MONITORING REPORT OF JI PROJECT

Monitoring period:
01/01/2008 – 30/06/2011

Version 02
September07, 2011

"Reduction of greenhouse gases emissions by gasification of Odesa region"

CONTENTS

ANNEXES

[1]Annexes 2, 3, 4 areprovidedintheform of Excel filesas separate supporting documents

SECTION A. General project activity and monitoring information

A.1.Name of the project:

"Reduction of greenhouse gases emissions by gasification of Odesa region"
Sectoral scope - 3 "Energy demand"

A.2. Informationaboutregistrationandapprovaloftheproject:

The project obtained approval from Ukraine (the Host country) in September 2011 (Letter of Approval № 2401/23/7, issued by the State Environmental Investment Agency of Ukraine dated 05/09/2011). The project was also approved by Switzerland, the country – buyer of GHG emission reductions (Letter of Approval № J294-0485, issued by the Federal Office for the Environment (FOEN) dated23/08/2011).

A.3. Brief description of the project:

The main goal of the project is reduction of greenhouse gas emissions by changing the structure of fuel consumption in industrial, municipal, administrative and private sectors of Odesa region by replacing solid and liquid fuels with natural gas. The project provides for construction and expansion of gas distribution systems (GDS) of Odesa region, which will also improve the energy efficiency of thermal power generation due to the transition of existing thermal power plants to natural gas, and installation of individual heating and hot water supply systems characterized by better efficiency compared to centralized systems. The project initiated by OJSC "Odesagas" will result in the reduction of greenhouse gas emissions into the atmosphere and will improve the environmental situation in the region.
The***baseline scenario*** is to continue operating the existing systems of transportation andpreparation of energy carrier as well asheating systems that would result in the use by the end consumers of less eco-friendly fuel (fuel oil, coal, diesel oil), which would generate a significant amount of greenhouse gases (GHG) when combusted. In addition, the continued operation of obsolete equipment (most of which was produced in the USSR) and, consequently, low efficiency of transportation system and energy consumption system will lead to excessive use of fossil fuel that would nourish the harmful effects of atmospheric pollution by GHG emissions.

The project scenario involves expansion of the territorial gas supply system, which includes construction and reconstruction of:

- Gas distribution networks (GDN);
- Gas distribution points (GDP), including cabinet-type gas distribution points (CGDP).

The project provides for modernization of the fuel consumption system of Odesa region by means of the implementation of measures for transition of thermal units to natural gas and transferring the consumers from centralized to individual heating and hot water supply systems, which, in turn, will lead to the use of more efficient and environmentally friendly fossil fuel (natural gas), improvement of the quality of heating and hot water supply services, reduction of thermal energy consumption due to increased efficiency of individual systems in comparison with centralized ones.
In general, the project activity is aimed at:

- Ensuring the supply of gaseous fuels (gasification) to end users by means of the construction and reconstruction of gas distribution networks;
- Replacement of solid and liquid fuels and electricity with natural gas;
- Increase in heat energy efficiency;
- GHG emission reductions under the Joint Implementation Mechanism (JI).

According to collected data the following amount of emission reduction units was achieved during the monitoring period:

Table1.GHG emission reductions during the monitoring period

Monitoring period (01/01/2008 – 30/06/2011)	Baseline emissions, tCO_2e	Project emissions, tCO_2e	Emission reductions, tCO_2e
2008	2678541	1698672	979869
2009	2670037	1683102	986935
2010	2877646	1802878	1074768
2011*	1552970	977478	575492
Total, tCO_2e	**9779194**	**6162130**	**3617064**

* reporting period in 2011: 01.01.2011 – 30.06.2011

A.4. Monitoring period:

- Date of commencement of the monitoring period: 01/01/2008.
- Date of termination of the monitoring period: 30/06/2011.

A.5. Methodology applied to the project:

A.5.1. Baseline methodology:

The project activity is aimed at reduction of greenhouse gas emissions by changing the structure of fuel consumption in industrial, municipal, administrative and private sectors of Odesa region by replacing solid and liquid fuels with natural gas.
The proposed project applies a specific approach that uses the elements of approved Clean Development Mechanism methodology ACM0009 «Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas - Version 3.2»[2] in order to set the baseline.
Dynamic baseline was selected according to a specific approach based on the requirements of paragraph 9 (a) of the Guidance on criteria for baseline setting and monitoring, Version 02[3].
According to the determined methodology the calculation of GHG emissions in the baseline scenario was made for each year when monitoring of the project activity took place, in such a way so that to adjust volume of fossil fuel substituted with gas. This allows for calculation of the volume of greenhouse gas emissions for each project year, in the absence of the project activity.
The main indicator of the project actinities implementation is the annual consumption of natural gas.
Emission factor for stationary combustion of gas is calculated according to the National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine based on factors listed in Table P2.7, P2.8 of the inventory report.

A.5.2.Monitoringmethodology:

The proposed project applies a JI specific approach that uses the elements of the approved CDM methodologyACM0009 “Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas”, version 3.2.

The most objective and cumulative factor demonstrating whether the emissions reduction actuallyoccurred, is *volume of consumed natural gas*. Replacement of fuel oil, coal and diesel fuel with natural gas as a more environmentally friendly fuel, results in reduction of GHG emissions. In addition, the increase in efficiency of the energy carrier transportation, preparation and combustion systemtakes place in the course of the transition to natural gas, regardless of extraneous factors.

OJSC “Odesagas” collects and keeps the data relating to natural gas consumption in the form of bills for gas with the help of program complexes “Atlas SYBIL” and “Gasolina”. Information about natural gas

[2]http://cdm.unfccc.int/methodologies/DB/2CRBYLJO5JWC9YHBSWJQWYIH2LLGMJ
[3]http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

consumption as well as necessary documentation is attached to the monitoring report in Supporting documents.

According to the monitoring methodology that is described in the determined PDD, version 02, the following parameters and data were collected and recorded throughout the monitoring period to calculate the achieved emission reductions:

1) Data and parameters not monitored throughout the whole monitoring period, but determined only once, which are available at the stage of PDD development:

GWP_{CH4}	Global warming potential, tCO_2eq/tCH_4
$k_{7,fuel}$	Specific saving of electric energy in the course of heat carrier transportation to end consumer with account of losses in electrical grids, kWh/GJ
$k^b_{1,prepfuel}$	Average factor that takes into account energy losses in the course of energy carrier preparation in the baseline scenario, relative units
$k^p_{1,prepfuel}$	Average factor that takes into account energy losses in the course of energy carrier preparation in the project scenario, relative units
$k^b_{3,ef}$	Average factor that takes into account efficiency of thermal generating units in the baseline scenario, relative units
$k^p_{3,ef}$	Average factor that takes into account efficiency of thermal generating units in the project scenario, relative units
$k^b_{4,pipes}$	Average factor that takes into account total losses in the heat supply networks in the baseline scenario, relative units
$k^p_{4,pipes}$	Average factor that takes into account total losses in the heat supply networks in the project scenario, relative units

2) Data and parameters controlled during the whole monitoring period:

$V^y_{gas,PP}$	Total quantity of natural gas combusted in period "y" by individual, $thsm^3$
$V^y_{p,gas,LE}$	Quantity of natural gas combusted in period "y" by legal entity, $thsm^3$
$L^y_{p,los,1}$	Length of gas distribution systems constructed under the project, km
NCV^y_{gas}	Net calorific value of natural gas, TJ/ ths m^3
CEF^y_{elec}	GHGemission factorwhen electricity consumption is reduced, tCO_2e/MWh
NCV^y_{fuel}	Net calorific value of fossil fuel of "fuel" type (Fuel of "fuel" type means coal, fuel oil or diesel oil)
$k^c_{p,gas}$	Carbon emission factor when combusting natural gas, t/TJ
$k^o_{p,gas}$	Carbon oxidation factor when combusting natural gas, relative units
k^c_{fuel}	Carbon emission factor when combusting fossil fuel of "fuel" type (Fuel of "fuel" type means coal, fuel oil or diesel oil)
k^o_{fuel}	Carbon oxidation factor when combusting fossil fuel of "fuel" type
$EF^y_{CH_4,p,los,2}$	On default methane emission factor at technological gas equipment at end consumers place, tCH_4eq/PJ
$EF^y_{CH_4,p,los,1}$	On default methane emission factor in the course of natural gas transportation and distribution, t CH_4eq /ths km
$CEF^y_{gas,unit}$	Reduced GHG emission factor in the course of natural gas transportation to the end consumers, t CO_2eq/m^3

A.6. Status of implementation including project milestones:

Implementationofprojectactivitiesstartedinlate 2003, asprovidedforinthedetermined PDD, version 02. However, emissions generated in 2003areexcludedfromthecalculation from a conservative standpoint. Therefore, 01/01/2004 was taken as thecrediting periodstartdate.
Thismonitoringreportcontains informationaboutreductions, achievedundertheprojectduringtheperiod of 01/01/2008 – 30/06/2011.
Project implementation status in the reporting period of 01/01/2008 – 30/06/2011, including the project milestones is provided in Table 2.

Table 2. Project implementation status

Stage description				*Year of implementation*
Construction of gas distribution networks (GDN)				
Steel welded pipes	High pressure, km	Medium pressure, km	Low pressure, km	
	52.70	0.50	14.88	2008
	3.70	9.30	13.80	2009
	15.48	6.15	15.26	2010
	1.09	1.23	1.64	2011
Polyethylene pipes	54.85	52.48	35.58	2008
	14.02	5.69	7.19	2009
	2.27	22.99	15.38	2010
	1.92	2.52	1.48	2011
Installation of gas meters				
Meters	*Individuals, units*			
	3422			2008
	5673			2009
	2190			2010
	3550			2011
Construction of gas control points (cabinet-type gas control points), gas control units				
GCP, CTGCP	High pressure, units	Medium pressure, units		
	26	19		2008
	17	15		2009
	43	56		2010
	23	35		2011

Implementation of project activities is realized according to the project plan that is included in the determined PDD version 02.
Detailed information about implemented measures by departments and divisionsis provided in Supporting document (Excel file)“Annex 2Registry of gas networks and GCPs with legislative normative documentation”.

A.7. Deviations from or change of registered PDD:

There aren’t any deviations from or changes in the registered PDD.

A.8. Deviations from or change of registered monitoring plan:

There aren’t any deviations from or changes in the registered monitoring plan.

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

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SECTION B. Key monitoring activities

To determine the monitoring methodology an approach for baseline setting and monitoring developed according to Appendix B of the JI Guidelines was used. The projectuses a specific approach to Joint Implementation projects based on "Guidance on criteria for baseline setting and monitoring" (Version 2) of JI Supervisory Committee.

Monitoring of the project activity consists in measuring natural gas consumption by end customers and control over the length of gas distribution systems constructed under the project. Other parameters are obtained by calculation or from state statistics and inventory.

Monitoring plan provides for the following measures:

1. Collection of information on greenhouse gas emissions under the project during the crediting period.
2. Assessment of the project implementation schedule.
3. Collection of the information on metering equipment, its calibration.
4. Collection and archiving information on the impact of project activities on the environment.
5. Data archiving.
6. Organization of personnel training.

B.1. Information about types of metering equipment, its accuracy class and calibration procedures:

The following gas meters are used for natural gas consumption metering:

Metering equipment	Type	Producer	Verification/calibration frequency	Accuracy class
Diaphragmgasmeter	MKM-UG-2,5	SP PremagasKromshreder, Lubny city	8 years	±1.5..3.0 %
Diaphragmgasmeter	MKM-UG-4	SP PremagasKromshreder, Lubny city	8 years	±1.5..3.0 %
Diaphragmgasmeter	MKM-UG-6	SP PremagasKromshreder, Lubny city	8 years	±1.5..3.0 %
Diaphragmgasmeter	VK G-1,6	Premagazs.r.o., Slovakia	8 years	±1.5..3.0 %
Diaphragmgasmeter	VK G-2,5	Premagazs.r.o., Slovakia	8 years	±1.5..3.0 %
Diaphragmgasmeter	VK G-4	Premagazs.r.o., Slovakia	8 years	±1.5..3.0 %
Diaphragmgasmeter	VK G-6	Premagazs.r.o., Slovakia	8 years	±1.5..3.0 %
Diaphragmgasmeter	VK G-10	Premagazs.r.o., Slovakia	8 years	±1.5..3.0 %
Diaphragmgasmeter	G-1,6	«Samgas», Rivnecity	8 years	±1.5..3.0 %
Diaphragmgasmeter	G-2,5	«Samgas», Rivnecity	8 years	±1.5..3.0 %
Diaphragmgasmeter	G-4	«Samgas», Rivnecity	8 years	±1.5..3.0 %
Diaphragmgasmeter	G-16 RS/10	«Samgas», Rivnecity	8 years	±1.5..3.0 %
Diaphragmgasmeter	VK G-10	«Samgas», Rivnecity	8 years	±1.5..3.0 %
Turbine gas meter	LIS-1 G-2,5	SSIC “Electronmash”, Kyiv city	5 років	±1.5..3.0 %
Turbine gas meter	LIS-1СК G-2,5	SSIC “Electronmash”, Kyiv city	5 років	±1.5..3.0 %
Diaphragmgasmeter	MTVG-2,5	PietroFiorentini, Italy	8 years	±1.5..3.0 %
Diaphragmgasmeter	MTVG-4	PietroFiorentini, Italy	8 years	±1.5..3.0 %
Diaphragmgasmeter	MTVG-6	PietroFiorentini, Italy	8 years	±1.5..3.0 %
Diaphragmgasmeter	MTVG-10	PietroFiorentini, Italy	8 years	±1.5..3.0 %
Diaphragmgasmeter	SGMN C-1-G-6	UP "S. I. VavilovaMMZ", Minsk city	8 years	±1.5..3.0 %

Diaphragmgasmeter	CGK G-1,6	VPO "Tochmash", Vladimircity, Russia	8 years	±1.5..3.0 %
Diaphragmgasmeter	CGK G-2,5	VPO "Tochmash", Vladimircity, Russia	8 years	±1.5..3.0 %
Diaphragmgasmeter	CGK G-4	VPO "Tochmash", Vladimircity, Russia	8 years	±1.5..3.0 %

Detailed information about metering equipment installed at each subscriber's place is given in Supporting document "Annex 4: Types of metering equipment".

Typical meter for natural gas metering is shown in the Figure 1.

Figure 1. Gas meter MKM-U G-4 produced by Premagas.

B.2. Data collection (consolidated data for the whole monitoring period):

Data and parameters that are subject to periodic monitoring in accordance with the monitoring plan as defined in the PDD version 02, and a list of constant values used to calculate emission reductions are listed in sections B.2.1. and B.2.2. of the Monitoring report and in the Supporting document (Excel file)"Annex 3: CalculationofGHGemissionreductionsduetogasification of Odesa region"

B.2.1. List of fixed parameters and constant values:

Table 3. List of fixed parameters that are not controlled during the monitoring period

Parameter	Description	Source of data	Value, unit of measurement	Comments
GWP_{CH4}	Global warming potential for methane	According to data approved by the IPCC	21 t CO_2e / t CH_4	N/A
$k_{7,fuel}$	Specific saving of electric energy in the course of heat carrier transportation to end consumer with account of	Report «Determination of change of specific energy data of heat supply system in the course of gasification"	2.016 kWh/GJ	This applies only to individuals who were previously connected to central heating

	losses in electrical grids	developed by "UKRENERGOPROM-2" as of June 24, 2011		system
$k^{b}_{1,prepfuel}$	Average factor that takes into account energy losses in the course of energy carrier preparation in the baseline scenario	Report «Determination of change of specific energy data of heat supply system in the course of gasification" developed by "UKRENERGOPROM-2" as of June 24, 2011	<table><tr><td rowspan="2">Baseline heat source</td><td colspan="2">Fuel, relative units</td></tr><tr><td>Fuel oil</td><td>Coal</td></tr><tr><td>CS*</td><td>0.965</td><td>0.965</td></tr><tr><td>IS**</td><td>1</td><td>1</td></tr></table>	This applies in case of transfer of individual or central heat supply systems to gas.
$k^{p}_{1,prepfuel}$	Average factor that takes into account energy losses in the course of energy carrier preparation in the project scenario	Report «Determination of change of specific energy data of heat supply system in the course of gasification" developed by "UKRENERGOPROM-2" as of June 24, 2011	<table><tr><td rowspan="2">Project heat source</td><td>Fuel, relative units</td></tr><tr><td>Natural gas</td></tr><tr><td>CS</td><td>0.98</td></tr><tr><td>IS</td><td>1</td></tr></table>	This applies in case of transfer of individual or central heat supply systems to gas.
$k^{b}_{3,ef}$	Average factor that takes into account efficiency of thermal generating units in the baseline scenario	Report «Determination of change of specific energy data of heat supply system in the course of gasification" developed by "UKRENERGOPROM-2" as of June 24, 2011	<table><tr><td rowspan="2">Baseline heat source</td><td colspan="2">Fuel, relative units</td></tr><tr><td>Fuel oil</td><td>Coal</td></tr><tr><td>CS</td><td>0.79</td><td>0.76</td></tr><tr><td>IS</td><td>-</td><td>0.74</td></tr></table>	This applies in case of transfer of individual or central heat supply systems to gas.
$k^{p}_{3,ef}$	Average factor that takes into account efficiency of thermal generating units in the project scenario	Report «Determination of change of specific energy data of heat supply system in the course of gasification" developed by "UKRENERGOPROM-2" as of June 24, 2011	<table><tr><td rowspan="2">Project heat source</td><td>Fuel, relative units</td></tr><tr><td>Natural gas</td></tr><tr><td>CS</td><td>0.92</td></tr><tr><td>IS</td><td>0.92</td></tr></table>	This applies in case of transfer of individual or central heat supply systems to gas.
$k^{b}_{4,pipes}$	Average factor that takes into account total losses in the heat supply networks in the baseline scenario	Report «Determination of change of specific energy data of heat supply system in the course of gasification" developed by	<table><tr><td rowspan="2">Baseline heat source</td><td colspan="2">Fuel, relative units</td></tr><tr><td>Fuel oil</td><td>Coal</td></tr><tr><td>CS</td><td>0.844</td><td>0.844</td></tr><tr><td>IS</td><td>1</td><td>1</td></tr></table>	This applies in case of transfer of central heat supply systems to individual ones

		"UKRENERGOPROM-2" as of June 24, 2011		
$k^{p}_{4,pipes}$	Average factor that takes into account total losses in the heat supply networks in the project scenario	Report «Determination of change of specific energy data of heat supply system in the course of gasification" developed by "UKRENERGOPROM-2" as of June 24, 2011	<table><tr><td rowspan="2">Project heat source</td><td>Fuel, relative units</td></tr><tr><td>Natural gas</td></tr><tr><td>CS</td><td>0.844</td></tr><tr><td>IS</td><td>1</td></tr></table>	This applies in case of transfer of central heat supply systems to individual ones

* Centralheatsupplysystem
** Individual heat supply system

B.2.2.List of parameters that are subject to periodic monitoring.

Table 4.Parameters that are controlled during the monitoring period and used to calculate project emissions.

Parameter	Description	Source of data	Unit of measurement	Monitoring frequency	Comments
$V^{y}_{gas,PP}$	Total quantity of natural gas combusted in period "y" by individual	Gas meters	Ths m^3	Monthly	A cubic meter, reduced to standard conditions (T = 20 degrees, C, P = 101.325 kPa (760 mm. of mercury) and humidity is equal to zero)is taken as the unit of account of gas supplied to individuals and legal entities.
$V^{y}_{gas,LE}$	Total quantity of natural gas combusted in period "y" by legal entity	Gas meters	Ths m^3	Monthly	A cubic meter, reduced to standard conditions (T = 20 degrees, C, P = 101.325 kPa (760 mm. of mercury) and humidity is equal to zero)is taken as the unit of account of gas supplied to individuals and legal entities.
NCV^{y}_{gas}	Net calorific value of natural gas	The national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in	TJ/mlnm^3	Annually	According to principle of conservatism minimal calorific value of gas is used.

		Ukraine for 1990-2009. Table P.2.24.[4].			
$L^{y}_{p,los,1}$	Length of gas distribution systems constructed under the project	Certificatesofcommissioningof gas distribution networks	km	Monthly	Monitoring of the length of constructed gas distribution systems will be carried out by responsible people on the basis of commissioning certificates for each monitoring period.
$k^{c}_{p,gas}$	Carbon emission factor when combusting natural gas	The national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table P.2.26[4]	t C/TJ	Annually	Carbon emission factor when combusting natural gas is used to determine the on default carbon dioxide emission factor for stationary combustion of natural gas in Ukraine.
$k^{o}_{p,gas}$	Carbon oxidation factor when combusting natural gas	The national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table P.2.27.[4]	Relative units	Annually	Carbon oxidation factor when combusting natural gas is used to determine the on default carbon dioxide emission factor for stationary combustion of natural gas in Ukraine.
$EF^{y}_{CH_4,p,los,1}$	On default methane emission factor in the course of natural gas transportation and distribution	Tables of the national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table 1.V.2[5]	t CH_4/ths km	Annually	On default methane emission factor in the course of natural gas transportation and distribution is used for determining of GHG emissions from methane leakage at technological equipment.
$EF^{y}_{CH_4,p,los,2}$	On default methane emission factor at technological gas equipment at end consumers place	Tables of the national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table 1.V.2	t CH_4/ PJ	Annually	On default methane emission factor at technological gas equipment and at end consumers place is used for determining of GHG emissions from methane leakage at technological equipment at end

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

[5] http://neia.gov.ua/nature/control/uk/doccatalog/list?currDir=124564

					consumer place
$CEF^{y}_{gas,unit}$	Reduced GHG emission factor in the course of natural gas transportation to the end consumers	Official data of the Ministry of Fuel and Energy of Ukraine and the national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine	t CO_2-eq/m^3	Annually	Detailedcalculationandthereferences to the sources ofdata are providedintheSupportingdocument3.18 (Excel file).

Table 5.Parameters that are controlled during the monitoring period and used to calculate emissions in the baseline scenario.

Parameter	Description	Source of data	Unit of measurement	Monitoring frequency	Comments
$V^{y}_{gas,PP}$	Total quantity of natural gas combusted in period "y" by individual	Gas meters	Ths m^3	Monthly	A cubic meter, reduced to standard conditions (T = 20 degrees, C, P = 101.325 kPa (760 mm. of mercury) and humidity is equal to zero)is taken as the unit of account of gas supplied to individuals and legal entities.
$V^{y}_{gas,LE}$	Total quantity of natural gas combusted in period "y" by legal entity	Gas meters	Ths m^3	Monthly	A cubic meter, reduced to standard conditions (T = 20 degrees, C, P = 101.325 kPa (760 mm. of mercury) and humidity is equal to zero)is taken as the unit of account of gas supplied to individuals and legalentities.
NCV^{y}_{fuel}	Net calorific valueof fossil fuel of «fuel» type (Fuel of "fuel" type means coal, fuel oil or diesel oil)	The national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table P.2.24.[4]	TJ/ Ths t	Annually	The parameter is used according to the approved CDM methodology ACM0009 and "Guidance on criteria for baseline setting and monitoring».
NCV^{y}_{gas}	Net calorific value of natural gas	The national inventory report of anthropogenic emissions by sources and removals by sinks	TJ/ Mln m^3	Annually	Minimal value of gas calorific value is used according to the principles of

		of greenhouse gases in Ukraine for 1990-2009. Table P.2.24.[4]			conservatism
k^{c}_{fuel}	Carbon emission factor when combusting fossil fuel of "fuel" type. (Fuel of «fuel» type means coal, fuel oil, diesel oil)	The national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table P.2.26.[4]	t C/TJ	Annually	Carbonemissionfactor whencombustingfossil fuelisusedtodeterminet heon default carbondioxideemissio nfactorforstationaryco mbustionof fossil fuelinUkraine.
k^{o}_{fuel}	Carbon oxidation factor when combusting fossil fuel of "fuel" type. (Fuel of «fuel» type means coal, fuel oil, diesel oil)	The national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009. Table P.2.27.[4]	Relative units	Annually	Carbonoxidationfactor whencombustingfossil fuelisusedtodeterminet heon default carbondioxideemissio nfactorforstationaryco mbustionof fossil fuelinUkraine.
CEF^{y}_{elec}	GHG emission factor when electricity consumption is reduced	Carbon dioxide emission factors for 2008 are taken from Order of the National Environmental Investment Agency of Ukraine (hereinafter - NEIAU) № 62 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2008[6]"; Carbon dioxide emission factors for 2009 are taken from the Order of NEIAU # 63 of 15.04.2011 "On approval of specific carbon dioxide emission factors in 2009"[7]; Carbon dioxide emission factors for 2010 are taken from the Order of NEIAU # 43 of 28.03.2011. "On approval of specific carbon dioxide	tCO_2/MWh	Annually	N/A

[6]http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[7]http://www.neia.gov.ua/nature/doccatalog/document?id=127172

		emission factors in 2010"[8]; Carbon dioxide emission factors for 2011 are taken from the Order of NEIAU # 75 of 12.05.2011. "On approval of specific carbon dioxide emission factors in 2011"[9];			

Yearly parameter values used to calculate GHG emissions for the project and the baseline scenarios are shown in the Supporting document Annex 3: CalculationofGHGemissionreductionsduetogasification of Odesa region.

B.2.3. Data related to leakage:

According to the methodology provided in the determined PDD, version 02, indirect extraneous leakage of CO_2, CH_4, N_2O from oil and coal extraction activities, petrol combustion by transport during transportation of diesel oil and coal to end consumerare excluded from a conservative standpoint. According to the PDD methane leakage in the course of gas transportation by gas transportation networks are included in the project emissions.

B.2.4. Datarelatingtoecologicalandsocialimpact:

OJSC "Odesagas" has the necessary Environmental Impact Assessment for all projects on gas distribution network construction in accordance with Ukrainian law (State Construction Standard of Ukraine A.2.2-1-2003"The composition and content of materials of environmental impact assessment (EIA) in the design and construction of plants, buildings and structures"[10]). EIA of the projects are developed by subcontracting project and assembling organizations and are transferred to OJSC "Odesagas" in the form of individual sections of reconstruction projects.
Overall, the impact of the project "Reduction of greenhouse gases emissions by gasification of Odesa region" on the environment during the construction work can be assessed as permittable. Project facilities are not included in the list of activities and facilities of environmental hazard. Analysis of the facilities impact of the environment showed that taking into consideration all the factors, we can conclude that in the normal technical operational mode they will neither cause any negative processes in the environment of the region, nor lead to any negative social and economic consequences and the risk of accidents and their possible impact is minimized.

The operation of project facilities is accompanied with production and technological (normalized) gas losses–marginal gas leakage which allow for ensuring reliable operation of gas pipelines, connecting pieces, fittings, expansion joints, gas equipment, appliances etc.
To prevent impact on the environment during construction works measures aimed at restoring the ecological balance are carried out. In order to reduce impact on the environmental all construction and installation works are carried out exclusively within the right-of-way.
Land reclamation is planned on land:
- Trails of the pipeline across the width of the allotment;
- The territory of temporary storage of pipes and ancillary materials;
- Affected land surface on the trails of temporary roads;
- The area around ground facilities affected during construction;
- Other territories in the areas of construction, as a result of the passage of vehicles, clogged and polluted with industrial and domestic waste and oil.

[8]http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[9]http://www.neia.gov.ua/nature/doccatalog/document?id=127498
[10]http://www.budinfo.com.ua/dbn/8.htm

Technical reclamation of areas includes the following measures:
- Removal and preparation of soil and vegetation layer in the areas of construction;
- Cleaning of construction debris, unused materials, and all contaminants of area remained after the process of dismantling of temporary structures, bases after the completion of works on the trace;
- Restoring of the topsoil.

As part of procedures undertaken at the request of relevant state services, the company reportson environmental performance with set periodicity. Environmental department of OJSC "Odessagas" develops quarterly report in accordance with the Form № 2-TP (air) that is provided to local government statistics.

B.3. Emergency situations and procedures for detection and liquidation of malfunctions at OJSC "Odesagas":

Detection, liquidation and registration of malfunctions and emergency situations at gas networks of OJSC "Odesagas" is carried out according to Safety rules of gas supply systems of Ukraine.[11]

There were no emergency situationsand considerable technological abnormalitiesatOJSC "Odesagas"in the monitoring period of January 1, 2008- June 30, 2011.

[11] http://dnop.com.ua/dnaop/act5048.htm

SECTION C. Quality assurance and quality control measures

C.1. Roles and responsibilities

Structure of data collection as a part of the project monitoring is shown in figure 2.

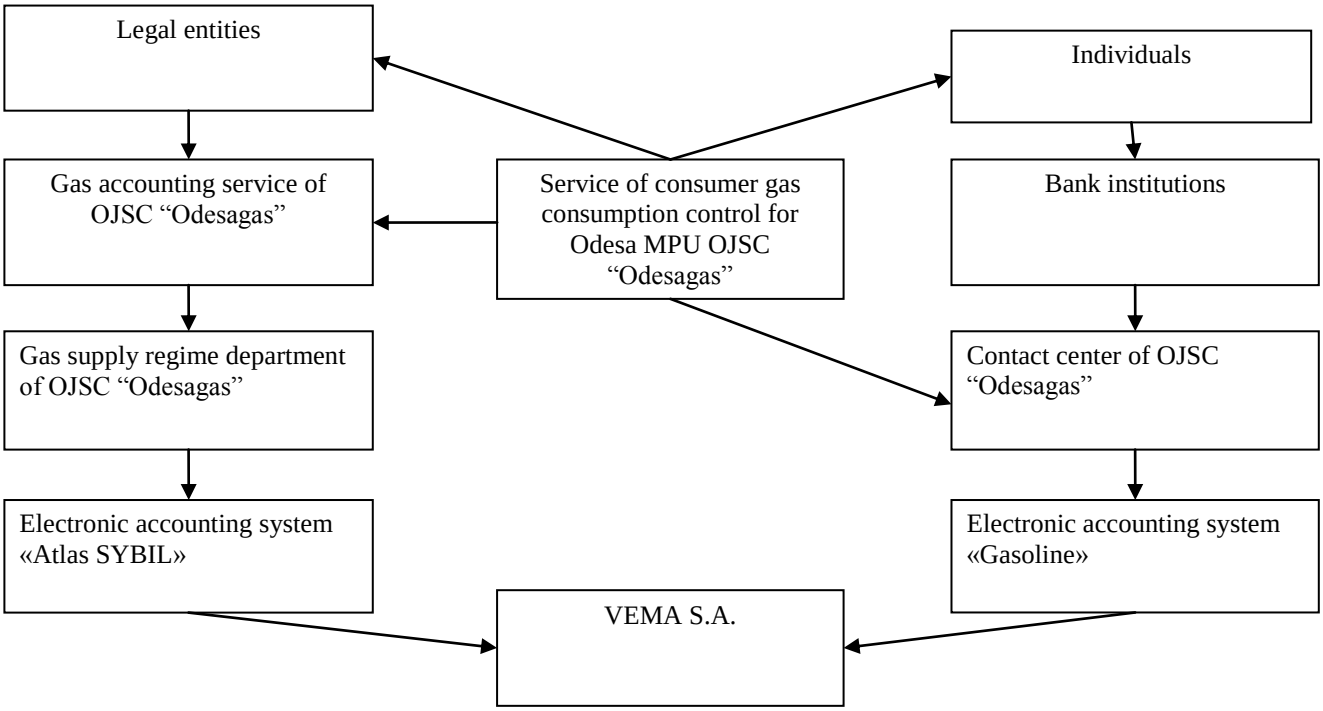

Figure2.Structureof monitoring datacollection

OJSC "Odesagas" carries out the monitoring of natural gas fuel consumption by individuals in the following way:

1. Service of consumer gas consumption control conducts monthly inspections of meters, executes the statement signed by the individual and transfers it to the Contact center.
2. Bank institutions deliver the information on gas consumption in the form of paid bills to the Contact center of OJSC "Odesagas".
3. Contact center processes received information and bases it into "Gasolina" program.
4. Indices of gas supply volume processed by «Gasolina» program are delivered to the project developer «VEMA S.A.»
5. The length of gas distribution systems, implemented under the project is determined by the assembly and technical service based on GDN Commissioning certificates.

OJSC "Odesagas" carries out the monitoring of natural gas consumption by legal entities in the following way:

1. Legal entities supply information on gas consumption to the Gas accounting service every month.
2. Service of consumer gas consumption control conducts monthly inspections of meters, executes the statement signed by the enterprise and transfers it to the Gas accounting service.
3. Gas accounting service provides information to the Gas supply regime department for its processing into basic form by "Atlas SYBIL" program.
4. Indices of gas supply volume processed by "Atlas SYBIL" program are delivered to the project developer «VEMA S.A.».

C.2. Trainings:

Since the principal activities of OJSC "Odesagas"are not changed when implementing the Joint Implementation (JI) project and the project monitoring is carried out as a part of practice established at the company, special trainings for personnel are not necessary. Technical personnel of the enterprise possesses necessary knowledge and experience for execution of the project implementation and monitoring.

In case of new equipment implementation (the equipment which has not been used by this enterprise before), the company-manufacturer or the company-supplierof this equipment shall conduct trainings on the peculiarities of equipment operation for the personnel. During the monitoring periodthe equipmentwhich would require special training for personnel was not installed.

OJSC "Odesagas" retrains the personnel according to the requirements of Norms of labour protection. The enterprise has the Labour Protection Department responsible for professional development and trainings of the personnel.

C.3. Involvement of third parties:

According to paragraph 6 of the Model Agreement on the provision of gas supply services, approved by NERC as of 04.01.2000 № 1[12] (registered by Ministry of Justice on 01.02.2000 № 57/4278) maintenance of gas supply systems inside buildings (low-pressure gas pipelines, gas meters, gas appliances, devices necessary for use of gas in everyday life) is the responsibility of gas transportationorganization.
Calibration and verification of legal entity's gas meters are performed by respective departments of these enterprises. OJSC "Odesagas" supervises the verification and calibration of gas meters, held by legal entities on a periodic basis.

C.4. Internal audits and control methods:

Routine repair of gas networks and equipment GCP (CGCP) is carried out once a year maintenance - once every six months. Repaired gas equipment is regularly examined to ensure that it works properly and is not a source of gas leakage.
Means of metering equipment used for monitoring of the project activity are subject to periodic state verification. Personnel of OJSC "Odesagas" is liable to periodic examination of their knowledge of requirements to:
- collecting data according to the monitoring plan (the collection of data under the monitoring coincides with the usual practice of data collection at the company);
- labour protection;

Each quarter, representatives of "VEMA S.A.", developers of the project, conduct internal audits of the project monitoring system atOJSC "Odesagas".
Internal audit includes measures on verification of consumed gas accounting and record keeping by Gas accounting service, Gas supply regime department contact center; verification of proper working condition and periodic maintenance of "Atlas SYBIL" and "Gasolina" software; cross-check of data of these program compexesand recordsof consumed gas, that are kept by the relevant services of the company; checking the timeliness of natural gas meters verification etc.

[12] http://zakon.nau.ua/doc/?uid=1027.51.0

SECTION D. Calculation of GHG emission reductions

D.1. Formulae used for calculation of GHG reductions.

D.1.1.Formulae for calculation of project emissions

Formula 1 –Projectemissionsof reporting period, tCO_2e	
	$PE_p^y = PE_{p,gas,PP}^y + PE_{p,gas,LE}^y + PE_{p,los}^y + PE_{tp,gf}^y$,
	$PE_{p,gas,PP}^y$ - GHG emissions due to natural gas combustion by consumers of "PP" type during the period «y», in the project scenario (t CO_2e); $PE_{p,gas,LE}^y$ - GHG emissions due to natural gas combustion by consumers of «LE» type during the period «y», in the project scenario (t CO_2e); $PE_{p,los}^y$ - GHG emissions due to methane leakage at technological equipment and at end-users place in period «y», in the project scenario (t CO_2e); $PE_{tp,gf}^y$ - GHG emissions due to gas fuel combustion by gas-turbine installations when transporting natural gas to end consumers (t CO_2e); $[y]$ - index corresponding to monitoring period; $[p]$ - index corresponding to project scenario; $[PP]$ - index corresponding to individual; $[LE]$ - index corresponding to legal entity.

Formula 2 –GHG emissions due to natural gas combustion by consumers of "PP" type during the period «y», in the project scenario (t CO_{2e})	
	$PE_{p,gas,PP}^y = \sum_{pp=1}^{PP} V_{gas,PP}^y * NCV_{gas}^y * EF_{p,gas}^y$,
	$\sum_{pp=1}^{PP} V_{gas,PP}^y$ - Total quantity of natural gas combusted in period «y» by individuals (ths m^3); NCV_{gas}^y - Net calorific value of natural gas (TJ/ths m^3); $EF_{p,gas}^y$ - on default carbon dioxide emission factor for permanent combustion of natural gas (t CO_2e /TJ). $[y]$ - index corresponding to monitoring period; $[p]$ - index corresponding to project scenario; $[PP]$ - index corresponding to individual.

Formula 3 –GHG emissions due to natural gas combustion by consumers of «LE» type during the period «y», in the project scenario (t CO_2e)	
	$PE_{p,gas,LE}^y = \sum_{le=1}^{LE} V_{gas,LE}^y * NCV_{gas}^y * EF_{p,gas}^y$,
	$\sum_{le=1}^{LE} V_{gas,LE}^y$ - Total quantity of natural gas combusted in period «y» by legal entities, in the project scenario (ths m^3); NCV_{gas}^y - Net calorific value of natural gas (TJ/ths m^3); $EF_{p,gas}^y$ - on default carbon dioxide emission factor for permanent combustion of natural gas (t CO_2e /TJ).

	$[y]$ - index corresponding to monitoring period; $[p]$ - index corresponding to project scenario; $[LE]$ - index corresponding to legal entity.

Formula 4 –GHG emissions due to methane leakage at technological equipment and at end-consumers place in period «y», in the project scenario (t CO_2e)	
	$PE^{y}_{p,los} = PE^{y}_{p,los,1} + PE^{y}_{p,los,2}$,
	$PE^{y}_{p,los,1}$ - GHG emissions from methane leakage at technological equipment in period «y», in the project scenario (t CO_2e); $PE^{y}_{p,los,2}$ - GHG emissions from methane leakage at equipment of end consumers in period «y», in the project scenario (t CO_2e); $[y]$ - index corresponding to monitoring period; $[p]$ - index corresponding to project scenario.

Formula 5 –GHG emissions due to methane leakage at technological equipment in period «y», in the project scenario (t CO_2e)	
	$PE^{y}_{p,los,1} = \sum L^{y}_{p,los,1} * EF^{y}_{CH_4,p,los,1} * GWP_{CH_4}$,
	$L^{y}_{p,los,1}$ - Length of gas distribution systems constructed under the project (ths km); $EF^{y}_{CH_4,p,los,1}$ - on default methane emission factor in the course of natural gas transportation and distribution (t CH_4e /ths km); GWP_{CH4} - global warming potential for methane. It is determined according to the recommendation of Intergovernmental Panel on Climate Change, (t CO_{2e} / t CH_4); $[y]$ - index corresponding to monitoring period; $[p]$ - index corresponding to project scenario; $[PP]$ - index corresponding to individual; $[LE]$ - index corresponding to legal entity.

Formula 6 –GHG emissions due to methane leakage at equipment of end-consumers in period «y», in the project scenario (t CO_2e)	
	$PE^{y}_{p,los,2} = (\sum_{le=1}^{LE} V^{y}_{gas,LE} + \sum_{pp=1}^{PP} V^{y}_{gas,PP}) * NCV^{y}_{gas} * EF^{y}_{CH_4,p,los,2} * GWP_{CH_4}$,
	$\sum_{pp=1}^{PP} V^{y}_{gas,PP}$ - Total quantity of natural gas combusted in period «y» by individuals, (ths m^3); $\sum_{le=1}^{LE} V^{y}_{gas,LE}$ - Total quantity of natural gas combusted in period «y» by legal entities, in the project scenario (ths m^3); NCV^{y}_{gas} - Net calorific value of natural gas, (TJ/ths m^3); $EF^{y}_{CH_4,p,los,2}$ - on default methane emission factor at technological gas equipment at end consumer place (t CH_4e /PJ). GWP_{CH4} - global warming potential for methane. It is determined according to the recommendation of Intergovernmental Panel on Climate Change, (t CO_{2e} / t CH_4); $[y]$ - index corresponding to monitoring period;

	$[p]$ - index corresponding to project scenario; $[PP]$ - index corresponding to individual; $[LE]$ - index corresponding to legal entity.

Formula 7 –GHG emissions due to gas fuel combustion by gas-turbine installations when transporting natural gas to end consumers (t CO_2e)	
	$PE^{y}_{tp,gf} = (\sum_{le=1}^{LE} V^{y}_{gas,LE} + \sum_{pp=1}^{PP} V^{y}_{gas,PP}) * CEF^{y}_{gas,unit}$
	$\sum_{pp=1}^{PP} V^{y}_{gas,PP}$ - total quantity of natural gas combusted during the period «y» by individuals (ths m^3); $\sum_{le=1}^{LE} V^{y}_{gas,LE}$ - total volume of natural gas combusted in period "y" by legal entities, in the project scenario(ths m^3). $CEF^{y}_{gas,unit}$ - Reduced GHG emission factor in the course of natural gas transportation to the end consumers (t CO_{2e}/m^3). Determination of the factor is provided in supporting Excel file of Annex 3: CalculationofGHGemissionreductionsduetogasification of Odesa region

D.1.2. Formulae used for calculation of emissions in the baseline scenario:

Formula 8 – baselineemissionsof the reporting period (BE_b^y), tCO_2e	
	$BE^{y}_{b} = BE^{y}_{b,fuel,PP} + BE^{y}_{b,fuel,LE}$,
	$BE^{y}_{b,fuel,PP}$ - GHG emissions due to fossil fuel of "fuel" type combustion by consumers of "PP" type in period «y», in the baseline scenario (t CO_2e); $BE^{y}_{b,fuel,LE}$ - GHG emissions due to fossil fuel of "fuel" type combustion by consumers of «LE» type in period «y», in the baseline scenario (t CO_2e); $[y]$ - index corresponding to monitoring period; $[b]$ - index corresponding to baseline scenario; $[fuel]$ - index corresponding to type of fossil fuel (coal, fuel oil or diesel oil); $[PP]$ - index corresponding to individual; $[LE]$ - index corresponding to legal entity.

Formula 9 – GHG emissions due to fossil fuel of "fuel" type combustion by consumers of "PP" type in period «y», in the baseline scenario (t CO_2e)	
	$BE^{y}_{b,fuel,PP} = \sum_{pp=1}^{PP} V^{y}_{fuel,PP} * NCV^{y}_{fuel} * k_{h,fuel} * \left(EF^{y}_{b,fuel} + k_{7,fuel} * CEF^{y}_{elec}\right)$
	$\sum_{pp=1}^{PP} V^{y}_{fuel,PP}$ - Total quantity of fossil fuel of "fuel" type that would be combusted in period «y» by individual, in the absence of the project (t); NCV^{y}_{fuel} - Net calorific value of fossil fuel of "fuel" type, (TJ/ t); $EF^{y}_{b,fuel}$ - on default carbon dioxide emission factor for permanent combustion of fossil fuel of "fuel" type, in the baseline scenario (t CO_2e /TJ);

	$k_{h,\,fuel}$ - adjusting factor; $k_{7,\,fuel}$ - Specific loss of electric energy in the course of heat carrier transportation to end consumer, (MWh/GJ). CEF_{elec}^{y} - GHG emission factor in case of electric power consumption reduction (t CO_2e /MWh); $[y]$ - index corresponding to monitoring period; $[b]$ - index corresponding to baseline scenario; $[fuel]$ - index corresponding to type of fossil fuel; $[PP]$ - index corresponding to individual.

Formula10 – adjusting factor	
	$$k_{h,\,fuel} = \frac{k_{1,prepfuel}^{p} * k_{3,ef}^{p} * k_{4,pipes}^{p}}{k_{1,prepfuel}^{b} * k_{3,ef}^{b} * k_{4,pipes}^{b}},$$
	$k_{1,prepfuel}^{b}$ - factor that takes into account energy loss in the course of energy carrier preparation in the baseline scenario. This factor applies in case of transfer of individual or central heat supply systems to gas. $k_{1,prepfuel}^{p}$ - factor that takes into account energy loss in the course of energy carrier preparation in the project scenario. This factor applies in case of transfer of individual or central heat supply systems to gas. $k_{3,ef}^{b}$ - efficiency factor of boiler equipment that takes into account efficiency of thermal generating units in the baseline scenario. This factor applies in case of transfer of individual or central heat supply systems to gas. $k_{3,ef}^{p}$ - efficiency factor of boiler equipment that takes into account efficiency of thermal generating units in the project scenario. This factor applies in case of transfer of individual or central heat supply systems to gas. $k_{4,pipes}^{b}$ - efficiency factor that takes into account heat energy losses in the course of heat carrier transportation to the end consumer, in the baseline scenario.This factor applies in case of transfer from central heat supply systems to individual heat supply systems. $k_{4,pipes}^{p}$ - efficiency factor that takes into account heat energy losses in the course of heat carrier transportation to the end consumer, in the project scenario. This factor applies in case of transfer from central heat supply systems to individual heat supply systems. $[p]$ - index corresponding to project scenario; $[b]$ - index corresponding to baseline scenario.

Formula 11 – Total quantity of fossil fuel of "fuel" type that would be combusted in period «y» by individual, in the absence of the project (t)	
	$$V_{fuel,PP}^{y} = V_{gas,PP}^{y} * \frac{NCV_{gas,}^{y}}{NCV_{fuel}^{y}},$$
	$V_{gas,PP}^{y}$ - Total quantity of natural gas combusted in period «y» by an individual,(ths m^3); $NCV_{gas,}^{y}$ - Net calorific value of natural gas, (TJ/ ths m^3); NCV_{fuel}^{y} - Net calorific value of fossil fuel of "fuel" type, (TJ/ t); $[y]$ - index corresponding to monitoring period; $[b]$ - index corresponding to baseline scenario; $[gas]$ - index corresponding to natural gas;

	$[fuel]$ - index corresponding to type of fossil fuel; $[PP]$ - index corresponding to individual.

Formula 12 – GHG emissions due to fossil fuel of "fuel" type combustion by consumers of «LE» type in period «y», in the baseline scenario (t CO_2e)	
	$BE^{y}_{b,\,fuel,LE} = \sum_{le=1}^{LE} V^{y}_{fuel,LE} * NCV^{y}_{fuel} * k_{m,\,fuel}$,
	$\sum V^{y}_{fuel,LE}$ - total quantity of fossil fuel of «fuel» type, combusted during «y» period by legal entity, (t); NCV^{y}_{fuel} - Net calorific value of fossil fuel of "fuel" type, in the baseline scenario (TJ/ t); $EF^{y}_{b,\,fuel}$ - on default carbon dioxide emission factor for permanent combustion of fossil fuel of "fuel" type, in the baseline scenario (t CO_2e /TJ); $k_{m,\,fuel}$ - adjusting factor; $[y]$ - index corresponding to monitoring period; $[b]$ - index corresponding to baseline scenario; $[fuel]$ - index corresponding to type of fossil fuel; $[LE]$ - index corresponding to legal entity.

Formula 13 – adjusting factor	
	$k_{m,\,fuel} = \frac{k^{p}_{1,\,prepfuel}}{k^{b}_{1,\,prepfuel}}$,
	$k^{b}_{1,\,prepfuel}$ - factor that takes into account energy loss in the course of energy carrier preparation in the baseline scenario (relative units). This factor applies in case of transfer of individual or central heat supply systems to gas; $k^{p}_{1,\,prepfuel}$ - factor that takes into account energy loss in the course of energy carrier preparation in the project scenario (relative units). This factor applies in case of transfer of individual or central heat supply systems to gas; $[p]$ - index corresponding to project scenario; $[b]$ - index corresponding to baseline scenario.

Formula 14 – total quantity of fossil fuel of «fuel» type, combusted during «y» period by legal entity, (t)	
	$V^{y}_{fuel,LE} = V^{y}_{gas,LE} * \frac{NCV^{y}_{gas}}{NCV^{y}_{fuel}}$,
	$V^{y}_{gas,LE}$ - Total quantity of natural gas combusted in period «y» by legal entity (ths m^3); NCV^{y}_{gas} - Net calorific value of natural gas, (TJ/ ths m^3); NCV^{y}_{fuel} - Net calorific value of fossil fuel of "fuel" type, (TJ/ t); $[y]$ - index corresponding to monitoring period; $[b]$ - index corresponding to baseline scenario; $[gas]$ - index corresponding to natural gas; $[fuel]$ - index corresponding to type of fossil fuel;

	$[LE]$ - index corresponding to legal entity.

D.1.3. FormulaeforcalculationofGHGemissionreductions:

Total emission reductions are the difference between the baseline and project emissions.

Formula 15 – Quantity of Emission Reduction Units (ERU)	
	$ER^y = BE_b^y - PE_p^y,$
	BE_b^y - GHG emissions due to use of outdated system of energy carrier supply, in period «y», in the baseline scenario (t CO_2e); PE_b^y - GHG emissions due to use of new system of energy carrier supply, in period «y», in the project scenario (t CO_2e); $[y]$ - index corresponding to monitoring period; $[b]$ - index corresponding to baseline scenario; $[p]$ - index corresponding to project scenario.

D.2. Results of the GHG emission reductions monitoring

D.2.1. GHG emissions in the project scenario

The following GHG emission volumes were achieved in the reporting period as a result of the implementation of measurea under the project:

Monitoring period: 01/01/2008 – 30/06/2011	GHGemissions due to natural gas combustion by individuals	GHGemissions due to natural gas combustion by legal entities	GHG emissions due to methane leakage at technological equipment and at end-consumers place	GHGemissions in the course of gas transportation by gas transportation networks	**Total project emissions, tCO_2e**
2008	382064	1169528	86033	61047	1698672
2009	398350	1153975	83418	47359	1683102
2010	485417	1178747	89771	48943	1802878
2011*	231188	675649	48361	22280	977478
Total	**1497019**	**4177899**	**307583**	**179629**	**6162130**

* reporting period in 2011: 01.01.2011 – 30.06.2011

D.2.2. GHG emissions in the baseline scenario

Emissions that would occur in the absence of implementation of measurea under the project are the following:

Monitoring period: 01/01/2008 – 30/06/2011	GHGemissions due to fossil fuel combustion by individuals	GHGemissions due to fossil fuel combustion by legal entities	**Total baseline emissions, tCO_2e**
2008	792713	1885828	2678541
2009	827802	1842235	2670037
2010	1005590	1872056	2877646
2011*	479985	1072985	1552970
Total	**3106090**	**6673104**	**9779194**

* reporting period in 2011: 01.01.2011 – 30.06.2011

D.2.3. Leakages:

According to the methodology provided in the determined PDD, version 02, therearenoleakagesrelatedtothis project.

D.2.4. Emissionsreductionduetotheprojectimplementationin the monitoring period:

Emissionsreductionsduetotheprojectimplementationarecalculatedasthedifferencebetweenthebaselineandtheprojectemissions

Monitoring period: 01/01/2008 – 30/06/2011	**Emission reductions, tCO_2e**
2008	979869
2009	986935
2010	1074768
2011*	575492
Total	**3617064**

* reporting period in 2011: 01.01.2011 – 30.06.2011

To quantify GHG emission reductions values of some parameters (net calorific values of all types of fuels, carbon emission factors when fuel combustion takes place, carbon oxidation factors when fuel combustion takes place) that are provided in the national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine for 1990-2009, submitted by the State Environmental Investment Agency of Ukraine to the UNFCCC on 06/08/2011 (the latest version at the time of PDD elaboration) were used. At the same time, in accordance with the approved monitoring methodology in the PDD, for calculating the number of ERUs for each reporting year of the monitoring period actual values for each year were used. Also to quantify GHG reductions in the PDD was used, estimated projected volumes of gas and the number of subscribers.Therefore the actual calculated amount of emission reductions for each project year is slightly different from those values that were provided in the PDD.

Annex 1 – Parameter values of the project monitoring for the period 01/01/2008 - 30/06/2011

Parameter		Year			
		2008	2009	2010	2011*
$V^{y}_{gas,PP}$, Ths m^3	**Totalquantityofnaturalgasconsumedbyindividuals**	**211239.40**	**221410.69**	**267011.27**	**120228.58**
Incl. by departments and administrations:					
Odesainterdistrict (hereinafterOI) gasfacilitiesoperationadministration (hereinafter GFOA)		5614.17	5528.40	2603.95	730.67
AnanyevGFOA		3621.72	3570.79	3610.33	2259.70
BaltaGFOA		9165.53	9695.52	35328.36	5898.69
B. Dnistrovskyi GFOA		310.23	332.76	553.37	24.93
BerezanskGFOA		10664.66	12846.22	11373.89	984.88
IllichivskGFOA		15861.37	16090.12	16128.22	17076.42
IzmayilGFOA		26725.05	28396.94	32347.71	21397.99
LyubashivkaGFOA		6269.72	6641.79	9322.17	4543.58
RozdilnaGFOA		25088.29	26127.11	28924.35	0.00
Shyryaevo GFOA		9335.02	9799.63	11113.94	7598.54
Artsyz GFOA		684.34	686.99	1267.72	809.34
Ivanivka GFOA		3475.31	3288.80	3498.10	2351.44
Kotovsk GFOA		13678.21	14003.78	15170.19	11263.50
Ovidiopol GFOA		10496.31	11865.27	13156.79	6579.11
Reni GFOA		11226.14	11047.05	11708.92	7818.12
OdesaGFOA		59023.33	61489.52	70903.27	30891.67
$V^{y}_{gas,LE}$, Ths m^3	**Totalquantityofnaturalgasconsumedbylegal entities**	**623570.37**	**613879.64**	**627057.34**	**359424.61**
Incl. by departments and administrations:					
OIGFOA		67697.75	63018.13	72036.71	44652.83
AnanyevGFOA		1543.42	1388.13	1516.37	892.24
BaltaGFOA		8122.76	7269.77	8373.91	986.83
B. Dnistrovskyi GFOA		9092.60	7863.85	10511.50	5863.20
BerezanskGFOA		3215.88	2960.75	3008.56	0.00
IllichivskGFOA		28688.33	27767.68	26517.79	21545.37
IzmayilGFOA		23660.65	14763.44	20367.39	12443.01
LyubashivkaGFOA		2876.24	2163.62	2376.22	1427.68
RozdilnaGFOA		7033.37	8744.05	9299.21	4778.83
Shyryaevo GFOA		1517.89	1563.58	2142.72	1217.84
Artsyz GFOA		722.79	608.44	730.21	0.00
Ivanivka GFOA		1736.17	1536.98	1622.09	1080.49
Kotovsk GFOA		13959.06	12064.58	12965.63	7824.03
Ovidiopol GFOA		10520.01	7588.72	17818.59	3569.54
Reni GFOA		3503.56	3372.83	3585.80	2291.33
OdesaGFOA		439679.887	451205.08	434184.63	250851.41
$L^{y}_{p,los,1}$, km	**Lengthofgasdistributionsystemsimplementedundertheproject**	211.00	53.70	77.53	9.89

NCV^{y}_{gas}, TJ/mln m^3	**Net calorificvalueofnaturalgas**	34,0[13]	34,1[13]	34,1[13]	34,1[13]
NCV^{y}_{fuel}, TJ/ths t	**Net calorificvalueofcoal**	21,5[13]	21,8[13]	21,8[13]	21,8[13]
NCV^{y}_{fuel}, TJ/ths m^3	**Net calorificvalueoffuel oil**	39,8[13]	39,9[13]	39,9[13]	39,9[13]
$k^{c}_{p,gas}$, t/TJ	**Carbonemissionfactorwhencombustingnaturalgas**	15,12[13]	15,11[13]	15,11[13]	15,11[13]
$k^{o}_{p,gas}$, Relative units	**Carbonoxidationfactorwhencombustingnaturalgas**	0,995[13]	0,995[13]	0,995[13]	0,995[13]
k^{c}_{fuel}, t/TJ	**Carbonemissionfactorwhencombustingcoal**	25,95[13]	25,97[13]	25,97[13]	25,97[13]
k^{o}_{fuel}, Relative units	**Carbonoxidationfactorwhencombustingcoal**	0,963[13]	0,963[13]	0,963[13]	0,963[13]
k^{c}_{fuel}, t/TJ	**Carbonemissionfactorwhencombustingfuel oil**	21,1[13]	21,1[13]	21,1[13]	21,1[13]
k^{o}_{fuel}, Relative units	**Carbonoxidationfactorwhencombustingfuel oil**	0,99[13]	0,99[13]	0,99[13]	0,99[13]
CEF^{y}_{elec}, tCO_{2e}/ MWh	**GHG emissionfactorwhenelectricityconsumptionisreduced**	1.082[14]	1.096[15]	1.093[16]	1.09[17]
$EF^{y}_{CH_4,p,los,2}$, t CH_4/PJ	**Ondefaultmethaneemissionfactorattechnologicalgasequipmentatendconsumersplace**	139.5[18]	139.5[18]	139.5[18]	139.5[18]
$EF^{y}_{CH_4,p,los,1}$, t CH_4/ths km	**Ondefaultmethaneemissionfactorinthecourseofnaturalgastransportationanddistribution**	820[18]	820[18]	820[18]	820[18]
$CEF^{y}_{gas,unit}$, t CO_{2e}/m^3	**Reduced GHG emissionfactorinthecourseofnaturalgastransportationtotheen**	0.000073[19]	0.000057[19]	0.000055[19]	0.000046[19]

[13] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php
[14] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[15] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[16] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[17] http://www.neia.gov.ua/nature/doccatalog/document?id=127498
[18] http://neia.gov.ua/nature/control/uk/doccatalog/list?currDir=124564
[19] Supporting documentAnnex 3: CalculationofGHGemissionreductionsduetogasification of Odesa region

	dconsumers				

* Thevaluesareprovided for the period of 01.01.2011- 30.06.2011