JOINT IMPLEMENTATION PROJECT

«Realisation of a complex of energy saving activities at the JSC "Odessa Port Plant"»

(the project name)

The fifth monitoring report covering the period from 01/01/2011 until 30/06/2011

Position of the head of organization, institution or establishment compiling the document

Managing Partner of «Climate Protection Bureau LLP» (position) _____ (signature) **V.V. Khalabuzar** (full name of person)

(Seal place)

Position of the head of economic entity owning the source to be used as the basis for the joint implementation project

First Deputy Chairman of the Board of JSC "OPP" (position) _____ (signature) **O. Y. Fedchun** (full name of person)

(Seal place)

SEAL: Joint stock company "Odessa Port Plant" Identification code 00206539, Ukraine, Odessa region, Yuzhnyi,

The city of Yuzhne

August 2011

Joint implementation monitoring report form

Monitoring period is 01.01.2011 – 30.06.2011

Version 02

Contents:

Section A. General information about the project and monitoring

A.1. Title of the project activity

«Realisation of a complex of energy saving activities at the JSC "Odessa Port Plant"»

A.2. Registration number of the joint implementation project

In the International Transaction Log (ITL) the project has obtained identification number UA1000193.

A.3. Brief description of the project activity

Project activity is aimed at improvement in power efficiency of the plant by the implementation of 3 subprojects. The main purpose of the planned activities implementation for the power efficiency improvement of the production in JSC "OPP" is to decrease natural gas burnt for ammonia production and heat energy generation for production and heating needs of the plant impelling greenhouse gases emissions to reduce.

1. **Installation of waste heat boilers for the flue gases** – as a result of this subproject implementation, during 2001-2004 the waste heat boilers were installed, allowing to recover heat of the flue gases from gas-turbine engines. The main purpose of this activity is to decrease natural gas volumes burnt by the boiler shop of JSC "OPP" to generate heat energy for production and heating needs of the plant. The flue gas heat recovery by waste heat boilers allows to generate steam necessary for urea production and to heat up the water in the network of the plant. This heat energy partly substitutes one that is generated by the boiler shop leading to the reduction of natural gas volumes burnt by the boiler shop for heat energy recovery.

2. **Modernization of two urea production units** – as a result of this subproject implementation, in 2001 a phased modernization of two urea production units started. The aim of the modernization is to install highly efficient equipment permitting to decrease amounts of heat and electric energy used for urea production, at the same time allowing to reduce the amounts of fossil fuel burnt for the energy recovery. Reduction of heat energy volume for the urea production will lead to the decrease in amounts of heat energy generated by the boiler shop and, as a result, reducing consumption of natural gas by the boiler shop. Reduction of the electric power consumption will permit to reduce its consumption from Ukraine's Electricity Transmission Grid leading to the decrease of the burning volume of fossil fuel for electric energy production by power plants in Ukraine.

3. **Modernization of two ammonia production units –** as a result of this subproject implementation, in 2004 a phased modernization of two ammonia production units started. The purpose of modernization is to reduce consumption of natural gas for ammonia production. Natural gas, used for ammonia production, has two functions:

- technological purposes – the natural gas is used directly for the chemical ammonia synthesis providing necessary chemical elements for the process. Data on consumption of technological gas is used to calculate amounts of ammonia produced;

- fuel purposes – this natural gas is necessary to provide required temperatures for chemical synthesis. It is the gas which is planned to reduce in natural gas consumption for ammonia production.

Natural gas consumption reduction was achieved from power efficient equipment installation allowing to reduce the rate of natural gas specific consumption for ammonia production.

A.4. Monitoring period

Commencement date is 01.01.2011
Completion date is 30.06.2011

A.5. Methodologies referred to the project activity

The baseline and monitoring plan for this project were chosen according to "Guidance on criteria for baseline setting and monitoring" (version 02). Correspondently to the document request, the selection of the baseline and monitoring plan can be stated on a certain approach that is used only for a specific project of joint implementation, or on a standard approach with a use of methodologies including small-scaled that are approved by the Joint Implementation Supervisory Committee.

Since this project consists of several subprojects that are aimed at different key factors allowing to reduce greenhouse gas emission, the baseline and the monitoring plan were determinated on the basis of certain approach. According to requirements of "Guidance on criteria for baseline setting and monitoring" (version 02) for such projects, based on the certain approach, specific methodological parts can be included into the baseline and monitoring plan determination, that are approved by the Joint Implementation Supervisory Committee. For the baseline and monitoring plan determination of this project, specific elements of consolidated methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 3.2) were use. One of three subprojects, namely "Installation of waste heat boilers for the flue gases", completely conforms with the object of this methodology, therefore, to determine basic emissions and monitoring plan of this subproject, the indicated methodology requirements were used. Subproject "Modernization of two urea production units" presumes calculation of the heat and electric energy consumption for urea production, and methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 3.2) states the requirements for calculation of the heat and electric energy amounts, therefore, specific parts of the indicated methodology were used for this subproject. Monitoring plan approved for the proposed joint implementation project is supposed to provide all the necessary data required for calculation of the emission levels under the basic and design scenarios accordingly to amount of emission reduction in result of the proposed joint implementation project realization, therefore an "Instrument for project emission calculation and CO_2 effluence from fossil fuel combustion" (version 2) was applied in order to ascertain the baseline and monitoring plan of the "Modernization of two ammonia production units" subproject.

A.6. Status of implementation, including project major parts schedule

Table 1 – Status of project implementation during monitoring period under review.

Name of the phase	Commencement date	Completion date
Revamp of the synthesis section with stripper replacement in urea production unit #1	13/04/2011	20/12/2011

The schedule of the implementation is in accordance with PDD version 02.

A.7. Planned deviation and revision of the registered PDD

- approach of emission calculation of "Modernization of two ammonia production units" subproject was changed;

- value of carbon oxidation factor during the natural gas combustion ($OXID_{NG}$) was changed. Data of this parameter in PDD was accepted according to "Key principles of national greenhouse gases inventorying IPCC", 2006, although, since the indicated document is not yet approved at the parties conference, but is only prepared for the parties conference approval, the factor determined by "Reviewed key principles of national greenhouse gases inventorying IPCC", 1996 was used for calculation herein;

- emission factor value for National Energy Grid System of Ukraine (NEGSU) was changed ($EF_{co2,elec}$) based on National Environmental Investment Agency of Ukraine order # 75 dated 12.05.2011.

A.8. Planned deviation and revision of the registered monitoring plan

- determination method of emission factor for National Energy Grid System of Ukraine (NEGSU) was changed ($EF_{co2,elec}$). According to requirements of "Guidance on criteria for baseline setting and monitoring" (version 02), among the monitoring backgrounds the priority is official data, therefore instead of early used source of data (Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5)) it is the data stated in the order # 75 of National Environmental Investment Agency of Ukraine dated 12.05.2011 being used;
- a method approach to establish the monitoring plan for "Modernization of two ammonia production units" subproject was changed. An "Instrument for project emission calculation and CO_2 effluence from fossil fuel combustion" (version 2) was applied as a substitute for the earlier used method according to "National Cadastre of anthropogenic emissions from the sources and capture by absorbers of greenhouse gases in Ukraine during 1990-2009". It is connected to the fact, that the latest version of the "National Cadastre of anthropogenic emissions from the sources and capture by absorbers of greenhouse gases in Ukraine during 1990-2009" defines the value of low temperature of the natural gas combustion as a fixed figure (33.85 TJ/mln. m^3), but according to the chosen monitoring plan (section B herein) the low temperature of the combustion is determined in accordance with official data of the natural gas supplier enterprise, that increases the accuracy and reliability in calculating emission reduction and does not contradict the requirements of "Instrument for project emission calculation and CO_2 effluence from fossil fuel combustion" (version 2).

A.9. Official responsible for the monitoring report preparation and presentation

JSC "OPP"
Deputy Chief Engineer, Chief of the technical and production department, Lisovsky L.V.

"Climate Protection Bureau LLP":
Managing Partner, Khalabuzar V.V.

Section B. Key monitoring activities

Key monitoring activities:

- measurement of the heat energy amount from waste heat boilers for the flue gases;
- registering of operational time of waste heat boilers for the flue gases;
- measurement of the power energy consumed by urea production units;
- measurement of the heat energy consumed by urea production units;
- calculation of urea amount produced;
- measurement of the natural gas consumed by ammonia production units;
- calculation of ammonia produced;
- low temperature of the natural gas combustion.

Measurements of the heat energy amount from waste heat boilers for the flue gases, as well as the heat energy consumed by urea production units are taken by sections of heat measurements. Location scheme of heat measurement sections are shown on the figure 1.

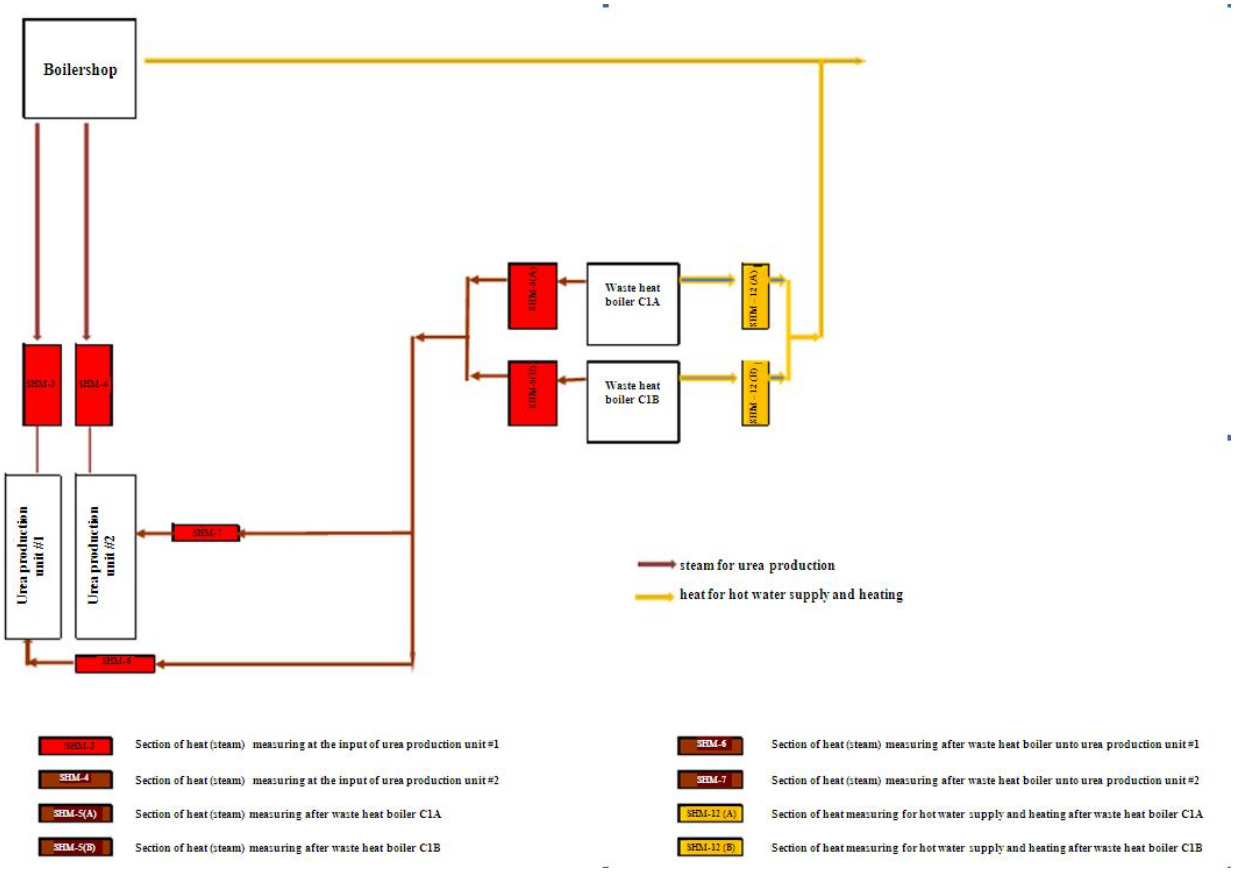

Figure 1 – Location scheme of the sections of heat measurement.

Measurements of the power energy consumed by urea production units are taken by power measurement sections. Location scheme of power measurement sections are shown on the figure 2.

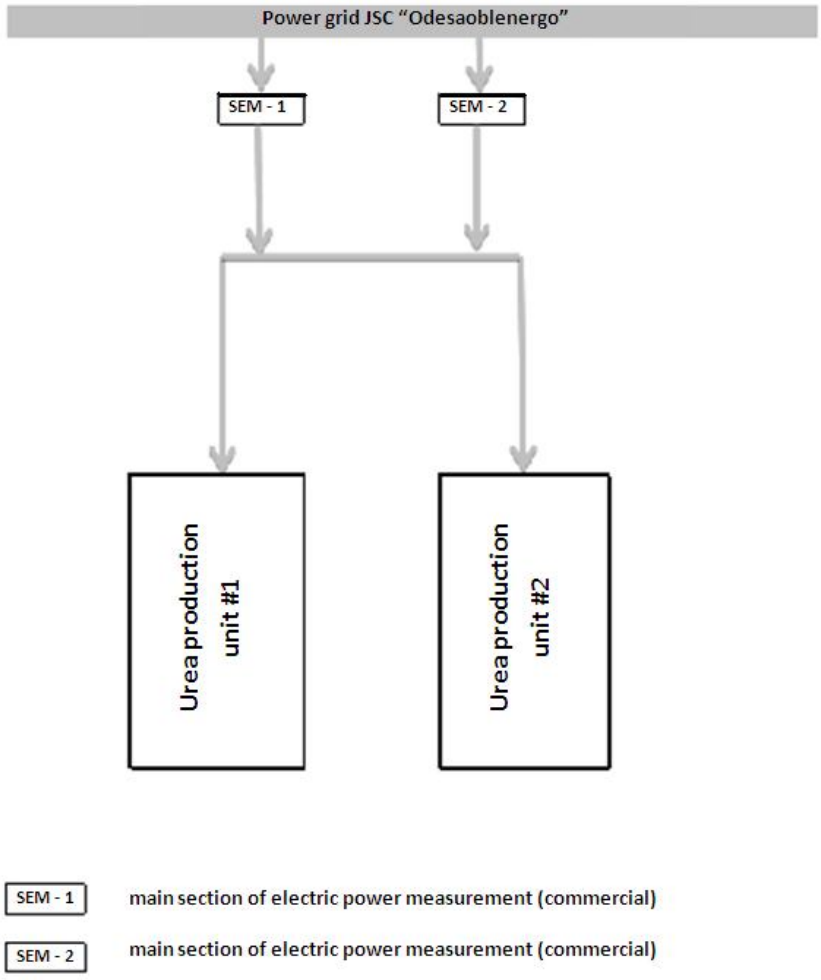

Figure 2 - Location scheme of electric power measurement sections.

Measurements of the natural gas consumed by ammonia production units are taken by gas measuring sections. Location scheme of gas measuring sections are shown on the figure 3.

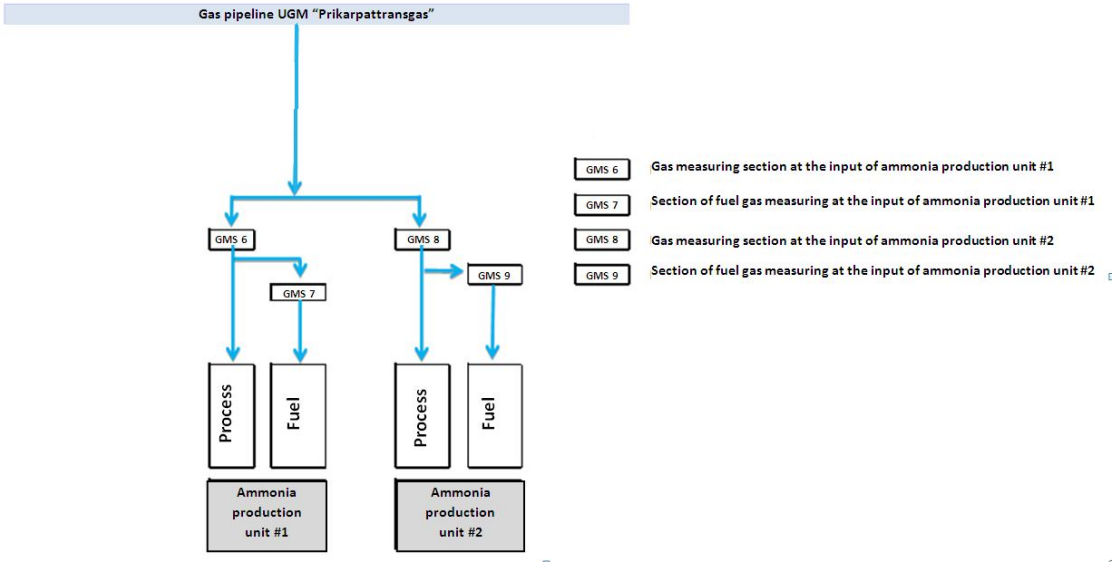

Figure 3 - Location scheme of gas measuring sections.

Registering of operational time of waste heat boilers for the flue gases in the ammonia terminal is equal to operational time of gas-turbine engines. Operational time of gas-turbine engines is controlled by shift manager of the ammonia terminal. Registered results of gas-turbine engines operational time are recorded in technological registers (registration of equipment operational time), afterwards an economist registers data in APM Mechanics software that automatically carries out correspondent calculations to include data into technical and production reports monthly.

Calculation of produced urea and ammonia is conducted according to the "Method of calculating urea output by urea production plant" and to the "Calculation method of ammonia plant productivity in the ammonia production department" relatively.

Measurement of low temperature of the natural gas combustion every month is conducted by technical control department of JSC OPP which is certified by state metrological system entitling to conduct correspondent measurements. Value of low temperature of the natural gas combustion is recorded in technical and production reports in ammonia production.

B.1. Type of monitoring equipment

Monitoring equipment of this project is sections of relating energy resources measurements. The main element of the measurement section is a primary transducer (meter) that is subject to periodic inspection or calibration. Detailed information relating the measurement sections and primary transducers (meters) is drawn below.

B.1.1. A table of detailed information concerning measuring equipment (including type, manufacturing number, last inspection date, error information, required replacement or changes):

Related data is drawn in the table 2.

Table 2

Measurement section (according to the scheme)	Means of measuring equipment (meter, transducer)	Type	Manufacturing number	Technological position	Error	Date of last inspection (calibration)	Date of next inspection (calibration)
1	2	3	4	5	6	7	8
Section of heat (steam) energy measurements at the input of urea production unit #1 SHM-3	Pressure difference transducer	STD-120	701002	1F2004	Accuracy class 0.5	14.10.2010	4th quarter. 2012
	Surplus pressure transducer	STG-674	0797701018	1P2126	Accuracy class 0.5	15.10.2010	4th quarter. 2012
	Resistive temperature transducer	ТСП-1287	01	1T2324	Tolerance class "B"	03.09.2010	3rd quarter. 2012
Section of heat (steam) energy measurements at the input of urea production unit #2 SHM-4	Pressure difference transducer	STD-120	0457006	2F2004	Accuracy class 0.5	27.06.2010	2nd quarter 2012
	Surplus pressure transducer	STG-674	660017	2P2126	Accuracy class 0.5	25.06.2010	2nd quarter 2012
	Resistive temperature transducer	ТСП-1287	02	2T2324	Tolerance class "B"	03.09.2010	3rd quarter. 2012
Section of heat (steam) energy measurements after waster heat boilers unto urea production unit #1 SHM-6	Differential indicator	ST-3000	600904	1F2037	Accuracy class 0.5	14.10.2010	4th quarter. 2012
	Pressure transducer	STG94LR-A10	001003	P2122	Accuracy class 0.5	19.08.2010	3rd quarter. 2012
	Thermoelectric transducer	TXK-2088	011	1T2391	±2.5 ^{0}C	09.09.2010	3rd quarter. 2012
Section of heat (steam) energy measurements after waster heat boilers unto urea production unit #2 SHM-7	Differential indicator	ST-930	600905	2F2037	Accuracy class 0.5	27.06.2010	2nd quarter 2012
	Pressure transducer	STG94LR-A10	001003	P2122	Accuracy class 0.5	19.08.2010	3rd quarter. 2012
	Thermoelectric transducer	TXK-2088	022	2T2391	±2.5 ^{0}C	09.09.2010	3rd quarter. 2012
Section of heat(steam) energy measurement after the waste heat boiler C1A SHM-5(A)	Pressure differential indicator	STD-924	985109	WP050A	Accuracy class 0.5	15.07.2010	3rd quarter. 2011
	Pressure transmitter	STG-94L	985032	WP040A	Accuracy class 0.5	20.06.2011	2nd quarter 2012
	Resistive temperature transducer	ТСП-8040P	476	WT060A	Tolerance class "B"	30.08.2010	3rd quarter. 2012
Section of heat(steam) energy measurement after the waste heat boiler C1B SHM-5(B)	Pressure differential indicator	STD-924	985109	WP050	Accuracy class 0.5	15.07.2010	3rd quarter. 2011
	Pressure transmitter	STG-94LR	985028	WP040B	Accuracy class 0.5	22.06.2011	2nd quarter 2012
	Resistive temperature transducer	ТСП-8040P	477	WT060B	Tolerance class "B"	30.08.2010	3rd quarter. 2012
Section of heat energy measurement for hot water supply and heating after the waste heat boiler C1A SHM-12 (A)	Pressure differential indicator	STD-930	300301	WP120	Accuracy class 0.5	17.11.2010	4th quarter 2011
	Pressure transmitter	STG-94LR	985041	WP080	Accuracy class 0.5	07.06.2011	2nd quarter 2012
	Resistive temperature transducer	ТСП-8040P	05	WT080	Tolerance class "B"	30.08.2010	3rd quarter. 2012
	Resistive temperature transducer	ТСП-8040P	001	WT010A	Tolerance class "B"	14.02.2011	1st quarter 2013
Section of heat energy measurement for hot water supply and heating after the waste heat boiler C1A SHM-12 (B)	Pressure differential indicator	STD-930	300301	WP120	Accuracy class 0.5	17.11.2010	4th quarter. 2011
	Pressure transmitter	STG-94LR	985041	WP080	Accuracy class 0.5	07.06.2011	2nd quarter 2012
	Resistive temperature transducer	ТСП-8040P	05	WT080	Tolerance class "B"	30.08.2010	3rd quarter. 2012
	Resistive temperature transducer	ТСП-8040P	07	WT010B	Tolerance class "B"	28.01.2011	1st quarter 2013
Main section of electric power measurement (commercial) SEM-1	Power energy meter	AIR-3-AL-C8-T	01005047	Main SD Substation 'Khimichna' Inlet 2	Accuracy class 0.2	16.12.2008	4th quarter. 2014
Main section of electric power measurement (commercial) SEM-2	Power energy meter	AIR-3-AL-C8-T	01005043	Main SD Substation 'Khimichna' Inlet 1	Accuracy class 0.2	17.11.2008	4th quarter 2014

1	2	3	4	5	6	7	8
Gas measuring section at the input of the ammonia production unit #1 GMS -6	Natural gas consumption meter	STD 924-E1A	820392	F59	Accuracy class 0.5	30.06.2011	2nd quarter 2013
Fuel gas measuring section at the input of the ammonia production unit #1 GMS -7	Natural gas consumption meter	STD 924	820394	F60	Accuracy class 0.5	14.10.2009	4th quarter 2011
Gas measuring section at the input of the ammonia production unit #2 GMS -8	Natural gas consumption meter	STD 924	820391	2F59	Accuracy class 0.5	09.11.2010	4th quarter. 2012
Fuel gas measuring section at the input of the ammonia production unit #2 GMS -9	Natural gas consumption meter	STD 924	820393	2F60	Accuracy class 0.5	20.07.2010	3rd quarter. 2012
Measuring low temperature of the natural gas combustion	Chromatograph	GC-8A PT	16857	-	3%	17.06.2011	2nd quarter 2012

B.1.2. Procedure of inspection (calibration)

Means of measuring equipment, meters and transducers listed in table 2, are subject to periodic inspection or calibration. Data of the inspection procedure (calibration) interval schedule is shown in table 3.

Table 3

Measuring equipment (meter, transducer, etc.)	Interval between the inspections (calibration), years
Pressure difference transducer STD-120	2
Surplus pressure transducer STG-674	2
Differential indicator ST-3000, ST-930	2
Pressure transducer STG94LR-A10	2
Pressure difference indicator STD-924, STD-930	1
Pressure transmitter STG-94L, STG-94LR	1
Resistive temperature transducer ТСП-1287	2
Thermoelectric transducer ТХК-2088	2
Resistive temperature transducer ТСП-8040Р	2
Power energy meter AIR-3-AL-C8-T	6
Natural gas consumption meter STD 924	2
Natural gas consumption meter STD 924-E1A, STD 924	2
Chromatograph GC-8A PT	1

B.1.3. Participation of third party

SE "Odessastandardmetrology" is authorized body, entitled to conduct inspection and calibration of measuring equipment.

B.2. Data collection (total data of all monitoring period)

Structure of monitoring management is shown in figure 4.

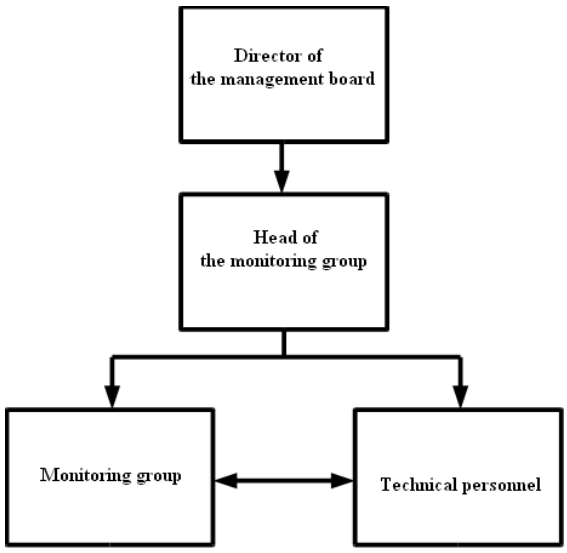

Figure 4 - Management Structure of monitoring and operation

Measurement and data collection from measurement results are the responsibility of technical personnel. The technical personnel deliver the measurement results to monitoring group to organize calculation of units of greenhouse gases emission reduction. The calculation of emission reduction units is performed by joint implementation project developer. The monitoring group is also responsible for data collection that is not subject to measuring, but is to monitoring.

From monitoring results, correspondent data was determined, that is used for calculation of greenhouse gases emission reduction. Digital value of this data is shown in table 4 in accordance with PDD variables.

Table 4

<table>
<tr><td>Title</td><td>Variables</td><td>Digital value and unit of measurement</td></tr>
<tr><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Amount of heat energy generated by the waste heat boilers for the flue gases</td><td>$HG_{boilers}$</td><td>
<table>
<tr><td>Month</td><td>Tcal</td></tr>
<tr><td>January</td><td>11,401</td></tr>
<tr><td>February</td><td>8,376</td></tr>
<tr><td>March</td><td>9,959</td></tr>
<tr><td>April</td><td>10,596</td></tr>
<tr><td>May</td><td>12,341</td></tr>
<tr><td>June</td><td>11,119</td></tr>
<tr><td>Total for the first six months 2011</td><td>63,792</td></tr>
</table>
</td></tr>
<tr><td>Operational time of the waste heat boilers for the flue gases</td><td>$T_{boilers}$</td><td>
<table>
<tr><td>Month</td><td>hour</td></tr>
<tr><td>January</td><td>745</td></tr>
<tr><td>February</td><td>672</td></tr>
<tr><td>March</td><td>744</td></tr>
<tr><td>April</td><td>720</td></tr>
<tr><td>May</td><td>742</td></tr>
<tr><td>June</td><td>720</td></tr>
<tr><td>Total for the first six months 2011</td><td>4 343</td></tr>
</table>
</td></tr>
<tr><td>Amount of electric power energy consumed by urea production units</td><td>EC_{urea}</td><td>
<table>
<tr><td>Month</td><td>MW·hour</td></tr>
<tr><td>January</td><td>14 850</td></tr>
<tr><td>February</td><td>13 500</td></tr>
<tr><td>March</td><td>15 000</td></tr>
<tr><td>April</td><td>14 950</td></tr>
<tr><td>May</td><td>15 250</td></tr>
<tr><td>June</td><td>15 100</td></tr>
<tr><td>Total for the first six months 2011</td><td>88 650</td></tr>
</table>
</td></tr>
<tr><td>Amount of heat energy consumed by urea production units</td><td>HC_{urea}</td><td>
<table>
<tr><td rowspan="2">Month</td><td colspan="2">Tcal</td></tr>
<tr><td>Urea production unit №1</td><td>Urea production unit №2</td></tr>
<tr><td>January</td><td>28,979</td><td>28,931</td></tr>
<tr><td>February</td><td>24,566</td><td>28,900</td></tr>
<tr><td>March</td><td>27,051</td><td>29,646</td></tr>
<tr><td>April</td><td>26,290</td><td>27,901</td></tr>
<tr><td>May</td><td>27,150</td><td>27,605</td></tr>
<tr><td>June</td><td>27,253</td><td>25,158</td></tr>
<tr><td>Total for the first six months 2011</td><td>161,289</td><td>168,141</td></tr>
</table>
</td></tr>
<tr><td>Amount of urea produced</td><td>P_{urea}</td><td>
<table>
<tr><td rowspan="2">Month</td><td colspan="2">t</td></tr>
<tr><td>Urea production unit №1</td><td>Urea production unit №2</td></tr>
<tr><td>January</td><td>37 953</td><td>43 479</td></tr>
<tr><td>February</td><td>35 202</td><td>39 203</td></tr>
<tr><td>March</td><td>40 101</td><td>40 760</td></tr>
<tr><td>April</td><td>40 497</td><td>42 127</td></tr>
<tr><td>May</td><td>41 081</td><td>41 012</td></tr>
<tr><td>June</td><td>39 706</td><td>39 672</td></tr>
<tr><td>Total for the first six months 2011</td><td>234 540</td><td>246 253</td></tr>
</table>
</td></tr>
</table>

1	2	3		
Amount of natural gas consumed by ammonia production units	$FC_{NG,ammonia}$	Month	million. m^3	
			Ammonia production unit №1	Ammonia production unit №2
		January	54,250168	53,448473
		February	49,212363	48,507578
		March	46,285200	53,073573
		April	53,465230	51,957337
		May	55,295312	53,262193
		June	52,789698	51,093791
		Total for the first six months 2011	**311,297971**	**311,342945**
Amount of ammonia produced	$P_{ammonia}$	Month	t	
			Ammonia production unit №1	Ammonia production unit №2
		January	50 987	51 992
		February	46 383	47 276
		March	40 248	51 599
		April	50 155	48 760
		May	51 152	50 708
		June	48 789	48 028
		Total for the first six months 2011	**287 714**	**298 363**
Low temperature of the natural gas combustion	NCV_{NG}	Month	Tcal/million. m^3	
		January	8,065	
		February	8,067	
		March	8,086	
		April	8,057	
		May	8,143	
		June	8,125	

B.2.1. List of other parameters used for calculation

Other parameters used for calculation of greenhouse gases emission reduction are not subject to measuring. The list of these parameters is shown in table 5. Parameter variables in table 5 are indicated in accordance with PDD variables.

Table 5

Title	Variables	Digital value and unit of measurement	Data source
1	2	3	4
A factor of NEGSU emission for the projects of reduction or increasing of electric power consumption	$EF_{co2,elec}$	1,090 t CO_2 e/MW hour	Order # 75 of National Environmental Investment Agency of Ukraine dated 12.05.2011
Electric capacity of the equipment to sustain operational mode of one waste heat boiler for flue gases	$W_{boilers}$	0,0888 MW	Registration certificate of the equipment
Power efficiency (ECE) of the plant boiler shop	η_{boiler}	87%	"Instrument for determination of basic efficiency of heat/electric energy generation systems" (version 01)
Factor of carbon oxidation during the natural gas combustion	$OXID_{NG}$	0,995	"National Cadastre of anthropogenic emissions from the sources and capture by absorbers of

			greenhouse gases in Ukraine during 1990-2009" (hereinafter as "National Cadastre of Ukraine")
Carbon content in natural gas	W_{NG}	15,11 t C/TJ	"National Cadastre of Ukraine"
Specific electric power consumption for urea production according to the baseline	$SEC_{urea,elec,b}$	0,1935 MW·hour/t	For this parameter, a fixed value was accepted, which was based on historical data of urea production units operation within 3 years until the project activities began
Specific heat energy consumption for urea production according to the baseline	$SEC_{urea,term,b}$	$0,8242 \cdot 10^{-3}$ Tcal/t	For this parameter, a fixed value was accepted, which was based on historical data of urea production units operation within 3 years until the project activities began
Specific natural gas consumption for ammonia production according to the baseline	$SEC_{ammonia,b}$	1 156 m^3/t – for ammonia production unit #1; 1 147 $м^3$/т – for ammonia production unit #2	For this parameter, a fixed value was accepted, which was based on historical data of urea production units operation within 3 years until the project activities began

B.2.2 Leakage data

Not applied for this project

B.2.3. Environmental impact

Proposed introductions into existing scheme of the production will positively influence on the environment, owning to reduction of the energy resources for the production, leading to a decrease of the greenhouse gases emission and pollution of the atmosphere.

Emission will reduce due to this project realization, namely:

- the subproject "Installation of waste heat boilers for the flue gases" will allow to reduce amount of natural gas burnt for heat energy generation in boiler shop of the plant, thus decreasing greenhouse gases emissions and pollution of the atmosphere;

- the subproject "Modernization of two urea production units" will allow to reduce specific electric and heat energy consumption for production of one tonne of urea. The decrease of specific heat energy consumption will result in reduction of natural gas burnt in the boiler shop for heat energy generation, thus decreasing greenhouse gases emissions and pollution of the atmosphere. The reduction of specific electric power consumption will result in a decrease of electric power supplied by Electricity Transmission Grid of Ukraine, reducing the amount of fossil fuel for electric power generation at power plants of Ukraine;

- the subproject "Modernization of two ammonia production units" will allow to reduce natural gas consumption for ammonia production, thus decreasing greenhouse gases emissions and pollution of the atmosphere.

Emissions reduction achieved due to this project implementation doesn't have any negative impact on the environment of Ukraine and does not influence on greenhouse gases emissions abroad.

According to the requirements of the Ukrainian legislation in force, namely the law of Ukraine "On environmental protection" №1264-XII dated 25.06.1991 and DBN A.2.2-1, the implementation of this project does not demand ecological assessment and thereafter elaboration of EIA.

B.2.4. Data processing and archiving

Measuring and primary archiving the results are the responsibility of technical personnel. The technical personnel submit measurements results to the monitoring group to organize work for estimation of greenhouse gases emissions reduction. The calculation of emission reduction units is performed by joint implementation project developer. The functions of the monitoring group also include collection of non-measured data which is also subject to the monitoring. The monitoring group is obliged to make a back up copy of monitoring data which should be stored apart from the main data to avoid their loss in case of force majeure situation, which can cause the monitoring data loss.

All information about monitoring data and corrective measures are to be archived for future verification of emissions reduction level. The head of the monitoring group is responsible for preparation and archiving of monitoring reports. The director of the management board analyses summarized monitoring data and relevant documentation from time to time.

Figure 5 shows a scheme of collecting and archiving of monitoring data.

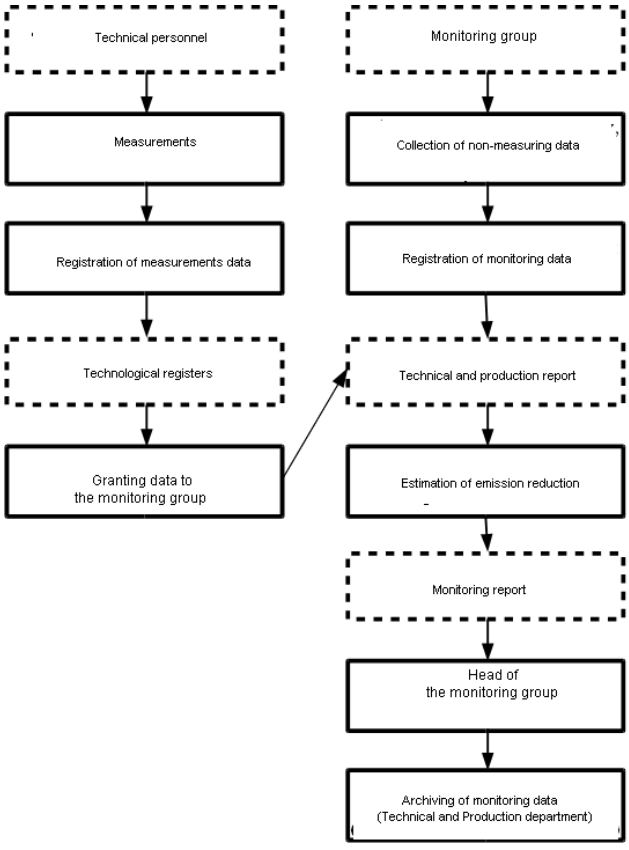

Figure 5 - Scheme of collecting and archiving of monitoring data.

B.2.5. Registration of emergency situations and process accidents

During reviewed monitoring period the following incidents were registered on the equipment, used for the project:

02.01.2011 – a stop of urea production unit #1 due to emission through level meter shell in reactor R201;
28.01.2011 – blockage of urea production unit #1 due to centrifugal compressor 1K104 stoppage because of block activation under "Electrical protection shut down";
01.02.2011 – blockage of urea production unit #1 due to centrifugal compressor 1K104 stoppage because of block activation under "Electrical protection shut down";
13.02.2011 – blockage of urea production unit #1 due to indices collapse of position 1P1154C (suction pressure of reciprocating compressor) on IPC block controller as a result 1P1154EL block activation with a stop of compressor 1K102B;
08.03.2011 – emergency stoppage of ammonia production unit #1 due to occurrence of syn-gas emission in impulsive selection of gauge Pd 32 on pipeline SG-70-16 at the outlet of ammonia reactor 105-D;
14.03.2011 – blockage of urea production unit #2 due to rupture of preventive membrane in stripper shell protection 2E201;
14.04.2011 – blockage of urea production unit #1 in connection with reciprocating compressor stoppage 1K102A due to blocking parameter activation of high temperature in first stage pressurization;
17.04.2011 – breakage of locking part of ejector valve 301-X leading to preventive membrane rupture in regenerator 102-EA. To stabilize the process operation, loading of the ammonia production unit #1 temporarily was lowered.
30.04.2011 – emergency stoppage of ammonia production unit #2 due to failure of VOITH control system driver for turbine valves 105-JT.

All the abovementioned events were timely eliminated by the technical personnel of JSC "OPP".

Section C. Quality assurance and quality control measures

C.1. Registered procedure and management plan

C.1.1. Role and obligation

The structure of the monitoring group, its functions and obligations identified by order of the Director of JSC "OPP" #282 dated 19.07.2010.

The director of the JSC "OPP" appoints personnel for operation and maintenance of technical equipment needed for the project. Their functions also include registration of all data necessary for monitoring. The head of the monitoring group of fuel supply system operational data is deputy chief engineer – head of technical and production department of the JSC "OPP". The monitoring is conducted in close collaboration with technical personnel and will include the monitoring itself and also analysis and archiving of all data determined in the previous section. The functions of monitoring group will also include the work organization for estimation of emissions reduction level. The calculation of emission reduction units is performed by joint implementation project developer. Periodic data on energy sources consumption will be analyzed according to relevant registered data obtained from the technical personnel to approve data credibility. In case of inequality of these data the cause of its appearance must be found in collaboration with the technical personnel. If the discrepancy of monitoring data is found, monitoring system of relevant data must be corrected.

The head of the monitoring group is responsible for preparation and archiving of monitoring reports. The director analyses general monitoring data and relevant documentation from time to time.

Technical personnel record the results of measurements in the relevant registers and submit them to the monitoring group to organize work for estimation of greenhouse gases emissions reduction. The calculation of emission reduction units is performed by joint implementation project developer. The functions of the monitoring group also include collection of non-measured data which are also subject to the monitoring. The monitoring group registers the monitoring data in the technical and production reports.

The monitoring data is kept during the whole crediting period and 2 year after the last charge of emission reduction unit.

C.1.2. Training

Technical personnel of JSC "OPP" have been prepared to operate new equipment and to conduct relevant preventive activities.

C.2. Measures of the internal audit and control

JSC "OPP" personnel are under periodic exams for knowing of safety and health requirements. Means of the measuring equipment (meters, transducers) used for monitoring are subject to periodic inspection (calibration).

The responsibility for keeping measuring equipment (meters, transducers) in proper condition and timely repairs, inspections (calibrations) is taken by chief metrologist of JSC "OPP".

While the measuring equipment (meters, transducers) is being under repairing, the monitoring data is collected by accessory (duplicated) measurement section of the relevant energy resources. Owning to availability of accessory (duplicated) measurement section there is no risk of lack of monitoring data required for calculation of emission reduction.

Section D. Estimation of greenhouse gases

D.1. Project emissions

The project scenario emissions are calculated by the following formula:

$$PE_y = PE_{boilers,y} + PE_{urea,y} + PE_{ammonia,y},$$

where,
PE_y – emission level during a year according to the project scenario, t $CO_{2\,e}$;
$PE_{boilers,y}$ – emission level during a year according to the project scenario of subproject "Installation of waste heat boilers for flue gases", t $CO_{2\,e}$;
$PE_{urea,y}$ – emission level during a year according to the project scenario of subproject "Modernization of two urea production units", t $CO_{2\,e}$;
$PE_{ammonia,y}$ – emission level during a year according to the project scenario of subproject "Modernization of two ammonia production units", t $CO_{2\,e}$.

$$PE_{boilers,y} = EC_{boilers} \cdot EF_{co2,elec},$$

where,
$EC_{boilers}$ – electric power needed for maintaining operational modes of waste heat boilers for flue gases, MW·hour;
$EF_{co2,elec}$ – factor of NEGSU emissions for the projects of reduction or increasing of electric power consumption, t $CO_{2\,e}$/MW·hour.

$$EC_{boilers} = W_{boilers} \cdot T_{boilers},$$

where,
$W_{boilers}$ – electric capacity of the equipment to sustain operational mode of one waste heat boiler for flue gases, MW;
$T_{boilers}$ – operational time of waste heat boilers for flue gases, year.

$$PE_{urea,y} = PE_{urea,elec,y} + PE_{urea,term,y},$$

where,
$PE_{urea,elec,y}$ – emissions caused by electric power consumption according to the project scenario, t $CO_{2\,e}$;
$PE_{urea,term,y}$ – emissions caused by heat energy consumption according to the project scenario, t $CO_{2\,e}$.

$$PE_{urea,elec,y} = EC_{urea} \cdot EF_{co2,elec},$$

where,
EC_{urea} – amount of electric power consumed by urea production units, MW hour;
$EF_{co2,elec}$ – factor of NEGSU emissions for the projects of reduction or increasing of electric power consumption, t $CO_{2\,e}$/MW·hour.

$$PE_{urea,term,y} = HC_{urea} \cdot 4{,}1868 \cdot EF_{co2,NG}/\eta_{boiler},$$

where,
HC_{urea} – amount of heat energy consumed by urea production units, Tcal;
$EF_{co2,NG}$ – emission factor for natural gas combustion, t $CO_{2\,e}$/TJ;

η_{boiler} – power efficiency (Efficiency Factor) of the boiler shop.
4,1868 – standard rate for conversion of Tcak into TJ, TJ/Tcal.

$EF_{co2,NG} = OXID_{NG} \cdot W_{NG} \cdot 44/12$,

where,
$OXID_{NG}$ – factor of carbon oxidation during the natural gas combustion;
W_{NG} – carbon content of natural gas, t C/TJ;
44/12 – stoichiometric ratio between molecular masses of carbon dioxide and carbon, t CO_2/t C.

$PE_{ammonia,y} = FC_{NG,ammonia} \cdot NCV_{NG} \cdot 4,1868 \cdot EF_{co2,NG}$,

where:
$FC_{NG,ammonia}$ – amount of natural gas consumed by ammonia production units, million м^3;
NCV_{NG} – low temperature of the natural gas combustion, Tcal/million m^3;

$EF_{co2,NG}$ – emission factor for natural gas combustion, t $CO_{2\ e}$/TJ;
4,1868 – standard rate for conversion of Tcak into TJ, TJ/Tcal.

The monitoring data for project emission calculation for reviewed monitoring period is shown in the table 4 and 5 herein.

The project scenario emission for the reviewed monitoring period is shown in table 6.

Table 6

Month	Amount of emission under project scenario, t CO_{2e}
January	232 094
February	210 907
March	216 893
April	226 784
May	235 246
June	225 243
Total for the first six months 2011	**1 347 167**

D.2. Basic emissions

Baseline emissions are calculated by the following formula:

$BE_y = BE_{boilers,y} + BE_{urea,y} + BE_{ammonia,y}$,

where:
BE_y – emissions during a year according to the baseline, t $CO_{2\ e}$;
$BE_{boilers,y}$ – emissions during a year according to the baseline of "Installation of waste heat boilers for flue gases" subproject, t $CO_{2\ e}$;
$BE_{urea,y}$ – emissions during a year according to the baseline of "Modernization of two urea production units" subproject, t $CO_{2\ e}$;
$BE_{ammonia,y}$ – emissions during a year according to the baseline of "Modernization of two ammonia production units" subproject, t $CO_{2\ e}$.

$BE_{boilers,y} = HG_{boilers} \cdot 4,1868 \cdot EF_{co2,NG} / \eta_{boiler}$,

where:

$HG_{boilers}$ – amount of heat energy generated by waste heat boilers for flue gases, Tcal;
$EF_{co2,NG}$ – emission factor of natural gas combustion, t CO_2 $_e$/TJ;
η_{boiler} – power efficiency (Efficiency Factor) of the boiler shop.
4,1868 – standard factor for conversion of Tcal into TJ, TJ/Tcal.

$EF_{co2,NG} = OXID_{NG} \cdot W_{NG} \cdot 44/12$,

where:
$OXID_{NG}$ – factor of carbon oxidation during the natural gas combustion;
W_{NG} – carbon content of natural gas, t C/TJ;
44/12 – stoichiometric ratio between molecular masses of carbon dioxide and carbon, t CO_2/t C.

$BE_{urea,y} = BE_{urea,elec,y} + BE_{urea,term,y}$,

where:
$BE_{urea,elec,y}$ – emissions caused by electric power consumption according to the baseline scenario, t CO_2 $_e$;
$BE_{urea,term,y}$ – emissions caused by heat energy consumption according to the baseline scenario, t CO_2 $_e$.

$BE_{urea,elec,y} = EC_{urea} \cdot EF_{co2,elec}$,

where:
EC_{urea} – amount of electric power consumed by urea production units, MW hour;
$EF_{co2,elec}$ – factor of NEGSU emissions for the projects of reduction or increasing of electric power consumption, t CO_2 $_e$/MW·hour.

$EC_{urea} = P_{urea} \cdot SEC_{urea,elec,b}$,

where:
P_{urea} – amount of produced urea, t;
$SEC_{urea,elec,b}$ – specific electric power consumption for urea production according to the baseline, MW·hour/t.

$BE_{urea,term,y} = HC_{urea,b} \cdot EF_{co2,NG}/\eta_{boiler}$,

where:
$HC_{urea,b}$ – amount of heat energy consumed by urea production units, TJ;
$EF_{co2,NG}$ – emission factor of natural gas combustion, t CO_2 $_e$/TJ;
η_{boiler} – power efficiency (Efficiency Factor) of the boiler shop.

$HC_{urea,b} = P_{urea} \cdot SEC_{urea,term,b} \cdot 4,1868$,

where:
P_{urea} – amount of produced urea, t;
$SEC_{urea,term,b}$ – specific heat energy consumption for urea production according to the baseline, Tcal/t;
4,1868 – standard rate for conversion Tcal into TJ, TJ/Tcal.

$EF_{co2,NG} = OXID_{NG} \cdot W_{NG} \cdot 44/12$,

where:
$OXID_{NG}$ – factor of carbon oxidation during the natural gas combustion;
W_{NG} – carbon content of natural gas, t C/TJ;

44/12 – stoichiometric ratio between molecular masses of carbon dioxide and carbon, t CO_2/t C.

$BE_{ammonia,y} = FC_{NG,ammonia} \cdot NCV_{NG} \cdot 4,1868 \cdot EF_{co2,NG}$,

where:
$FC_{NG,ammonia}$ – amount of natural gas consumed by ammonia production units, million м^3;
NCV_{NG} – low temperature of the natural gas combustion, Tcal/million m^3;
$EF_{co2,NG}$ – emission factor for natural gas combustion, t $CO_{2\ e}$/TJ;
4,1868 – standard rate for conversion of Tcak into TJ, TJ/Tcal.

$FC_{NG,ammonia} = P_{ammonia} \cdot SEC_{ammonia,b}$,

where:
$P_{ammonia}$ – amount of produced ammonia, t;
$SEC_{ammonia,b}$ – specific natural gas consumption for ammonia production, m^3/t.

The monitoring data of baseline emission calculation for reviewed monitoring period is shown in the table 4 and 5 herein.

The baseline emissions for the reviewed monitoring period are shown in table 7.

Table 7

Month	Amount of emission under baseline scenario, t CO_{2e}
January	258 726
February	234 978
March	234 662
April	250 123
May	258 983
June	246 119
Total for the first six months of 2011	**1 483 591**

D.3. Leakage

Not applied for this project

D.4. Emission reduction for the reviewed monitoring period

Emission reduction for the reviewed monitoring period is shown in the table 8.

Table 8

Month	Amount of emission reduction units, t CO_{2e}
January	26 632
February	24 071
March	17 769
April	23 339
May	23 737
June	20 876
Total for the first six months of 2011	**136 424**