JOINT IMPLEMENTATION PROJECT

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

(the project name)

The second monitoring report covering the period from 01/01/2008 until 31/12/2008

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

Director General of LLC " Center TEST" (position) _____ (signature) N.F. Kolesnikova (full name of person)

(Seal place)

SEAL: Limited Liability Company "Center TEST". Identification code 32349482, Ukraine, Kyiv city.

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

Chairman of the Board of JSC "OPP" (position) _____ (signature) V.S. Gorbatko (full name of person)

(Seal place)

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

The city of Kyiv

November 2010

Joint implementation monitoring report form

Monitoring period is 01.01.2008 – 31.12.2008

Version 04

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

Joint implementation project design documents concerning the "Realisation of a complex of energy saving activities at the JSC "Odessa Port Plant" after the final determination, were submitted to the National Environmental Investment Agency of Ukraine to obtain a letter of endorsement, whereupon the project will be registered in the National Environmental Investment Agency of Ukraine and Joint Implementation Supervisory Committee, where the project will obtain registration number.

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.

It is possible to reduce natural gas intake in results of power efficient equipment installation allowing to reduce the rate of natural gas specific consumption for ammonia production.

A.4. Monitoring period

Commencement date is 01.01.2008
Completion date is 31.12.2008

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 was determinated on the basis of certain approach. According to "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 out of three subprojects, namely "Installation of waste heat boilers for the flue gases", completely conforms to 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, in order to ascertain the baseline and monitoring plan of the "Modernization of two ammonia production units" subproject , the requirements of "National Cadastre of anthropogenic emissions from the sources and capture by absorbers of greenhouse gases in Ukraine during 1990-2008" (hereinafter National Cadastre of Ukraine) were applied.

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

Table 1 – Schedule of "Installation of waste heat boilers for the flue gases" subproject implementation

Name of the phase	Commencement date	Completion date
Taking measures on operation stabilization of urea production unit #1	24/03/2005	14/10/2008
Modernization of 103-J syngas compressor in the ammonia production unit #1	23/12/2005	26/06/2008

The schedule of the implementation is in accordance with PDD version 01.

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

- approach of emission calculation of "Modernization of two ammonia production units" subproject was changed (more detailed information is drawn in article A.8 herein);

- 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;

- only one greenhouse gases emission factor value was used for National Energy Grid System of Ukraine (NEGSU) (unlike PDD), namely: a factor of greenhouse gases emission during consumption reduction or increasing of electric power from NEGSU.

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

- approach of emission calculation of "Modernization of two ammonia production units" subproject was changed. As indicated in article A.2. PDD and A.3. herein, the natural gas for the fuel purposes is the object of greenhouse gases emission reduction during the ammonia production, therefore instead of formula described in PDD for the emission calculation during the ammonia production, the formula applied for emission calculation during fossil fuel combustion was used.

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.

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.

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.

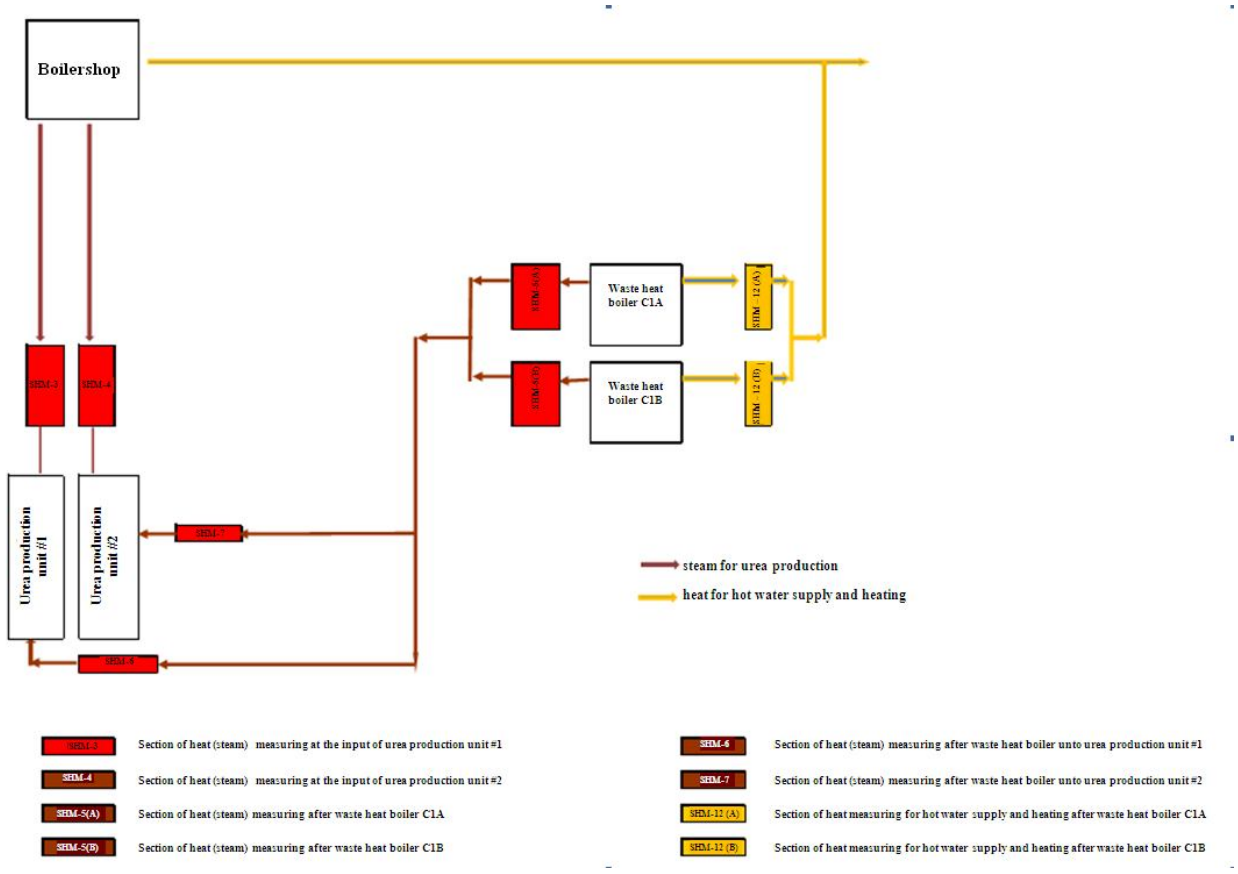

Figure 1 – Location scheme of the sections of heat measurement.

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.

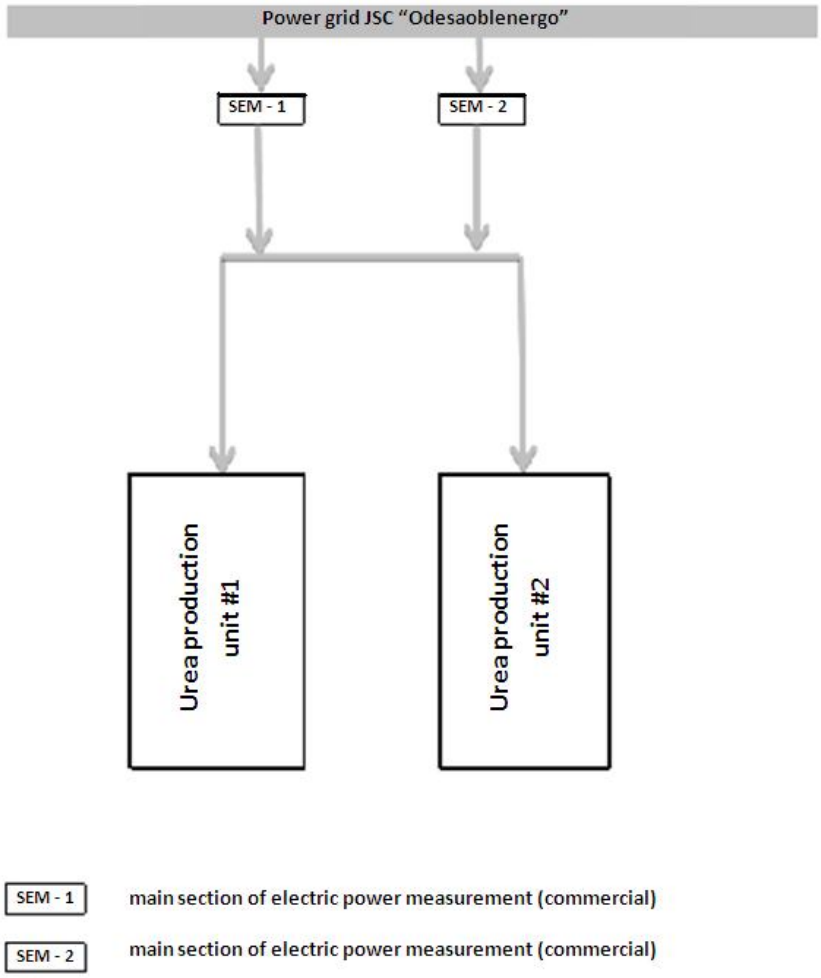

Figure 2 - Location scheme of electric power measurement sections.

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.

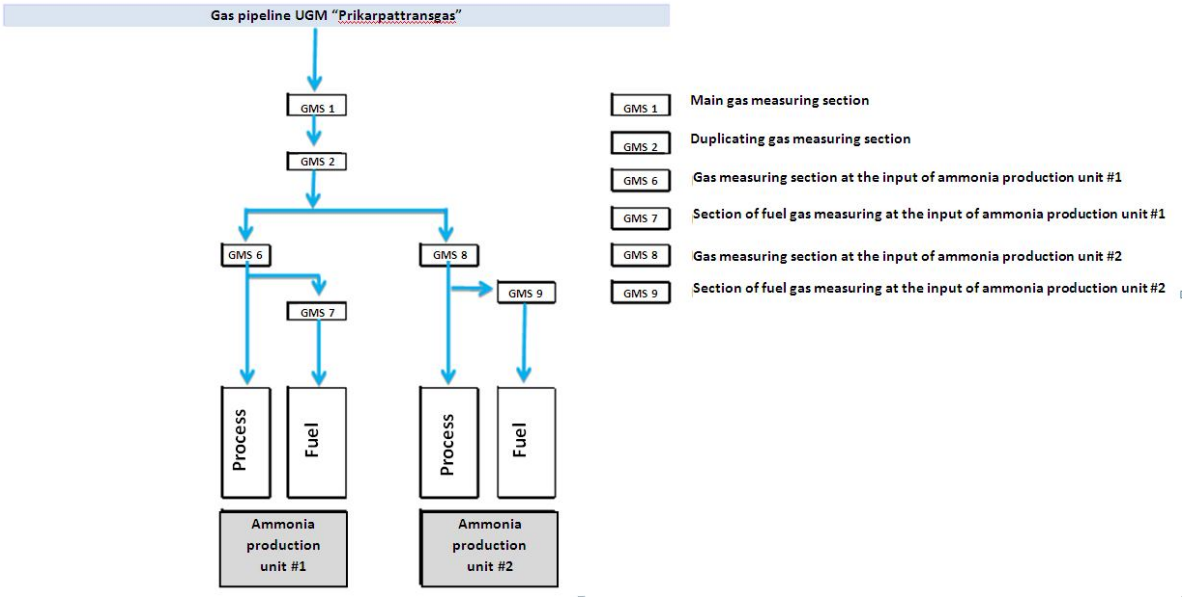

Figure 3 - Location scheme of gas measuring sections.

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 carried out according to the "Method of urea output calculation by urea production plant" and to the "Calculation method of ammonia plant productivity in the ammonia production department" relatively.

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	Error	Date of last inspection (calibration)	Date of next inspection (calibration)	Comment
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	Accuracy class 0.5	08.09.2008	3rd quarter. 2010	
	Surplus pressure transducer	STG-674	0797701018	Accuracy class 0.5	08.09.2008	3rd quarter. 2010	
	Resistive temperature transducer	ТСП-1287	01	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	Accuracy class 0.5	27.06.2010	2nd quarter 2012	
	Surplus pressure transducer	STG-674	660017	Accuracy class 0.5	25.06.2010	2nd quarter 2012	
	Resistive temperature transducer	ТСП-1287	02	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	Accuracy class 0.5	08.09.2008	3rd quarter. 2010	
	Pressure transducer	STG94LR-A10	001003	Accuracy class 0.5	19.08.2010	3rd quarter. 2012	
	Thermoelectric transducer	TXK-2088	011	±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	Accuracy class 0.5	27.06.2010	2nd quarter 2012	
	Pressure transducer	STG94LR-A10	001003	Accuracy class 0.5	19.08.2010	3rd quarter. 2012	
	Thermoelectric transducer	TXK-2088	022	±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	Accuracy class 0.5	15.07.2010	3rd quarter. 2011	
	Pressure transmitter	STG-94L	985032	Accuracy class 0.5	13.05.2010	2nd quarter 2011	
	Resistive temperature transducer	ТСП-8040P	476	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	Accuracy class 0.5	15.07.2010	3rd quarter. 2011	
	Pressure transmitter	STG-94LR	985028	Accuracy class 0.5	10.02.2010	1st quarter 2011	
	Resistive temperature transducer	ТСП-8040P	477	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	Accuracy class 0.5	23.11.2009	4th quarter 2010	
	Pressure transmitter	STG-94LR	985041	Accuracy class 0.5	16.06.2010	2nd quarter 2011	
	Resistive temperature transducer	ТСП-8040P	05	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 (B)	Pressure differential indicator	STD-930	300301	Accuracy class 0.5	23.11.2009	4th quarter. 2010	
	Pressure transmitter	STG-94LR	985041	Accuracy class 0.5	16.06.2010	2nd quarter 2011	
	Resistive temperature transducer	ТСП-8040P	05	Tolerance class "B"	30.08.2010	3rd quarter. 2012	
Main section of electric power measurement (commercial) SEM-1	Power energy meter	AIR-3-AL-C8-T	01005047	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	Accuracy class 0.2	17.11.2008	4th quarter 2014	

1	2	3	4	5	6	7	8
Main gas measuring section GMS-1	Measuring set	FlowTek-TM	1-945	Main acceptable relative error of the gas volume measuring ±1,1%	18.12.2008	4th quarter 2010	
Duplicated gas measuring section GMS-2	Measuring set	FlowTek-TM	704	Main acceptable relative error of the gas volume measuring ±1,1%	26.11.2009	4th quarter 2011	
Gas measuring section at the input of the ammonia production unit #1 GMS -6	Natural gas consumption meter	STD 924-E1A	820392	Accuracy class 0.5	15.04.2009	2nd quarter 2011	
Fuel gas measuring section at the input of the ammonia production unit #1 GMS -7	Natural gas consumption meter	STD 924	820394	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	Accuracy class 0.5	13.11.2008	4th quarter. 2010	
Fuel gas measuring section at the input of the ammonia production unit #2 GMS -9	Natural gas consumption meter	STD 924	820393	Accuracy class 0.5	20.07.2010	3rd 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) 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
Measuring set FlowTek-TM	2
Natural gas consumption meter STD 924	2
Natural gas consumption meter STD 924-E1A, STD 924	2

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.

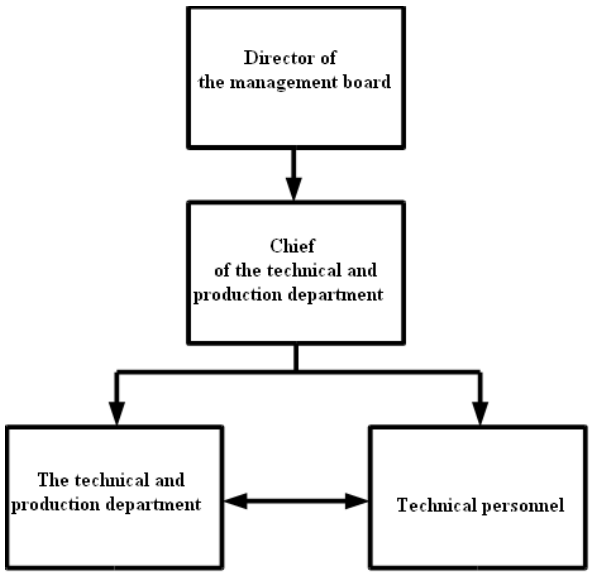

Figure 4 - Management Structure of monitoring and operation

Measurement and data collection from measurement results are the responsibility of technical personnel. The technical personnel deliver the measurement results to the technical and production department for work organization of calculation of greenhouse gases emission reduction. The calculation of emission reduction volume is carried out by designer of the joint implementation project. The staff of the technical and production department 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

Title	Variables	Digital value and unit of measurement	
1	2	3	
Amount of heat energy generated by the waste heat boilers for the flue gases	$HG_{boilers}$	Month	Tcal
		January	8,852
		February	8,203
		March	8,214
		April	9,866
		May	12,074
		June	9,057
		July	12,622
		August	13,515
		September	10,405
		October	9,878
		November	8,229
		December	6,583
		Total for 2008	**117,498**
Operational time of the waste heat boilers for the flue gases	$T_{boilers}$	Month	hour
		January	744
		February	696
		March	744
		April	720
		May	745
		June	720
		July	738
		August	744
		September	721
		October	749
		November	655
		December	536
		Total for 2008	**8 512**
Amount of electric power energy consumed by urea production units	EC_{urea}	Month	MW·hour
		January	14 550
		February	13 500
		March	14 600
		April	14 500
		May	15 100
		June	14 350
		July	14 035
		August	14 800
		September	12 000
		October	13 000
		November	15 000
		December	15 500
		Total for 2008	**170 935**

1	2	3		
Amount of heat energy consumed by urea production units	HC_{urea}	Month	Tcal	
			Urea production unit #1	Urea production unit #2
		January	27,281	31,264
		February	26,086	28,600
		March	25,998	28,771
		April	26,503	30,749
		May	27,748	30,870
		June	26,538	29,141
		July	28,013	30,456
		August	30,613	32,752
		September	20,047	30,807
		October	22,694	26,963
		November	28,276	27,611
		December	26,959	29,024
		Total for 2008	**316,756**	**357,008**
Amount of urea produced	P_{urea}	Month	t	
			Urea production unit #1	Urea production unit #2
		January	38 192	43 784
		February	37 323	40 462
		March	40 604	43 603
		April	37 899	41 997
		May	39 852	43 752
		June	37 215	42 327
		July	35 660	36 687
		August	39 209	42 926
		September	25 536	40 198
		October	29 770	39 778
		November	40 347	42 526
		December	40 577	42 149
		Total for 2008	**442 184**	**500 189**
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	52,778	57,486
		February	45,417	53,919
		March	50,670	57,005
		April	45,276	56,314
		May	44,498	57,505
		June	45,385	54,223
		July	9,473	57,273
		August	54,849	54,947
		September	53,968	54,504
		October	56,342	57,515
		November	47,795	47,569
		December	35,806	49,548
		Total for 2008	**542,257**	**657,808**

1	2	3		
Amount of ammonia produced	$P_{ammonia}$	Month	t	
			Ammonia production unit #1	Ammonia production unit #2
		January	48 733	52 207
		February	39 595	48 884
		March	46 858	52 202
		April	39 265	50 457
		May	38 085	51 014
		June	41 354	49 582
		July	7 881	50 284
		August	45 806	49 591
		September	50 721	49 481
		October	52 755	51 529
		November	43 768	41 439
		December	32 704	44 549
		Total for 2008	**487 525**	**591 219**
Net calorific value of the natural gas combusted	NCV_{NG}	Month	Tcal/million. m^3	
		January	8,055	
		February	8,084	
		March	8,108	
		April	8,153	
		May	8,157	
		June	8,178	
		July	8,151	
		August	8,170	
		September	8,193	
		October	8,164	
		November	8,101	
		December	8,120	

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	$EF_{co2,elec}$	0,896 t CO_2 e/MW hour	Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5)
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	"Key principles of national greenhouse gases inventorying IPCC"

1	2	3	4
Carbon content in natural gas	W_{NG}	15,3 t C/TJ	"National Cadastre of anthropogenic emissions from the sources and capture by absorbers of greenhouse gases in Ukraine during 1990-2008"[1] (hereinafter 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 ton 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 archiving the results are the responsibility of technical personnel. The technical personnel submit measurements results to the technical and production department for work organization of estimation of greenhouse gases emissions reduction. The calculation of emission reduction volume is carried out by designer of the joint implementation project. The functions of the staff of the technical and production department also include collection of non-measured data which are also subject to the monitoring. The staff of the technical and production department 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 chief of the technical and production department is responsible for preparation and archiving of monitoring reports. The director analyses summarized monitoring data and relevant documentation from time to time.

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

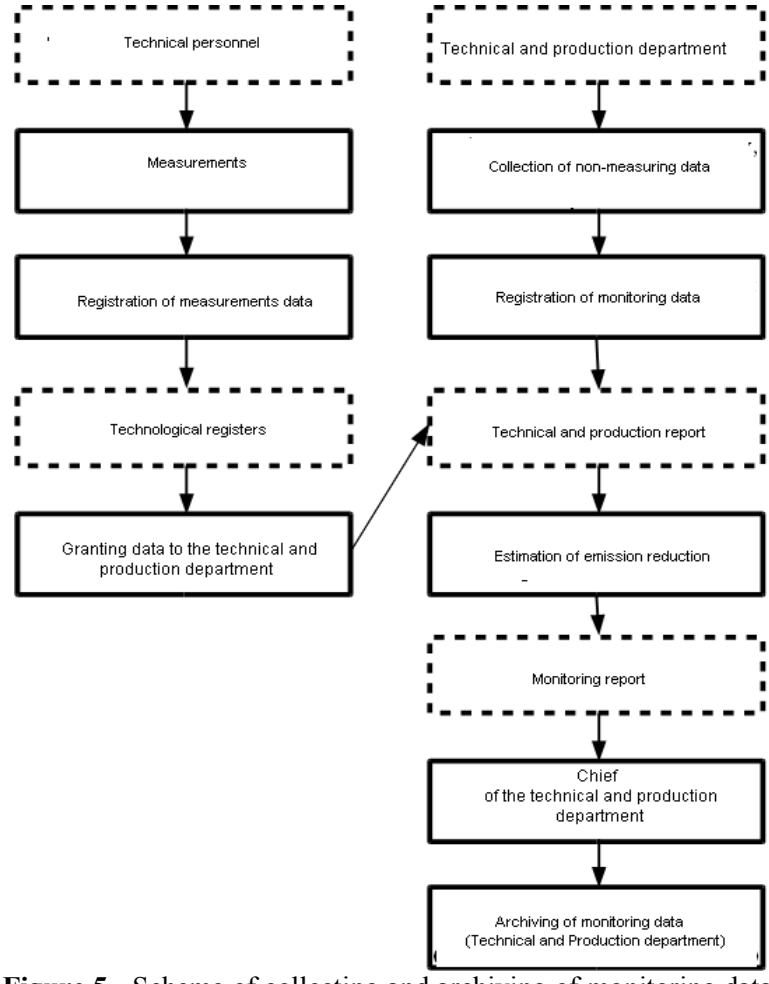

Figure 5 - Scheme of collecting and archiving of monitoring data.

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:

21.01.2008 – the urea production unit #1 was stopped due to leakage in the flange joint of the HP scrubber lower cover plate;
28.01.2008 – blockage of the urea production unit #2 as a result of emergency stop of the reciprocating compressor for blocking the maximum temperature at the second stage of absorption;
12.02.2008 – the ammonia production unit #1 stop in connection with syngas compressor stop for blocking parameter of axle dismissal in HPB;
12.02.2008 – a stop of a liquid ammonia delivery to the urea production unit #1;
13.02.2008 – a stop of the urea production unit #2 in connection with an emergency stop of centrifugal compressor for blocking minimum absorption;
29.02.2008 – a stop of the urea production unit #1 in connection with leakage in flange joint of the level meter;
03.03.2008 – blockage of the urea production unit #1 as a result of emergency stop of the reciprocating compressor;
19.03.2008 – blockage of the urea production unit #1 as a result of emergency stop of the reciprocating compressor;
31.03.2008 – a stop of the urea production unit #1 in connection with a stop of the syngas compressor due to LPB vibration;
14.04.2008 – blockage of the urea production unit #1 as a result of the centrifugal compressor stop in connection with blockage of maximum LP and HP frame vibration;
22.04.2008 – surge protection activation on the first stage of the C-1B compressor;
08.05.2008 – a stop of the ammonia production unit #2 in connection with a stop of syngas compressor as a result of operational failure of the valve control drive for off-taking turbine steam;
20.05.2008 – the gas turbine engine compressor C-1A was switched to the reserved compressor C-1B in connection with air entering into the compensator of the sealing maintenance;
22.05.2008 – a stop of the urea production unit #1 in connection with a stop of the syngas compressor due to LPB vibration;
02.06.2008 - the urea production unit #1 was stopped as a result of leakage in the flange joint of the HP scrubber lower cover plate;
28.06.2008 – an emergency stop of all main and subsidiary equipment at the urea production unit #1as a result of the minimum voltage safety activity caused by shutdown of the 110kV power line “Adzhalyk-Khimichna T1-Karbamidna T1”;
25.07.2008 – an emergency stop of all main and subsidiary equipment in the urea production unit #2 as a result of the minimum voltage safety activity caused by power drop in external power supply grid in consequence of short circuit in 110 kV power line “Centrolit-Luzanivka” and “Usatovo-Chumka”;
25.07.2008 - the urea production unit #2 was stopped as a result of leakage in the flange joint of the HP scrubber lower cover plate;
30.07.2008 - the urea production unit #1 was stopped as a result of leakage in the flange joint of the HP scrubber lower cover plate;
31.07.2008 – an emergency stop of the compressor C-1A;
16.08.2008 – an emergency stop of all main and subsidiary equipment in the urea production unit #1 as a result of isolation damage, leading to a short circuit of cable, and due to a maximum stream safety activity, the cable line 6 kV L1 " MSDS «Khimichna» - MSDS «Ammiachna» " was turned off;
25.08.2008 - an emergency stop of all main and subsidiary equipment in the urea production unit #2 as a result of emergency cutoff of PL 110kV “Centrolit-Khimichna T2-Amiachna T1” of the external power supply system;

12.10.2008 – an emergency stop of the reciprocating compressor, leading to the urea production unit #2 blockage as a result of the minimum voltage safety activity caused by voltage drop in the external power supply grid and emergency stop of the PL 110kV “Adzhalik-Centrolit II”;
30.10.2008 - thrice limiting protection activation due to vibration of the force turbine of the gas-turbine engine C-1A;
07.11.2008 - an emergency stop of all main and subsidiary equipment in the urea production unit #1 as a result of cutoff of PL 110kV “Adzhalik-Khimichna T1-Karbamidna T1” of the external power supply system;
12.12.2008 – blockage of the urea production unit #2 as a result of reciprocating compressor stop;
23.12.2008 – the ammonia production unit #1 was stopped due to product sale limits;
25.12.2008 – blockage of the urea production unit #2 as a result of reciprocating compressor stop;

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" dated 19.07.2010. Before the order was issued, the technical and production department had responsibilities of the monitoring group and the obligations of the head of the monitoring group were performed by the chief of the technical and production department.

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 will be deputy chief engineer – head of technical and production department of the JSC "OPP". The monitoring will be 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 of calculation of emissions reduction volume. The calculation of emission reduction volume is carried out by designer of the joint implementation project. Periodic data on energy sources consumption will be compared with relevant registered data taken 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 for work organization of calculation of greenhouse gases emissions reduction. The calculation of emission reduction volume is carried out by designer of the joint implementation project. 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 – total emission levels 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} – net calorific value of the natural gas combusted, 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	236 394
February	214 514
March	231 884
April	221 998
May	223 787
June	218 247
July	155 487
August	239 983
September	232 166
October	242 282
November	209 052
December	190 944
Total for 2008	**2 616 739**

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 – total 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 $CO_{2\ e}$.

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

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, т;
$SEC_{urea,term,b}$ – 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} – net calorific value of the natural gas combusted, 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	253 518
February	225 318
March	251 548
April	230 951
May	231 722
June	233 895
July	159 175
August	245 767
September	249 684
October	259 235
November	220 704
December	203 138
Total for 2008	**2 764 655**

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	17 124
February	10 804
March	19 664
April	8 953
May	7 936
June	15 648
July	3 688
August	5 784
September	17 518
October	16 952
November	11 652
December	12 193
Total for 2008	**147 916**