complete inspection of all elements on every GDP (CGDP) will appear inadvisable, then it is necessary to choose the most model and characteristic elements. For example, for the workers of the stations it must be a reasonable idea, for what objects what equipment is the best decision and on what terms the verification of these two issues to be done. Certain issues have to be deterimed systematically during preliminary measurings:

- where emissions take place and what is their size parameters;
- what places emissions are relatively small in;

- on what places there are possibilities for repair or/and replacements of equipment, that require small charges;
- where greater emissions are found, the removal of which will not demand greater charges.

Quality information (for example, difficulties in measuring on concrete valves through the limited access to them et cetera) also must be fixed, wherein it is possible to facilitate planning and implementation of the project.

The system of the name/ numeration of gas equipment must be concerted before THE BEGINNING of measuring.

Tables, stated below must carry explanatory and actual information, not order and normative character.

Table 1MP. Information about an object - (name of GDP or CGDP)

Recorded technical verification of gas equipment of GDP (a magazine is on service that is conducted by inspectors) - one time per four days, is performed by the corresponding authorized worker. Emissions are specified in the magazine of reports. Gas contamination is determined under the use of gas detector with the aim of providing of PBSGU requirements with the aim of prevention of emergency situations.

Current repair is conducted one time per year, technical service - one time per half-year.

Name of GDP (CGDP) (code according to the Register)	Gas pressure at entrance /exit, (MPa)	Gas temperature at entrance /exit, ^{o}C	Average volume of the transported gas, m3/hour.	% CH_4 (methane) in gas
1	2	3	4	5

Table 2MP. Protocol of measuring of methane emissions (name of GDP or CGDP)

Dates of realization of measuring : _____
Atmospheric pressure during realization of measuring : _____ (MPa)
Temperature of air during realization of measuring : _____(0C)
Volume of impermeable tank : _____ (м3)

№	Name of gas equipment	Measuring of sample of air flow		Time of filling the leakage-proof tank, sec	Methane emissions, m3/hour.	Yearly emisison GHG, tCO2/year
		Background concentration, %	Concentration of sample by the end of measuring, %			
1	2	3	4	5	6	7
1	GDP (CGDP)t					
2	Entrance bolt					
3	3 working faucet with a manometer					
4	Filter					
5	Bolt bypass					
6	3 working faucet					

№	Name of gas equipment	Measuring of sample of air flow		Time of filling the leakage-proof tank, sec	Methane emissions, m3/hour.	Yearly emisison GHG, tCO2/year
		Background concentration, %	Concentration of sample by the end of measuring, %			
1	2	3	4	5	6	7
	with a manometer					
7	Bolt bypass					
8	Manometer					
9	PZK					
10	Pressure regulator					
11	Exit bolt					
12	Comb with faucets (number of faucets on impulsive gas-di)					
13	PSK					
14	Manometre					
15	Object exit bolt					
Second line of reduction						
16	Entrance bolt					
17	3-way faucet with a manometre					
18	Filter					
19	Manometre					
20	PZK					
21	Pressure regulator					
22	Exit bolt					
23	Comb with faucets					
24	PSK					
25	Manometre					

Measuring conducted: _____
_____

Explanation to Table 2.

(1) Sequence number of equipment as per the register.
(2) Names of equipment.
(3) Base-line concentration is a concentration of methane in impermeable tank before the beginning of measuring (by volume percent).
(4) Concentrations of sample is a concentration of methane in impermeable tank at the end of measuring (by volume percent).

(5) Time filling of impermeable tank by methane to the set concentration (seconds).
(6) Emissions of methane in m3 calculated as per the formula (4) and (5) PDD
(7) Annual methane emisisons in tCO2 equivalent calculated as per the formula (6) of PDD

Table 3MP. Protocol of measuring of methane emissions on gas armature

Date of realization of measuring : _____
Atmospheric pressure during realization of measuring : _____ (MPa)
Temperature of air during realization of measuring : _____(0C)
Volume of impermeable tank : _____ (m3)

№	Code as per Register	Address	Measuring of air flow sample		Time of leakage-proof tank filling, sec	Methane emissions, m^3/hour.	Yearly emissions , tCO2/year
			Methane background concentration, %	Sample concentration %			
1	2	3	4	5	6	7	8

Measuring conducted: _____
_____

Explanation to Table 3.

(1) Sequence number of gas armature.
(2) Codes of gas armature as per Register.
(3) Addresses of location of gas armature.
(4) Base-line concentration is a concentration of methane in impermeable tank before the beginning of measuring (by volume percent).
(5) Concentration of sample is a concentration of methane in impermeable tank by the end of measuring (by volume percent).
(6) Time of impermeable tank filling with methane to the value of concentration of it. (6) (seconds).
(7) Hourly methane emissions calculation as per the formula (1) and (2).
(8) Annual methane emissions calculated as per the formula (3).

II. MONITORING MAP

of methane emissions on the gas equipment GDP (CGDP), on gas armature, threaded and flanged connections of gas-distributing networks of PJSC "Mariupolgaz".

The monitoring map determines the general order of realization of the annual measuring of methane emissions on gas equipment GDP (CGDP), gas armature, flanged and threaded connections of gas-distributing networks of PJSC "Mariupolgaz" , that are included in the limits of the JI project.

In accordance with project activity (Division A..2 of Project Design Documentation), every found methane emissions on gas equipment GDP (CGDP), gas armature, flanged and threaded connections of gas-distributing networks of PJSC "Mariupolgaz"" must be marked with an individual number.

With the aim of marking of found methane emission an individual number of PJSC "Mariupolgaz" draws the Register of gas-distributing points and gas armature of JI project "Reduction of methane emissions on gas equipment GDP (CGDP), gas armature, flanged and threaded connections of gas-distributing networks of PJSC “Mariupolgaz” (further as per the text of the Register), also the individual number (code) is appropriated for every object, and also such data are specified:

- place of location of equipment (address);
- type of equipment
- type of connection of equipment with the gas-transport system (for shunt-down devices);
- amount of flanged connections;
- amount of the threaded connections;
- conditional diameter;
- pressure of gas, on that an equipment is counted;
- year of introduction to exploitation;
- place of establishment (for the gas armature of gas-distributing networks).

In a period from 2005 to 2007 measuring of methane emissions on gas equipment is conducted annually only on that equipment, which was reparied during the passing year, works of pressurizing or replacement of equipment, conducted in accordance with Chart of Project Implementation (it. 4 Division A..4.2 of Project Design Documentation).

Measuring of volumes of methane emissions on gas equipment during realization of the first repair (replacements) of equipment in accordance with Chart of Project Implementation is conducted twice: the first time - to repair (replace) equipment, the second time - after repair (replacements).

Beginning from 2008 measuring of volumes of methane emissions are conducted not rarer, than one time per year on every gas equipment of PJSC “Mariupolgaz” , that is in the Register, to ascertain, that the gas equipment did not become the source methane emission again.

Technical maintenance of gas equipment, that is in the Register, is conducted not rarer than one time per half of a year.

Permanent repair of gas equipment that is in the Register is conducted one time per year.

In the case when the monitoring measuring of methane emission from the gas equipment shows presence of the volume emission that exceeds the volume of emission after the first repair (replacement) of equipment, such equipment must be repaired (substituted) in the near-term order.

Types of the data and the parametres used during annual monitoring measurements of volumes of leaks of methane present in the Table 4MP:

Table 4MP. Types of the data and the parametres used during annual monitoring measurements of methane leaks volumes

Ty -pe	Properties	Parame tr № in the Table 3 PDD	Designati on	Name to the parameter	Data measuring units
(i)	Data and parameters that are not monitored throughout the crediting period, but are	1	i	The sequence number of gas equipment GDP (CGDP), gas armature,	Sizeless

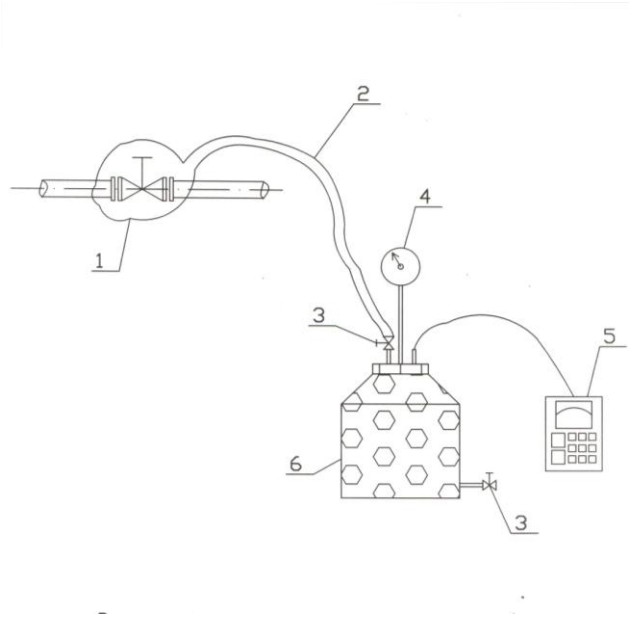
	determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination			where methane emissions are found , removed, and then checked	
		9	V_{bag}	Tank capacity	m^3
(ii)	Data and parameters that are not monitored throughout the crediting 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	-	-	-	-
(iii)	Data and parameters that are monitored throughout the crediting period	2	Ti	The amount of hours of exploitation of equipment on which emissions were found during a year	Hour
		3.	-	Time of repair (reconstruction)	Month and year
		4.	GWP_{CH4}	Potential of the global warming for methane	Tons equivalent CO2
		5.	$F_{CH4,i}$	Emission speed for each found emission	m^3 (CH4)/hour
		6.	t, P	Temperature	^0C
		7.	P	Gas pressure	MPa
		8.	URi	Vagueness factor of emission measuring equipment	%
		10.	$w_{sampleCH4,i}$	Methane concentration in a tank	%
		11.	τ_i	Time when methane concentration reaches a certain level	second

III. METHODOLOGY OF REALIZATION OF METHANE EMISSIONS MEASURING

Composition of brigade for realization of measuring :
Master of service exploitation of street gas pipelines and court introductions (SESG and CI);
A locksmith on exploitation and repair of gas equipment of GDP - 1 man;
A locksmith SESG and CI - 1 man.

Necessary materials, instruments and devices :
1) Keys, instruments;
2) Highly sensitive gas analyzer EX - TEC® SR5 or EX - TEC® HS 680 - 1 it.;
3) Impermeable (leakage-proof) tank, impermeable sack, hose, encapsulant, sticky ribbon (scotch);
4) Manometers;
5) Thermometer;
6) Barometer;
7) Stop-watch;

8) Fire-extinguisher.
There is a chart of fluidizer realization of measuring of methane emissions (see Pic. 6).



Pic.6. There is a chart of fluidizer measuring of methane emissions.

Denotation:
1. Impermeable sack.
2. Hose.
3. Faucet.
4. Manometer.
5. Gas analyzer EX - TEC® SR5 or EX - TEC® HS 680.
6. Impermeable tank (capacity).
Order of realization of measuring of methane emissions on the gas equipment of GDP (CGDP) and gas armature of gas pipelines :
1. To check GDP (CGDP, well) where gas equipment and gas armature are placed, on that measuring will be conducted, if it is not gassed. To conduct intention of gas contamination of GDP (CGDP, well) the gas analyzer EX - TEC® SR5 or EX - TEC® HS 680 (5).
2. To set a tank (6). To put a sack (1) on an element, on which measuring of methane emission will be conducted.
3. To connect a sack (1) and tank (6) with the help of the hose (2).
4. By a sticky ribbon to overbalance connection of the hose (2) and sack (1) for impermeability of connection.
5. To measure with the gas analyzer (5) the base-line concentration of methane in tank (6) and to enter its value in the minutes of measuring.
6. To open a faucet (3) in the place of connection to the hose (2) with a tank (6) and to include a stop-watch.
7. To close a faucet (3) in the place of connection to the hose with a tank in 180 seconds, to turn off a stop-watch.
8. By means of gas analyzer (5) to define the concentration of methane in tank and enter its value in the minutes of measuring.
9. Control of pressure of gas in tank (6) is done with the help of the manometer(4).

10. To define the temperature of air by means of thermometer type TL4 and enter its value in the minutes of measuring.
11. To define atmospheric pressure by means of barometer and enter its value in the minutes of measuring.
12. After measuring to disconnect a hose (2) from the tank (6).
13. To open a faucet (3) for ventilation of the tank (6).

Given, that fixed during realization of measuring of source of methane in protocol of measuring :
1. Name and code of GDP (CGDP) (if measuring is performed on gas equipment of GDP (CGDP).
2. Name, code of gas equipment GDP (CGDP) or gas armature of gas pipeline on that measuring of methane emission is conducted.
3. Address of location of GDP (CGDP) (if measuring is performed on gas equipment of GDP (CGDP) or gas armature on which measuring of methane emission is conducted .
4. Date of realization of measuring
5. Temperature of air (oC).
6. Atmospheric pressure (kPa).
7. A base-line concentration of methane in tank (%)
8. Concentration of methane in tank at the moment of completion of measuring (%)
9. Measuring (180 sec) duration.
10. The last names, name and patronymic of persons that conducted measuring.

IV. GUIDANCE
on collection and storage of these monitoring measuring

Realization of JI Project provides for :

1. Starting and next regular monitoring inspections of every gas equipment, that is in the Register, and realizations of measuring of methane emissions.
2. Repair (replacement) of threadbare gas equipment.
All data, collected in the process of realization of JI project, must be collected and entered in one database. The database must be constantly filled up during all term of action of JI Project, including data about the new sources discovered and removed during the project duration. In monitoring reports on JI Project the data must be included from a database
It is recommended to create a Working force on JI Project at the enterprise, and to define responsibility for collection of all information on the JI project, storage and archiving of documents on the project of JI to the separate members of the Working group.
Basic information generators for the calculation of units of reduction of methane emissions are documents, the properties of which are given in Table 5MP below

Table 5MP. List of preliminary documents formed during JI Project realization

№	The name of document	Document data source	Document format	Person who draws the document	Document is formed for the purpose	Place of document storage
1	Register of gas equipment of GDP (CGDP), gas armature, threaded and flanged joints	Technical documentation	Electronic table	Technical personnel and accounting office of the enterprise	To mark the places of methane emissions	At the secretary of JI project Working group

№	The name of document	Document data source	Document format	Person who draws the document	Document is formed for the purpose	Place of document storage
2	Protocols of measuring of sources of methane	Beginning and monitoring measuring	Filled paper forms with measuring data signed by the executing personnel	Masters of exploitation service	To form the information of the beginning and monitoring measurings	At the secretary of JI project Working group
3	List of the initial and monitoring measuring of methane emissions	Protocols of measuring of methane emissions	Electronic table	Authorized member of Working group	To calculate the volumes of methane emissions	At the secretary of JI project Working group
4	Calculation of volumes of methane emissions	PDD and Information of the monitoring of methane emissions measuring	Electronic table	Authorized member of Working group	To form Monitoring reports	At the secretary of JI project Working group
5	Report magazines on the exposure of sources	Reports of inspectors of exploitation service of gas pipelines and GDP (CGDP)	Filled paper forms with data on found emissions during duty once per four days	Masters of exploitation service of pipelines and GDP (CGDP)	For emissions elimination	At departments of exploitation service of pipelines and GDP (CGDP)
6	Magazines of technical maintenance of GDP (CGDP)	Supervision of inspectors of exploitation service	Filled paper forms	Workers of exploitation service of GDP (CGDP)	To supervise technical state of the equipment	In the middle of GDP (CGDP)