JI MONITORING REPORT
(for reporting period 01.08.2011 - 29.02.2012)

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(date)	(signature)	(surname, name and patronymic of the person)

S. P.

Title of manager of the economic activity subject- JI Project Host Party
Head of the board PJSC "Kyivgas"

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S. P.

Monitoring report of JI project
Reduction of Methane Emissions at Flanged, Threaded Joints and Shut-down Devices Equipment of OJSC "Kyivgas"[1] Equipment

Monitoring period: 01/08/2011 – 29/02/2012

Version: 02 as of 05/03/2012

Contents:

Appendix A.[2] The summary calculations of GHG emission reduction at flanged, threaded joints and shut-down devices of PJSC "Kyivgas" equipment for 7 months (01 August 2011 to 29 February 2012).

[1] Open Joint Stock Company (OJSC) "Kyivgas" at the started of the year was re named to Public Joint Stock Company (PJSC) "Kyivgas".

[2] Appendix A is given in electronic form.

Section A. General project activity and monitoring information

A.1. Title of the project

"Reduction of Methane Emissions at Flanged, Threaded Joints and Shut-down Devices of OJSC "Kyivgas" Equipment»

A.2. Status of JI project

JI project "Reduction of Methane Emissions at Flanged, Threaded Joints and Shut-down Devices of OJSC "Kyivgas" Equipment» was determined by the Bureau Veritas Certification, determination report No. UKRAINE/0125/2010 as of 08/07/2010. The project was approved by the National Environmental Investment Agency of Ukraine (Letter of Approval No.1121/23/7 as of 28/07/2010) and Federal Office for Environment (FOEN) of Switzerland (Letter of Approval No J294-0463 as of 23/07/2010).

A.3. Short description of the project activity

The following Greenhouse gases (GHG) emissions reduction were achieved as a result of rehabilitation of the flanged, threaded joints and shut-down devices conducted by PJSC "Kyivgas" in accordance with this project from 01 August 2011 to 29 February 2012[3]:

Table.1. GHG emissions reduction

	01/08/2011-31/12/2011	01/01/2012-29/02/2012
Methane emissions reduction for the period, m^3	31 284 422	12 063 927
GHG emissions reduction for the period, tCO_2e.	470 919	181 596
Total methane emissions reduction for the period of monitoring, m^3	**43 348 349**	
Total GHG emissions reduction for the period of monitoring, tCO_2e.	**652 515**	

A.4. Monitoring period

Commencement: 01/08/2011
Termination: 29/02/2012

[3] The presented values of GHG emission reductions are approximated to integers.

A.5. Methodology applied for project activity

A.5.1. Baseline methodology

The Specific Approach has been used that based on the approved by the Clean Development Mechanism Executive Board Methodology AM0023 version 3.0 of 30/10/2009 "Leak reduction from natural gas pipeline compressor or gate stations" [4] with clarification regarding the method of measurement of leakages volume (see section B.1 of determined PDD version 03).

A.5.2. Monitoring methodology

For quantitative assessment and preparation of the reports as regards reduction of emission on the ground of baseline and project activity used a specific approach based on the approved monitoring methodology AM0023 version 3.0 with modification regarding more accurate leakages volume measuring method given in section B.1 of determined PDD version 03.
Uncertainties of the measuring method were taken into account in the course of greenhouse gases reduction calculation (see section D of PDD version 03).

A.6. Status of implementation including time table for major project parts

Project activities include reduction of methane leakage which is the result of faulty sealing of ground and underground fittings implemented at the switch mechanisms (bolts, cocks, valves), flange and threaded joints of gas pipelines of PJSC "Kyivgas" in the amount of 60 613 pieces. Types and quantity of fittings are given in the PDD version 3.

During 2005 – 2009 years each of 60 613 shut-down devices (bolts, cocks, valves), flange and threaded joints of gas pipelines of PJSC "Kyivgas" were reconstructed or repaired.

The tasks of current monitoring period (August 2011 - February 2012) is further accomplishment of purposeful examination and technical maintenance (PETM) of all shut-down devices (bolts, cocks, valves), flange and threaded joints. Repaired since 2005 to 2009 years equipment components during current monitoring period regularly checked as a part of a standard monitoring program to make sure they have not become the source of leakage again.

According to Monitoring Plan of PDD version 3 the regular repairs of the components are done once per year, technical maintenance – once per half year.

[4] http://cdm.unfccc.int/UserManagement/FileStorage/JY2L0XEKMB3HD18T7RPO6ZSFCQINGA

Methane leakage volumes received in the result of measurements on the repairing equipment of the gas pipeline of PJSC “Kyivgas” are not exceeding the methane leakage volumes, which was measured after the first repair of equipment.

Photos of shut-down devices of European production which have been within the project replace outdated Soviet gas equipment and post-Soviet period are shown in Pictures 1 and 2.

Pic.1 Ball valves production in Hungary

Pic.2 Ball valves of large diameter production in Hungary

Some photos of monitoring measurements during the reporting period are shown in Pic. 3-5:

Pic. 3. Monitoring measurement of methane leaks on wedge latch, register number № 4020 (Marshall Jakubowsky str., 2A).

Pic. 4 Monitoring measurement of methane leaks on the wedge latch register number 3032 (Avenue Pravda, 10).

Pic.5. Monitoring measurement of methane leaks on wedge latch, registered number № 9945 (Avenue Pravda, 64)

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

There are no significant deviations from the registered version of PDD.

The estimated calculated values of volumes of GHG emission reductions listed in the determined PDD, version 03 are higher than actually received reductions for the current monitoring period by 0.3%.

The reason of such deviation is that fact that estimations of emission reductions given in the determined PDD version 03 are preliminary and are based on theoretical calculations, statistical estimates, as well as on the basis of initial measurements performed at facilities of PJSC "Kyivgaz" gas distribution infrastructure before the beginning of the project implementation.

According to the chosen Specific Approach GHG emission reductions within the framework of this project are calculated ex post.

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

There are no deviations from registered monitoring plan.

A.9. Persons responsible for preparation and producing of monitoring report

The following employees of PJSC "Kyivgas" are responsible for monitoring report: head of working team, the chief engineer – Bernatskiy B.E., and Director of VEMA S.A. - Fabian Knodel.

Section B. Key monitoring activities

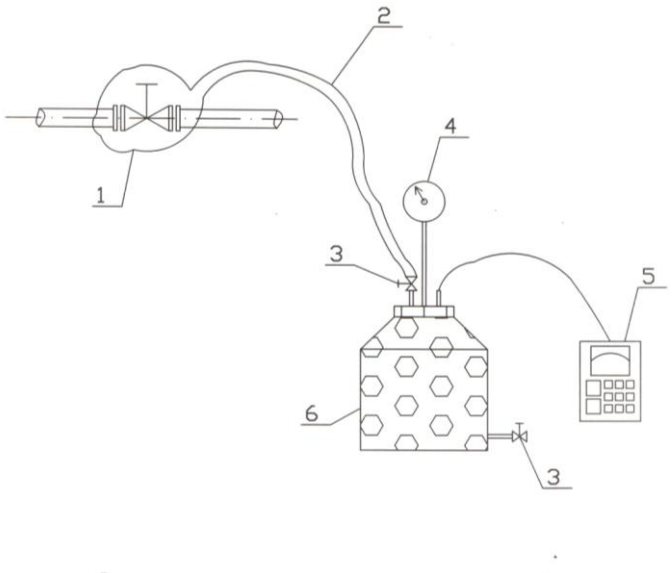
B.1.1. Applied equipment

Control and monitoring system consists of three parts:

1) Measurements of methane leakage value before the rehabilitation (hermetization) of the object;
2) Measurements of methane leakage value after the rehabilitation (hermetization) of the object;
3) Archiving and processing of obtained results.

To measure leakage volume of natural gas it was decided to use the method based on the Calibrated Bag Technology described in the Approved baseline strategy AM0023 "Reduction of natural gas leakage at compressor and gas distribution stations". One of the problems incurred by using this method is difficult accounting of the volume of the valves measurements are done on, and of the initial air volume upon determination of gas volume received in the bag.
A special plant was made to solve these problems. It is made on the basis of a plastic capacity of a certain volume (0,87 m^3), package, plastic hose and pressure gauge (see Picture 3). All junctions are sealed.

Scheme of plant is represented on Picture 6.



Pic. 6. Scheme of the plant for quantitative measurement of methane leakage.

Signs:

1. Hermetic bag.
2. Hose.
3. Crane.
4. Pressure gauge.

5. Gas analyzer EX-TEC® SR5.
6. Hermetic tank.

Gas analyzer EX-TEC® SR5. To determine methane concentration in the sample a high-precision gas analyzer EX-TEC® SR5 is used.

Pic. 7. Gas analyzer EX-TEC® SR5 fhoto

Gas analyzer has such characteristics:
- explosion-proof (CENELEC);
- gas detection upon control of pipeline networks (ppm range);
- gas detection at the internal installations (ppm range);
- alarm upon approaching the lower level of explosion (% UEG or Vol. %-range);
- measurement of concentration upon gas contamination and purging of lines (Vol. % range);
- measurement of concentration in probe aperture (Vol.%-range).

Relative error makes 10%, which conforms to EN 50054/57[5] Standard.

After detecting and measuring leaks performed repair (replacement) gas pipeline equipment, which will include the use of modern materials seals (GOST 7338-906[6], GOST 5152-847[7] or GOST 10330-768[8]) and complete replacement of obsolete equipment in new, modern European manufacturers or their analogues domestic production.

B.1.2. Calibration procedure

The devices applied in the process of methane leakage monitoring are:
- gas analyzers EX-TEC® SR5 (Serial Numbers 041020009 and 041020010), inter-checking interval is 1 year;
- manometer "Д-59Н-100-1.0 6 kPa", inter-checking interval is 1 year;

[5] Electrical apparatus for the detection and measurement of combustible gases) General requirements and test methods
[6] «Rubber and rubber-fabric plates»
[7] «Stuffing»
[8] «Scutched flax fibre. Technical conditions»

- thermometer type TL-4, inter-checking interval is 2 years;
- stop watch type «SOS pr-2b-2», inter-checking interval is 1 year.

The certificates conforming technical serviceableness of devices will be issued as a result of check-up (calibration).

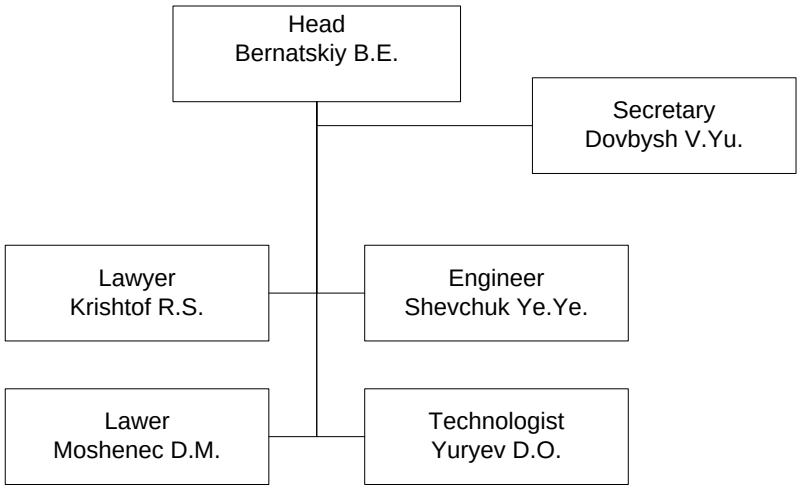
B.1.3. Involvement of Third Parties

SE "Analithaz-Service" - state-owned enterprise, which organize the state verification and calibration of gas analyzers in the institutions of the state standard.

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

B.2.1. The operational and management structure for the operator to implement monitoring plan.

Coordination of work of all departments and services of PJSC “Kyivgas” concerning project implementation is done by specially created Working team. Renewed structure of Working team is approved by the order № 179 from 04/05/2011 of the Chairman of the Board of PJSC “Kyivgas” Gorovoy S.A. The structure of Working team is shown on the Picture 8.



Pic. 8. Structure of Working team.

Head of working team Bernatskiy B.E. is responsible for general management of the project and coordination of all actions of the parties, determines plan of measures under the Project and scope of resources required. Yuryev D.O. coordinates collection of all information provided for by monitoring plan, and makes all necessary calculations. Archiving of all received information in the result of measurements and settlements is done under guidance of Dovbysh V.Yu. Technical maintenance of the Project is carried out

by Shevchuk Ye.Ye. Legal support of the Project is carried out by Krishtof P.S. and Moshenec D.M.

B.2.2. List of parameters applied in the course of calculation

Parameters applied for calculation are given below in the Table 2.

Table 2. Parameters used during GHG emissions calculation

Identification number	Data variable	Source of data	Data unit measurement	Form of representation of obtained data	Comments
1. i	The serial number of the device, where the leak of gas is detected, was removed and then tested	Leakage measurement activities	Dimensionless	Electronic	Detected on device leakage is assigned a corresponding number. List of the switching devices (valves, faucets, valves), flange and threaded connections, see the Accompanying document 1 to the PDD. A test after repair.
2. Ti	Time	Records of investigation results	The amount of hours of exploitation of equipment on which leakages were found during a year	Electronic	Quantity of hours of exploitation during a year from the moment of its repair (replacement).
3. Data	Data	Date on repair (replacement) and monitoring (register)	Date of repair (replacement) and monitoring	Electronic	Date of rehabilitation used together with the quantity of hours of equipment exploitation to determine the total number of hours of operation. In the case of repeated leakages the date is the date of last inspection, which showed no leakages.
4. GWP_{CH4}	Global Warming Potential for methane	IPCC	tCO_2e/ tCH_4	Electronic	Project developer will conduct monitoring of any changes in global warming potential for methane published by IPCC and approved by COP.
5. $F_{CH4,i}$	Leakage speed for each found leakage	Leakage measurement activity	m^3CH_4/h	Electronic	It is calculated by using the largest deviation of device error (10% for gas analyzer).
6. t	Temperature	Data of measurements of glass mercury thermometer TL-4	^0C	Electronic	It is measured for determination of CH_4 density.

Identification number	Data variable	Source of data	Data unit measurement	Form of representation of obtained data	Comments
7. P	Gas pressure	Data of measurements of manometer «Д-59Н-100-1.0 6 кПа».	kPa	Electronic	It is measured for determination of CH_4 density.
8. URi	Vagueness factor of emission measuring equipment	Information given by manufacturer and/or IPCC	%	Electronic	If possible, 95% - confidence interval is measured, advice of Good Practice Guidelines presented in section 6 2000 IPCC. If the manufacturer of leakage measurement equipment states uncertainty interval without specifying the confidence interval, it can be considered as 95%.
9. Vbag	Tank capacity	Data of measurements of flow meter	m^3	Electronic	Tank is filled with water. Quantity of water measured by flow meter shall be a tank capacity. Measurement showed that the volume capacity is 0,87 m^3.
10. $w_{sampleCH4,i}$	Methane concentration in a sample	Data of measurements of gas analyzer EX-TEC® SR5	%	Electronic	The concentration of methane in the sample (in tank) of leakage *i* is the difference between the concentration of methane in the sample at the beginning and end of measurement. Concentration is measured by gas analyzer EX-TEC ® SR5.
11. τ_i	Time when methane concentration in tank reaches a certain level	Data of measurements of stop watch type «SOS pr-2b-2»	seconds	Electronic	Time, during which the concentration of methane in tank reaches a certain level is determined by the stop watch. Measurement begins with the opening tap on the tank lid and ends in 180 seconds.

B.2.3. Data as to leakages

There are no leakages during the project implementation (JI Specific Approach on the basis of the approved Methodology AM0023, version 3.0 also as well as Methodology AM0023, version 3.0 doesn't provide for leakages).

B.3. Data processing and archiving

All information will be processed and archived in electronic and/or paper form and will be kept till December 31, 2019.

B.4. Emergencies and technological breaches

There were no emergencies at gas distribution stations of PJSC "Kyivgas" during 7 months (from 01 August 2011 to 29 February 2012) of current monitoring period.

B.5. Procedures for detection and liquidation of malfunctions at flanged, threaded joints and shut-down devices of PJSC "Kyivgas" equipment

Detection, liquidation and registration of failures and emergencies at flanged, threaded joints and shut-down devices of PJSC "Kyivgas" equipment is carried out according to the Ukrainian Gas Supply System Safety Rules.

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

Such external data are using for monitoring:

Data/Parameter	GWP_{CH4},
Unit	tCO_2e/tCH_4
Description	Global Warming Potential for methane
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 global warming potential for methane published IPCC (IPCC Second Assessment Report: Climate Change 1995 (SAR)) and accepted COP. The value of GWP for methane is provided on the UNFCCC web-site: http://unfccc.int/ghg_data/items/3825.php

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, version 3.0
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*[9]. If the producer of equipment of emissions measuring declares the area of vagueness without clarification of confidence interval, it can be accepted 95%

B.7. Error level of metering equipment

Relative error of gas analyzer EX-TEC® SR5 is 10%, meeting the standard EN 50054/57. The device is calibrated annually.

[9] 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

Section C. Quality assurance and quality control measures

C.1. Documented procedures and management plan

C.1.1. Roles and responsibilities

Management of the project is implemented by the Chief Engineer of PJSC “Kyivgas” Bernatskiy B.E. He manages and coordinates the activities of all departments. Specially formed working team is responsible for collection and processing of the parameters.
Structure of data collection and project management is given in the Section B.2 of this Monitoring Report.

C.1.2. Trainings

There is no need to conduct trainings for operation with new equipment. All trainings related to the project were conducted by the equipment suppliers and their cost is included into the equipment cost.

C.2. Internal audits and control measures

According to distribution of duties between the parties of the project the organization of monitoring measurements of leaks of methane on flanged, threaded joints and shut-down devices of the PJSC "Kiyvgaz" equipment is incurred by company VEMA S.A. With that end in view company VEMA S.A. concludes corresponding contracts with other companies on carrying out of such monitoring measurements. Thus, direct monitoring measurements are spent by the personnel of these companies, but at presence and at control of representatives of PJSC "Kiyvgaz" and company VEMA S.A. At carrying out of monitoring measurements the parties of the project co-ordinate the activity through working group specially created in at PJSC "Kiyvgaz". Data of monitoring measurements of leaks is fixed and in the electronic form transfer to participants of the project for their further processing, carrying out of calculations and storage.
Specially formed working team of PJSC “Kyivgas” ensures control of measurement of all necessary parameters provided according to monitoring plan.
Operating repair (once a year) and maintenance service (once a half year) flanged, threaded joints and shut-down devices, according to distribution of duties between the project parties, carries out by PJSC "Kiyvgaz".

C.3. Information about the indicators of project’s social and environmental effect

The quality of gas supply of the region’s population will be improved as a result of project implementation.
Also there will be decrease in natural gas losses and GHG emission reduction causing greenhouse effect and climate fluctuation.

Section D. Calculation of GHG emission reductions

D.1. Project emissions

Using the method for leakage volume measurement with the help of leak-proof tank, volume of methane leakage of one equipment unit can be calculated by the formula:

$F_{CH4,iP} = Vbag * w_{sampleCH4,i} * 3600 / \tau_i$, where (1)

$F_{CH4,iP}$ - methane leakage through leak point *i* through leakage element after reconstruction ($м^3$/h);
V_{bag} - volume of leak-proof tank for measurement ($м^3$);
$w_{sampleCH4,i}$ - concentration of methane in the leak sample *i* which is the difference of concentrations at the beginning and at the end of measurement (%);
τ_i - Average time of filling in the tank for leakage *i* after reconstruction (seconds)

Project methane leakages for monitoring period *y* are calculated by the formula:

$Q_{yP} = ConvFactor * \Sigma[F_{CH4,iP} * Ti,y * UR_i] * GWP_{CH4} * 0.9$, where (2)

Qy_P - methane emissions for the period y, for rehabilitated equipment (tCO_2e);
ConvFactor - conversion ratio $м^3CH_4$ to tCH_4 at the normal conditions (0 °C and 101.3 kPa), it makes 0.0007168 $tCH_4/м^3CH_4$;
UR_i - factor taking into account uncertainty of measurement method (95%);
Ti,y -time for corresponding component i, during which it worked within the period of consideration (monitoring period) y (hours);
GWP_{CH4} - Global Warming Potential for methane (21 tCO_2.eq/tCH_4);
0.9 - equipment error factor.

Emissions generated after implementation of project arrangements are given in the Table 3[10].

Table 3. Project GHG emissions reduction

	01/08/2011-31/12/2011	01/01/2012-29/02/2012
Volumes of project GHG emissions for the period, tCO_2e.	29 629	11 426
Total volumes of project GHG emissions for the monitoring period, tCO_2e.	**41 055**	

[10] The presented values of project GHG emission are approximated to integers.

D.2. Baseline emissions

Using the method for leakage volume measurement with the help of leak-proof tank, volume of methane leakage of one equipment unit can be calculated by the formula:

$F_{CH4,iB} = Vbag * w_{sampleCH4,i} * 3600 / \tau_i$, where (3)

$F_{CH4,iB}$ - methane leakage through component *i* due to leakage element before reconstruction (m^3/h);
V_{bag} - volume of leak-proof tank for measurement (m^3);
$w_{sampleCH4,i}$ - concentration of methane in the leak sample *i* which is the difference of concentrations at the beginning and at the end of measurement (%);
τ_i - average time of filling in the tank for leakage *i* after reconstruction (seconds).

Baseline methane leakages for monitoring period *y* are calculated by the formula:

$Q_{yB} = ConvFactor * \Sigma[F_{CH4,iB} * Ti,y * UR_i] * GWP_{CH4} * 0.9,$ where (4)

Q_{yB} - methane emissions for the period y, for equipment before the rehabilitation (tCO_2e)
ConvFactor - conversion ratio $м^3CH_4$ to tCH_4 at the normal conditions (0 °C and 101.3 kPa), it makes 0.0007168 $tCH_4/м^3CH_4$;
URi - factor taking into account uncertainty of measurement method;
Ti,y - time for corresponding component i, during which it worked within the period of consideration (monitoring period) y (hours);
GWP_{CH4} - Global Warming Potential for methane (21 tCO_2eq/tCH_4);
0.9 - equipment error factor.

Emissions which will be generated subject to absence of the rehabilitation arrangements are given in the Table 4[11].

Table 4. Baseline GHG emissions reduction

	01/08/2011-31/12/2011	01/01/2012-29/02/2012
Volumes of baseline GHG emissions for the period, tCO_2e.	500 548	193 022
Total volumes of baseline GHG emissions for the monitoring period, tCO_2e.	**693 570**	

[11] The presented values of project GHG emission are approximated to integers.

D.3. Leakage

There are no leakages during the project implementation (JI Specific Approach on the basis of the approved Methodology AM0023, version 3.0 also as well as Methodology AM0023, version 3.0 doesn't provide for leakages).

D.4. Emission reduction as a result of Project implementation.

Emission reduction as a result of project implementation shall be calculated as a difference in baseline and project emissions.
Quantity of emission reduction units (ERU), tCO_2e:

$$ERU = \sum[Q_{yB} - Q_{yP}] \quad (5)$$

ERU– emission reduction units, t CO_2e;
Q_{yP} – project emissions, t CO_2e;
Q_{yB} – baseline emissions, t CO_2.e

Emission reductions as a result of project implementation during 7 months (August 2011 – February 2012) are given in Table 5[12].

Table 5. GHG emissions reduction

	01/08/2011-31/12/2011	01/01/2012-29/02/2012
Quantity of GHG emission reduction for the period, tCO_2e.	470 919	181 596
Total quantity of GHG emission reduction for the monitoring period, tCO_2e.	**652 515**	

[12] The presented values of project GHG emission are approximated to integers.