Monitoring report

over period: 01.07.2011 – 29.02.2012

JOINT IMLEMENTATION PROJECT

"Reconstruction of the oxygen compressor plant at the JSC "Zaporizhstal", Ukraine"

The Project Developer

General Director
CJSC "National Carbon
Sequestration Foundation"

Seal

Fedorov Y.N.

The Project Owner

Deputy Chairman of Board,
Technical Director
JSC "Zaporizhstal"

Seal

Putnoki A.U.

Zaporizhzhya
May 2012

Contents

Section A. General description of the project and monitoring

A.1. Title of the project

Reconstruction of the oxygen compressor plant at the JSC "Zaporizhstal", Ukraine

ITL project ID: UA1000189

Sectoral scope: (3) Energy demand

Date of monitoring report preparation: 18.05.2012

Version: 02.1

A.2. Short description of the project

JSC "Zaporizhstal" performs the project of oxygen compressor plant (OCP) reconstruction aimed to supply oxygen in required level for pig iron and steel production. Also the project will serve to replace the worn-out air-separation units.

The OCP reconstruction at the JSC "Zaporizhstal" is implemented by the construction of the air-separation unit (ASU) VRU-60, manufactured by Air Liquide (France). The air-separation unit VRU-60 will make it possible to provide production needs with the required amount of oxygen upon achievement following effects:

- reduction of electric power consumption;

- reduction in manufacturing water consumption;

- generation of oxygen without additional compression;

- decrease of oxygen losses during production;

- increase of oxygen concentration up to 99,5%.

The implementation of the project by the construction of VRU-60 will make it possible, versus the situation in the absence of this project (reconstruction of OCP by the construction of a new air-separation units KAAr-32), to significantly reduce the electric power consumption supplied for the OCP operation from the power grid of Ukraine. The reduction in the supply of electric power from the grid will enable electric power generation at the electricity-generating plants of Ukraine to be decreased at the equivalent rate. This will lead to a reduction in the emissions of GHG as a result of the reduction in the consumption of fuel-and-energy resources for electric power.

The operational status of the air separation units installed in the OCP JSC "Zaporizhstal" during the current monitoring period (01.07.2011 – 29.02.2012) are shown below.

Table A.2-1. Operational status of the air separation units in the current monitoring period.

№	Air separation unit	Operational status in the current monitoring period[1]
1.	VRU-60	Operational
2.	KAr-30	Not operational.
3.	BR-2	Not operational.
4.	KtK-35-3	Not operational. Conservation.

[1] The operational status for each air separation unit is confirmed by technical reports of OCP and by aggregate journals.

A.3. Stages of the project implementation

Table A.3-1. The stages of the project implementation.

№	Stage	Data/period
1.	Construction work	February 2005 – October 2006
2.	Installation work	November 2005 – May 2007
3.	Start and adjusting work	June 2007 – December 2007
4.	Commissioning	27.12.2007

The JI-project "Reconstruction of the oxygen compressor plant at the JSC "Zaporizhstal", Ukraine" is approved by the Ukraine (Host party)[2] and by the Switzerland[3]. The Letters of Approval are attached to the monitoring report.

A.4. Deviations and corrections of approved PDD

Absent.

A.5. Monitoring period

Date of the start of monitoring: 01.07.2011

Date of the end of monitoring: 29.02.2012

A.6. Monitoring results for the current period

Table A.6-1. Monitoring results for the current period (01.07.2011 – 29.02.2012).

Period of monitoring	Project emissions (tCO_2-eq.)	Leakages (tCO_2-eq.)	Baseline emissions (tCO_2-eq.)	Emission reductions (tCO_2-eq.)
01.07.2011 – 29.02.2012	336 101	-	409 385	73 284

The detailed information about project emissions, baseline emissions and emission reductions is provided in the section D.5 of the monitoring report "Results of GHGs emission reductions monitoring".

A.7. Methodology used for monitoring of GHGs emission reductions

Baseline of the project is determined in accordance with "Combined tool to identify the baseline scenario and demonstrate additionality (Version 02.1)". For the baseline setting were used JI Guidelines, Baseline setting and monitoring (Version 01), and also with generic approach of

[2] Letter of Approval from National Environmental Investment Agency of Ukraine ref. No 1514/23/7, issued on 14.12.2009.

[3] Letter of Approval for a project under article 6 of the Kyoto Protocol (JI) of the Federal Office for the Environment (FOEN) of Switzerland ref. No J294-0485, issued on 23.07.2010.

"Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01)".

Monitoring of GHGs was done in accordance with the developed monitoring plan of project design documentation (section D). Monitoring plan was developed in accordance with JI Guidelines, Baseline setting and monitoring (Version 01), and also with generic approach of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01)".

A.8. Deviations and corrections of approved monitoring plan

Deviations and corrections of approved monitoring plan in the current monitoring period

Absent.

Deviations and corrections of approved monitoring plan verified in the previous period

Deviations and corrections of approved monitoring plan are provided for monitoring quality assurance and transparency of GHG monitoring and stated in the Revised monitoring plan version 01 dated on 15.09.2010, Monitoring report for 2008 dated on 27.11.2009, Monitoring report for 2009 dated on 14.04.2010, Monitoring report for January – June 2011 dated on 08.09.2011.

Deviations and corrections cover the following positions of approved monitoring plan:

- The value of CO_2 emission factor during electric power generation supplied by the power system of Ukraine ($EF_{CO2,ELEC,y}$) is revised according to the Order #75 of National Environmental Investment Agency of Ukraine dated on 12.05.2011. The revised value of CO_2 emission factor ($EF_{CO2,ELEC,y}$) is determined for monitoring in 2011 in rate of 1,090 tCO_2/MWh corresponding to the first class of electricity consumers. The choice of the emission value is based on conservative approach. The value of the parameter ($EF_{CO2,ELEC,y}$) will be revised in 2012 based on corresponding recommendation of National Environmental Investment Agency of Ukraine.
- Uncertainty level and verification frequency of meters are specified;
- Operational and management structure of monitoring is corrected;
- Monitoring of electricity consumption for production in OCP since 01.01.2009 are provided daily (not monthly how determined in PDD). This is possible because of commissioning of electronic system for technical registration of electricity consumption at the JSC "Zaporizhstal". Daily electricity consumption monitoring ensures continuous and transparent data;
- The barometric pressure data for oxygen generation/distribution monitoring are taken from the JSC "Zaporizhgas". The procedures of barometric pressure data collection, using and archiving are determined by Manual of planimetrist;
- The length of the crediting period is corrected: 01.01.2008 – 31.12.2012 (5 years, 60 months);
- The calculation of baseline emissions is specified: In case the oxygen production in the baseline scenario ($P_{oxygen,BL,y}$) calculated on the conservative provisions of the monitoring plan will be less than the measured oxygen production in the project scenario than the oxygen production in the baseline will be equal to the oxygen production in the project scenario. This is a conservative assumption as that provides to the zero emission reductions;
- The List of parameters that are monitored throughout the crediting period was completed with parameter $N_{day,j}$ (Number of days then the OCP was operated in operating conditions j).

A.9. Person(s) responsible for the preparation and submission of the monitoring report

JSC “Zaporizhstal”

Contact person: Ms. Inna Holina, Head of Laboratory of environment protection

Tel.: +38 061 218 24 07

Fax: +38 061 218 24 07

E-mail: holina@zaporizhstal.com

CJSC “National Carbon Sequestration Foundation”

Contact person: Mr. Roman Kazakov, Principal Specialist of Department of GHG Emissions Management

Tel.: +7 499 788 78 35 ext. 113

Fax: +7 499 788 78 35 ext. 107

E-mail: KazakovRA@ncsf.ru

Section B. Main activity according to the monitoring plan

B.1. Initial data for monitoring

B.1.1. List of fixed parameters for all monitoring period

Table B.1-1. List of fixed parameters for all monitoring period.

№	Data variable	Description	Data unit	Source of data	Comment
1.	$EF_{CO2,ELEC,y}$	Emission factor during electric power generation supplied by the power system of Ukraine	tCO_2/MWh	Order #75 of National Environmental Investment Agency of Ukraine dated on 12.05.2011	$EF_{CO2,ELEC,y}$ = 1,090 tCO_2/MWh
2.	$SP_{oxygen,BL,j}$	Output of the air-separation units (KAAr-32) in operating conditions j	m^3/hour	Project documentation for KAAr-32	$SP_{oxygen,BL,j}$ = 60000 m^3/hour, 62000 m^3/hour, 64000 m^3/hour. Output of the air-separation units depends on distributed oxygen ($D_{oxygen,PJ,day}$) and are to be determined based on table B.1-1. of the monitoring report or table D.1-1. of the PDD

B.1.2. List of parameters that are monitored throughout the crediting period

Table B.1-2. List of parameters that are monitored throughout the crediting period.

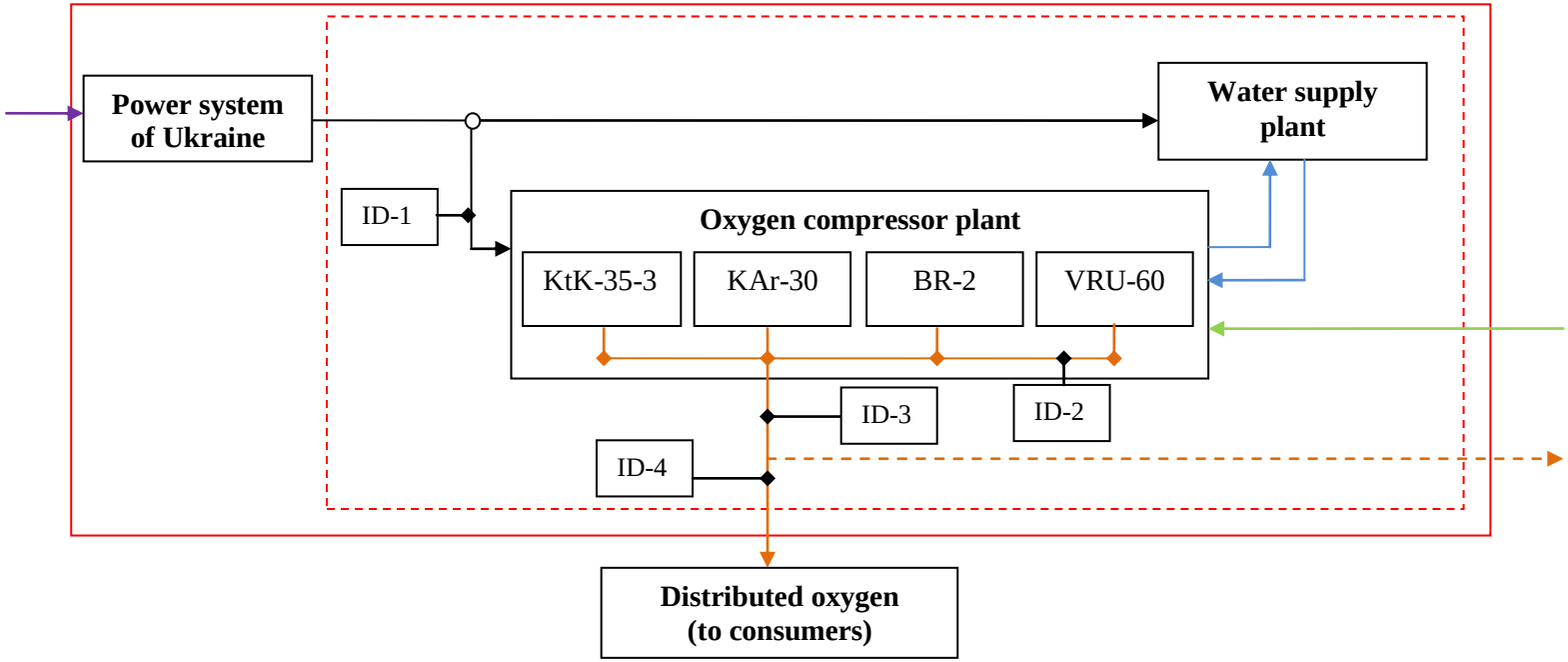
№	Data variable	Description	Data unit	Source of data	Comment
1.	ID-1, $EC_{OCP,PJ,y}$	Electric power consumption by the OCP	MWh	Electric power meter	To be registered by the plant of networks and substations
2.	ID-2, $P_{oxygen,VRU-60,y}$	Oxygen production in the air-separation unit VRU-60	thousand m^3	Flow-rate meter	To be registered by the Chief Power Engineer Department

№	Data variable	Description	Data unit	Source of data	Comment
3.	ID-3, $P_{oxygen,RASU,y}$	Oxygen production in the reserved air-separation units	thousand m^3	Flow-rate meter	To be registered by the Chief Power Engineer Department
4.	ID-4, $D_{oxygen,PJ,day}$	Distributed oxygen	thousand m^3	Flow-rate meter	To be registered by the Chief Power Engineer Department
5.	$N_{day,j}$	Number of days then the OCP was operated in operating conditions j	day	Estimated	Determined based on actual data of distributed oxygen ID-4 ($D_{oxygen,PJ,day}$) according to the table B.1-1. of the monitoring report or table D.1-1. of the PDD

B.1.3. Scheme of monitoring points

The monitoring points of GHGs emissions are shown in the following figure B.1-1.

Fig. B.1-1. Scheme of monitoring points location.



	Electric power
	Fuel-and-power resources (TPR)
	Oxygen
	Oxygen losses
	Technical water
	Air
	Boundary of the JSC “Zaporizhstal”
	Project boundary

Monitoring points	Description
ID-1	Electric power consumption by the OCP
ID-2	Oxygen production in the air-separation unit VRU-60
ID-3	Oxygen production in the reserved air-separation units
ID-4	Distributed oxygen

B.1.4. Formulas used in monitoring plan

B.1.4.1. Formulas used to calculate project emissions[4]

(D.1) $PE_{EC,y} = EC_{OCP,PJ,y} * EF_{CO2,ELEC,y}$

$PE_{EC,y}$ - project emissions, tCO_2

$EC_{OCP,PJ,y}$ - electric power consumption by the OCP due to the project activity, MWh

$EF_{CO2,ELEC,y}$ - emission factor during electric power generation supplied by the power system of Ukraine, tCO_2/MWh

B.1.4.2. Formulas used to calculate baseline emissions

(D.2) $BE_{EC,y} = EC_{OCP,BL,y} * EF_{CO2,ELEC,y}$

$BE_{EC,y}$ - baseline emissions, tCO_2

$EC_{OCP,BL,y}$ - electric power consumption by the OCP according to the baseline, MWh

$EF_{CO2,ELEC,y}$ - emission factor during electric power generation supplied by the power system of Ukraine, tCO_2/MWh

The electric power consumption by the OCP for oxygen production is calculated by the formula:

(D.2.1) $EC_{OCP,BL,y} = P_{oxygen,BL,y} * SEC_{oxygen,BL}$

$P_{oxygen,BL,y}$ - total oxygen production according to the baseline, thousand m^3

$SEC_{oxygen,\ BL}$ - specific electric power consumption for production in the OCP according to the baseline, MWh/thousand $m^3(O_2)$

The total oxygen production according to the baseline is calculated by the formula:

(D.2.2) $P_{oxygen,BL,y} = \Sigma\ (SP_{oxygen,BL,j} * T_{OCP,j}) + P_{oxygen,RASU,y}$

$SP_{oxygen,BL,j}$ - output of the air-separation units (KAAr-32) according to the baseline in operating conditions j, thousand $m^3(O_2)$/hour

$T_{OCP,j}$ - operational time for the air-separation units in operating conditions j, hours

$P_{oxygen,RASU,y}$ - oxygen production output in the reserved air-separation units, thousand $m^3(O_2)$

In baseline scenario are considered the following equipment in the OCP: two units KAAr-32 and reserved units (KAr-30, KtK-35-3 and BR-2). The total oxygen production in the baseline scenario includes the oxygen production in the ASUs KAAr-32 and in the reserved units. The oxygen production in baseline depends on the needs of oxygen in the steel plant (distributed oxygen). On the bases of distributed oxygen in project scenario (ID-4 – direct monitored) can be supposed how would be operated the equipment in the OCP – the operating conditions (j) (table D.1-1 of the PDD, table B.1-1). The data of specific oxygen production in units KAAr-32 ($SP_{oxygen,BL}$) and oxygen production in reserved ASUs ($P_{oxygen,RASU,y}$) are determined as optimal work of equipment for appropriate distributed oxygen (table D.1-1 of the PDD, table B.1-1).

[4] The numbering of the formulas corresponds to the approved monitoring plan stated in the Revision of the monitoring plan Version 01 of 15.09.2010. Addition to the Monitoring report version 05 of 27.11.2009 for period 01.01.2008-31.12.2008.

The operational time for the air-separation units ($T_{OCP,y}$) in operating conditions (j) is calculated by the formula:

(D.2.3) $T_{OCP,j} = N_{day,\ j} * 24$

$N_{day,j}$ - number of days then the OCP was operated in operating conditions j (table B.1-1), day

24 - hours per day, hour

The number of days then the OCP was operated in operating conditions j is to be determined based on actual data of distributed oxygen ($D_{oxygen,PJ,day}$) – ID-4.

The specific electric power consumption for production in the OCP according to the baseline ($SEC_{oxygen,BL}$) is calculated by the formula:

(D.2.4) $SEC_{oxygen,BL} = EC_{OCP,PJ,y} / (P_{oxygen,VRU-60,y} + P_{oxygen,RASU,y})$

$EC_{OCP,PJ,y}$ - electric power consumption by the OCP due to the Project activity, MWh

$P_{oxygen,VRU-60,y}$ - oxygen production output in the air-separation unit VRU-60, thousand $m^3(O_2)$

$P_{oxygen,RASU,y}$ - oxygen production output in the reserved air-separation units, thousand $m^3(O_2)$

The electric power consumption by the OCP ($EC_{OCP,PJ,y}$), oxygen production output in the air-separation unit VRU-60 ($P_{oxygen,VRU-60,y}$) and oxygen production output in the reserved air-separation units $P_{oxygen,RASU,y}$ will be measured directly (monitoring points: ID-1, ID-2, ID-3).

Table B.1-1. The operation of the oxygen compressor plant in the baseline scenario.

Operating conditions (j)	Distributed oxygen ($D_{oxygen,PJ,day}$), $m^3(O_2)$/day	Number and type of ASUs[5]	Specific oxygen production in ASUs KAAr-32 ($SP_{oxygen,BL}$), $m^3(O_2)$/hour	Oxygen production in reserved ASUs ($P_{oxygen,RASU,y}$), $m^3(O_2)$/hour
1.	$D_{oxygen,PJ,day}$ < 1 368 000	2 x KAAr-32	60 000	0
2.	1 368 000 – 1 413 600	2 x KAAr-32	62 000	0
3.	1 413 600 – 1 459 200	2 x KAAr-32	64 000	0
4.	$D_{oxygen,PJ,day}$ > 1 459 200	2 x KAAr-32, reserved units (KAr-30 and/or BR-2)	60 000	Direct monitored (ID-4)

B.1.4.3. Formulas used to calculate emission reductions

(D.3.) $ER_{EC,y} = BE_{EC,y} – PE_{EC,y}$

$ER_{EC,y}$ - emission reductions, tCO_2

$BE_{EC,y}$ - baseline emissions, tCO_2

$PE_{EC,y}$ - project emissions, tCO_2

[5] ASU – Air separation unit.

B.2. Procedures and scheme of monitoring

The procedures of GHGs emission reductions monitoring are determined by the Company standard STP 8.2-13-11 "Integrated quality system. Monitoring of GHGs emission reductions", approved by Order #552 dated on 12.12.2011. This standard is introduced instead of Company standard STP 8.2-13-10 functioned in the previous period. The new standard is elaborated for improvement of the GHG monitoring system at JSC "Zaporizhstal". The monitoring procedures of the JI project "Reconstruction of the oxygen compressor plant at the JSC "Zaporizhstal", Ukraine" were not changed.

In monitoring of GHGs emission reductions by the project "Reconstruction of the oxygen compressor plant" participate the following departments of JSC "Zaporizhstal":

- Laboratory of environment protection;
- Power bureau of Chief Power Engineer Department;
- Recording bureau of Chief Power Engineer department;
- Technical bureau of Plant of networks and substations;
- Technical bureau of Oxygen compressor plant.

By the monitoring plan the following parameters will be monitored in accordance with monitoring plan:

- Electricity consumption by the OCP;
- Oxygen production in VRU-60;
- Oxygen production in reserved units (KAr-30, KtK-35-3, BR-2);
- Distributed oxygen.

Scheme of collecting and carrying of monitoring data for GHGs emission reductions are shown on the fig. B.2-1. Units of company included in the monitoring of GHGs emissions, responsible specialists and their functions are shown in table B.2-1.

Fig. B.2-1. Scheme of collecting and carrying of monitoring data.

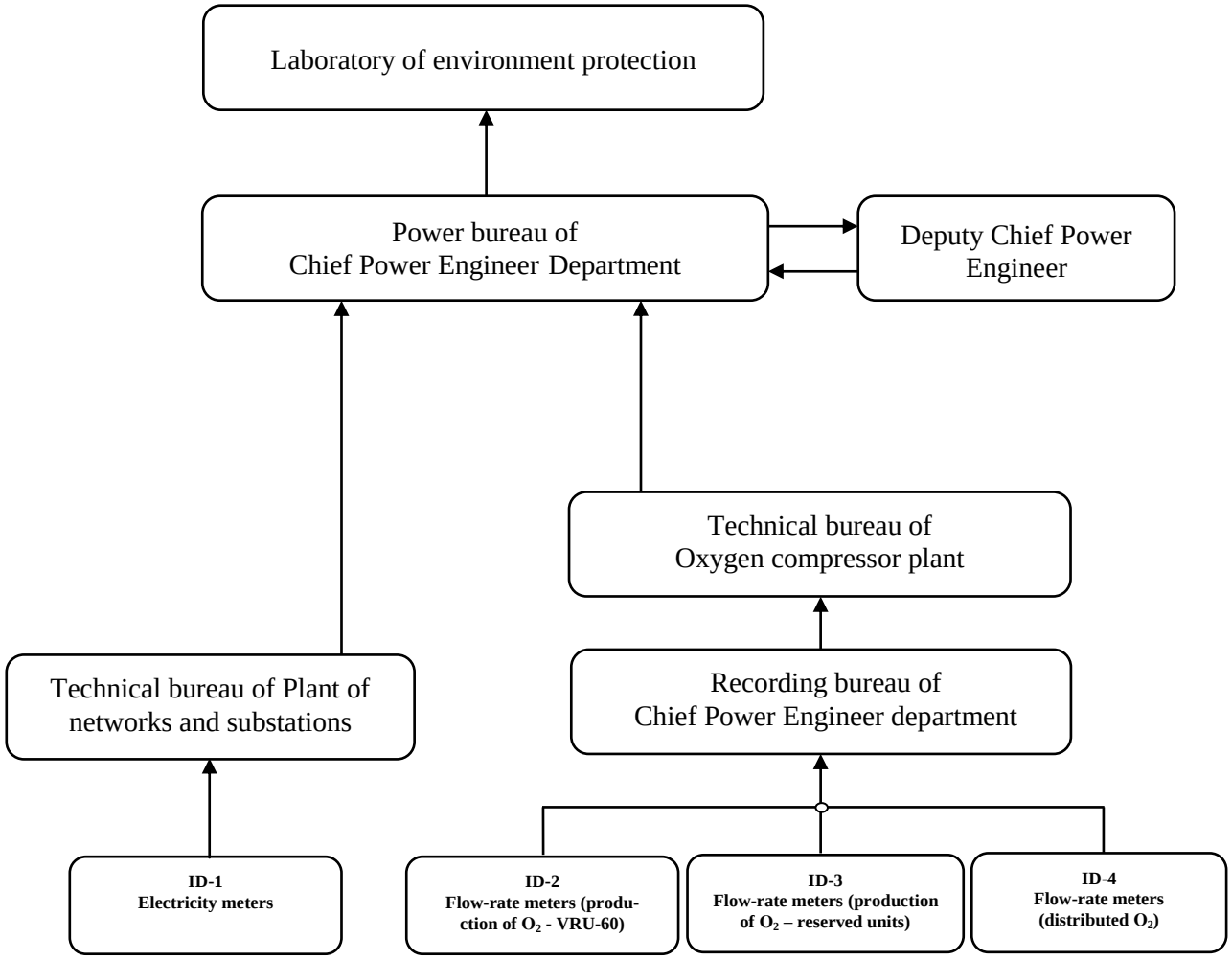


Table B.2-1. Departments of the company participating in GHGs emission monitoring, responsible specialists and their functions.

№	Title of the department	Responsible specialists	Monitoring functions	Frequency
1.	Technical bureau of Plant of networks and substations	Head	Preparation of monthly reports of electricity consumption for production in OCP (ID-1, $EC_{OCP,\ PJ,\ y}$) based on reading of electricity meters at the beginning of month and the end of a month received from the system of technical monitoring of electricity consumption.	Monthly
			Control and confirmation of monthly reports of electricity consumption for production in OCP based on logs of daily registration electricity consumption on substation of Plant of networks and substations.	Monthly
			Delivery of controlled and confirmed monthly reports of electricity consumption for production in OCP to Power bureau of Chief Power Engineer Department.	Monthly
			Storage of monthly reports of electricity consumption for production in OCP and reading of electricity meters at the beginning of month and the end of a month received from the system of technical monitoring of electricity consumption on the paper and electronic files. Storage of logs of daily registration electricity consumption on substation of Plant of networks and substations on the paper files.	During the crediting period and for two years after the last operation with ERUs

№	Title of the department	Responsible specialists	Monitoring functions	Frequency
2.	Recording bureau of Chief Power Engineer department	Engineer	Preparation of monthly reports of oxygen production in VRU-60 (ID-2, $P_{oxygen,VRU-60,y}$), in reserved units (ID-3, $P_{oxygen,RASU,y}$), distributed oxygen (ID-4, $D_{oxygen,PJ,day}$) based on primary recording data, prepared daily by Recording bureau of Chief Power Engineer department based on measured data of flow meters in oxygen-compressor plant. Primary data of oxygen production in VRU-60 (ID-2, $P_{oxygen,VRU-60,y}$) are supplied by operator of VRU-60 to Recording bureau of Chief Power Engineer department in Form of energy recourses production and consumption in VRU-60. Primary data of oxygen production in reserved units (ID-3, $P_{oxygen,RASU,y}$) and distributed oxygen (ID-4, $D_{oxygen,PJ,day}$) are supplied by Control equipment and automatization department of the oxygen compressor plant to Recording bureau of Chief Power Engineer department in diagrams.	Monthly
			Delivery of monthly reports of oxygen production in VRU-60, in reserved units, distributed oxygen to Head of Technical bureau of Oxygen compressor plant for control and confirmation.	Monthly
			Storage of primary recording data of oxygen production in VRU-60, in reserved units, distributed oxygen on the paper and electronic files.	During the crediting period and for two years after the last operation with ERUs
3.	Technical bureau of Oxygen compressor plant	Head	Control and confirmation of monthly reports of oxygen production in VRU-60, in reserved units, distributed oxygen based on manufacturing reports of oxygen compressor plant.	Monthly

№	Title of the department	Responsible specialists	Monitoring functions	Frequency
			Delivery of controlled and confirmed monthly reports of oxygen production in VRU-60, in reserved units, distributed oxygen to Power bureau of Chief Power Engineer Department.	Monthly
			Storage of manufacturing reports of oxygen compressor plant on the paper and electronic files. Storage of monthly reports of oxygen production in VRU-60, in reserved units, distributed oxygen on the paper files.	During the crediting period and for two years after the last operation with ERUs
4.	Power bureau of Chief Power Engineer Department	Power Engineer	Collection of monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen. Preparation of summary monthly reports.	Monthly
			Delivery of summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen to Deputy Chief Power Engineer for approval.	Monthly
			Delivery of by Deputy Chief Power Engineer approved summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen to Laboratory of environment protection.	Monthly
			Storage of summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen on the paper and electronic files.	During the crediting period and for two years after the last operation with ERUs
5.	Chief Power Engineer Department	Deputy Chief Power Engineer	Approval of summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen.	Monthly

№	Title of the department	Responsible specialists	Monitoring functions	Frequency
6.	Laboratory of environment protection	Head	Collection of by Deputy Chief Power Engineer approved summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen.	Monthly
			Calculation of GHGs emission reductions according to the formulas of monitoring plan based on data of by Deputy Chief Power Engineer approved summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen.	Monthly
			Storage of summary monthly reports of electricity consumption for production in OCP, oxygen production in VRU-60, in reserved units, distributed oxygen and results of GHGs emission reductions monitoring on the paper and electronic files. Storage of GHGs emission reductions calculations on electronic files.	During the crediting period and for two years after the last operation with ERUs

B.3. Meters included in the monitoring plan

For the recording of monitoring parameters are used following meters:

- Electricity meters – metering of electricity consumption for production in OCP;
- Flow-rate meters – metering of oxygen production and distribution.

B.3.1. Information of used meters

The information of used meters including data about their types, functions, calibration's and verification's data are provided in the attached meters certificates and in the tables B.3.1-1 - B.3.1-3.

Table B.3.1-1. The meters for electricity consumption[6]

№	Location of meters: Substation, connection	Type of meters[7]	№ of meters	Date of installation	Date of last verification	Date of current verification	Date of next verification
1.	M1: 55-1/12	EA05RL-B-4	01103338	18.10.2010	21.08.2010	-	21.08.2016
2.	M1: 55-2/63	EA05RL-B-4	01103311	18.10.2010	21.08.2010	-	21.08.2016
3.	M : 55-3/48	EA05RL-B-4	01103220	18.10.2010	15.09.2010	-	15.09.2016
4.	M1: 55-4/62	EA05RL-B-4	01103321	18.10.2010	15.09.2010	-	15.09.2016
5.	M1: СД-1/1	EA05RALX-B-4	01050771	08.12.2010	09.11.2010	-	09.11.2016
6.	M1: СД-2/40	EA05RALX-B-4	01059590	11.11.2010	23.09.2010	-	23.09.2016
7.	M1: СД-6/16	EA05RALX-B-4	01050778	17.01.2011	02.11.2010	-	02.11.2016
8.	M1: СД-17/58	EA05RALX-B-4	01059584	11.11.2010	02.11.2010	-	02.11.2016
9.	ПС-10: КТП-ККЦ/6к	EA05RL-B-4	01103223	21.10.2010	15.09.2010	-	15.09.2016
10.	M3: 55-5/3	EA05RL-B-4	01103231	20.10.2010	15.09.2010	-	15.09.2016
11.	M3: 355-1/21	EA05RL-B-4	01103339	20.10.2010	15.09.2010	-	15.09.2016
12.	M3: 355-2/30	EA05RL-B-4	01103288	20.10.2010	15.09.2010	-	15.09.2016
13.	M3: СД-26/9	EA05RALX-B-4	01089275	12.11.2010	23.09.2010	-	23.09.2016
14.	M3:СД-21/27	EA05RALX-B-4	01126401 01103414	29.12.2005 29.08.2011	28.09.2005 -	- 03.08.2011	Replaced 03.08.2017

[6] The provided data are compiled based on meters certificates and verification/calibration certificates. The attached documents confirm the quality and accuracy of the monitoring parameters recording through the monitoring period.

[7] Type of meters: microprocessor electronic meters - “Euro-Alpha”

№	Location of meters: Substation, connection	Type of meters[7]	№ of meters	Date of installation	Date of last verification	Date of current verification	Date of next verification
15.	М3: СД-29/29	EA05RALX-B-4	01126395 01103386	29.12.2005 13.09.2011	28.09.2005 -	- 07.09.2011	Replaced 07.09.2017
16.	М3: СД-20/12	EA05RALX-B-4	01059589	12.11.2010	24.11.2009	-	24.11.2015
17.	М3: СД-23/14	EA05RALX-B-4	01126402 01126401	29.12.2005 13.09.2011	28.09.2005 -	- 07.09.2011	Replaced 07.09.2017
18.	М3:СД-27/18	EA05RALX-B-4	01103398	12.11.2010	02.11.2010	-	02.11.2016
19.	М3: СД-28/20	EA05RALX-B-4	01144050	07.12.2010	06.09.2006	-	06.09.2012
20.	М3:СД-30/28	EA05RALX-B-4	01126399 01103406	30.12.2005 13.09.2011	28.09.2005 -	- 07.09.2011	Replaced 07.09.2017
21.	М3: СД-32/45	EA05RALX-B-4	01126397 01059551	30.12.2005 13.09.2011	28.09.2005 -	- 07.09.2011	Replaced 07.09.2017
22.	М3:СД-31/47	EA05RALX-B-4	01050775	12.11.2010	01.07.2010	-	01.07.2016
23.	М3: СД-33/49	EA05RALX-B-4	01059594	25.11.2009	24.11.2009	-	24.11.2015
24.	М3: СД-34/51	EA05RALX-B-4	01050766	25.11.2009	24.11.2009	-	24.11.2015
25.	М3:СД-22/42	EA05RALX-B-4	01089278	12.11.2010	23.09.2010	-	23.09.2016
26.	М3:СД-35/46	EA05RALX-B-4	01059531	25.11.2009	24.11.2009	-	24.11.2015
27.	М3:СД-36/48	EA05RALX-B-4	01059555	12.11.2010	23.09.2010	-	23.09.2016
28.	М3: АД-1/19	EA05RALX-B-4	01059569	12.11.2010	23.09.2010	-	23.09.2016

Table B.3.1-2. Flow-rate meters for oxygen production in air-separation units and oxygen distribution

№	Location of meters	Type of meters	№ of meters	Date of installation	Date of last verification	Date of current verification	Date of next verification
A. Meters for oxygen production in VRU-60							
1.	Oxygen Compressor Plant	Primary sensor: Rosemount 3051-CD Second meter: Controller ACS VRU[8]	8066805	18.01.2008	11.08.2010	11.08.2011	11.08.2012
2.	Oxygen Compressor Plant	Primary sensor: Rosemount 3051-CD Second meter: Controller ACS VRU	8066806	20.02.2008	11.08.2010	11.08.2011	11.08.2012
B. Meters for oxygen production in KtK-35-3[9]							
3.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: ВФС Second meter: КСФ-3	12215 3539 18	19.04.2006 19.04.2006 03.06.2006	08.04.2009 08.04.2009 14.05.2009	Preservation Preservation Preservation	- - -
4.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: ВФС Second meter: КСФ-3	5690 15506 1119	19.04.2006 19.04.2006 03.06.2006	08.04.2009 08.04.2009 14.05.2009	Preservation Preservation Preservation	- - -
C. Meters for oxygen production in KAr-30							
5.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: КСД-250 Second meter: ДИСК-250	14294 73535 53356	04.04.2008 04.04.2008 01.05.2008	14.04.2010 14.04.2010 13.05.2010	14.04.2011 14.04.2011 13.05.2011	14.04.2012 14.04.2012 13.05.2012
D. Meters for oxygen production in BR-2							
6.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: КСД-250 Second meter: ДИСК-250	2913 68584 53355	19.04.2006 19.04.2006 21.04.2006	14.04.2010 14.04.2010 13.05.2010	14.04.2011 14.04.2011 13.05.2011	14.04.2012 14.04.2012 13.05.2012
7.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: КСД-250 Second meter: ДИСК-250	58848 68583 53353	19.04.2006 19.04.2006 03.04.2006	14.04.2010 14.04.2010 26.05.2010	14.04.2011 14.04.2011 13.05.2011	14.04.2012 14.04.2012 13.05.2012

[8] There is a duplication second meter for oxygen production recording in VRU-60: СПГ-762 #1355 (the verification data are provided in the raw 8. of this table).

[9] The air separation unit KtK-35-3 was put into preservation 05.01.2008 (confirmed by Aggregate journal of KtK-35-3)

№	Location of meters	Type of meters	№ of meters	Date of installation	Date of last verification	Date of current verification	Date of next verification
E. Meters for oxygen distribution							
8.	Oxygen Compressor Plant (input in Open-hearth plant №1)	Primary sensor: Сафир-М Second meter: СПГ-762	11802921 1355	06.09.2007 06.09.2007	26.05.2010 25.11.2010	13.05.2011 -	13.05.2012 25.11.2012
9.	Oxygen Compressor Plant (input in Open-hearth plant №2)	Primary sensor: ДМ-3583 Second meter: КСД-3	61341 202713	10.05.2006 10.05.2006	13.05.2010 13.05.2010	13.05.2011 13.05.2011	13.05.2012 13.05.2012
10.	Oxygen Compressor Plant (input in Open-hearth plant №3)	Primary sensor: ДМ-3583 Primary sensor: Сафир 5420 Second meter: КСД-3 Second meter: СПГ-762	41087 08282132 104941 1352	17.05.2005 02.12.2010 17.05.2005 11.07.2011	13.05.2010 29.12.2010 13.05.2010 -	- 14.07.2011 - 14.07.2011	Replaced 17.07.2012 Replaced 14.07.2013
11.	Oxygen Compressor Plant (input in Dneprospecstal)	Primary sensor: ДМ-3583 Second meter: КСД-3	40445 118805	11.05.2006 11.05.2006	13.05.2010 13.05.2010	13.05.2011 13.05.2011	13.05.2012 13.05.2012
12.	Oxygen Compressor Plant (input in autogenous plant – west side)	Primary sensor: ДМ-3583 Second meter: КСД-3	481 250891	16.05.2005 16.05.2005	14.05.2010 14.05.2010	13.05.2011 13.05.2011	13.05.2012 13.05.2012
13.	Oxygen Compressor Plant (input in autogenous plant – east side)	Primary sensor: ДМ-3583 Second meter: КСД-3	24020 59498	06.05.2006 06.05.2006	13.05.2010 13.05.2010	13.05.2011 13.05.2011	13.05.2012 13.05.2012
14.	Oxygen Compressor Plant (input in heat and power plant)	Primary sensor: АРГ 31.2 Second meter: ДИСК-250	171 1511	27.03.2008 09.08.2007	28.12.2009 13.05.2010	21.12.2011 13.05.2011	21.12.2013 13.05.2012

Table B.3.1-3. Uncertainty level of meters

№	Type of meters	Uncertainty level
1.	Euro-Alpha	± (0,5-1,0)%
2.	Rosemount	± 0,075%
3.	ДМ-3583	± 1,5%
4.	ВФС	± 1,0%
5.	КСФ-3	± 1,0%
6.	КСД-250	± 1,0%
7.	ДИСК-250	± 1,0%
8.	Сафир-М	± 0,5%
9.	СПГ-762	± 0,05%
10.	КСД-3	± 1,0%
11.	АРГ 31.2	± 1,0%

B.3.2. Procedures of verification

Automation and metrological department of JSC "Zaporizhstal" is responsibility for organization of monitoring meters verification. Verification of meters are provided by State enterprise "Zaporizhzhya Scientific production center of standardization, metrology and certification".

Table B.3.2-1. Frequency of meters verification

№	Type of meters	Verification frequency
1.	Euro-Alpha	once every 6 years
2.	Rosemount	once a year
3.	ДМ-3583М	once a year
4.	ВФС	once a year
5.	КСФ-3	once a year
6.	КСД-250	once a year
7.	ДИСК-250	once a year
8.	Сафир-М	once a year
9.	СПГ-762	once every 2 years[10]
10.	КСД-3	once a year
11.	АРГ 31.2	once every 2 years

[10] Verification frequency determined by Ukrainian Register of SIT is once every 2 years. Verification frequency determined by meters producer is once every 4 years. Calibration frequency is once a year. Since 2010 the verification of СПГ-762 is provided once every 2 years and calibration - once a year.

B.4. Monitoring of project's impact on the environment

Not applicable. Project activity doesn't have considerable impact on the environment (see section F of the PDD).

B.5. Information of special equipment regimes exploitation

The special equipment regimes exploitation includes the situations when the main project equipment and measuring devices are exploited in nonstandard conditions because of defects, trouble, malfunction, etc. The special equipment regimes can potential affect the change of monitoring parameters and as a result the GHG emissions reduction monitoring.

The troubleshooting procedures for main project equipment and measuring devices are clearly described in the section C.3.

During the current monitoring period was undertaken the planned repair of the booster compressor at the air separation unit VRU-60. In the period of equipment maintenance (29.08.2011-01.09.2011) were used the reserved compressors.[11] There was not any influence on the oxygen production, oxygen distribution and electricity consumption.[12] Therefore the achieved GHG emission reductions were not affected by special equipment regimes exploitation.

B.6. Processing and storage of information

All necessary information for monitoring of GHGs emission reductions are stored in paper and electronic files and will be saved till the crediting period and for two years after the last operation with ERUs from the project. The procedures of monitoring data archiving and responsible person are determined by STP 8.2-13-11 "Monitoring of GHG emission reductions" and other internal documents. The description of data processing and storage is described in the section B.2. of the monitoring report.

[11] Period of maintenance is confirmed by aggregate journal of VRU-60.

[12] The confirmed data of oxygen compressor plant operation are contained in the reports of Recording bureau of Chief Power Engineer department and Technical bureau of Plant of networks and substations.

Section C. Quality control (QC) and quality assurance (QA) procedures

C.1. Internal audit and checking measures

Quality control of monitoring of GHGs emission reductions is a part of system of regular measures in order to make data more complete and right and to avoid mistakes in documentation and achieving of data.

The QA/QC procedures are determined by Standard JSC "Zaporizhstal" STP 8.2-13-11 "Monitoring of GHG emission reductions" and other internal documents. The QA/QC procedures include:

- quality assurance of the measured monitoring parameters;

- quality assurance of monitoring data processing and recording;

- quality assurance of monitoring data archiving;

- quality control of internal documentation, archiving data, calculation correctness.

The QA/QC procedures including information about responsible department/person, frequency and reporting documentation are detailed described in the section B.2. of the monitoring report.

C.2. Participation of third parties

Verification of meters are provided by State enterprise "Zaporizhzhya' Scientific production center of standardization, metrology and certification".

C.3. Procedures of emergencies finding

The procedures of emergencies finding (troubleshooting) include the procedures of identification, registration and elimination of defects, trouble, malfunction, etc. in the main project equipment and measuring devices.

The procedures of troubleshooting for main project equipment:

The procedures (incl. responsibility, frequency, etc.) of troubleshooting for main equipment are determined by Instructions of equipment exploitation and Job instructions. The specialists of OCP provide periodically the inspection of main and auxiliary equipment of air separation units in OCP. The information of discovered defects is recorded in aggregates journal.

The procedures of troubleshooting for measuring devices:

The procedures (incl. responsibility, frequency, etc.) of troubleshooting for measuring devices are determined by STP 7.6-01-03 "Measurement assurance. General provisions.", STP 7.6-07-03 "Organization and order of meters calibration and verification", Job instructions of CHPP and Department control equipment and automation.

The staff of Department of control equipment and automation provides periodically the inspection and maintenance of measuring devices. The information about defects, trouble (and provided calibration/verification) is recorded in meters certificates. In case of meters breakdown the measuring devices are to be replaced by reserved devices. In case of malfunction of registration devices the processing of measured data is provided in accordance with Instruction of planemetrist.

Section D. Results of GHGs emission reductions monitoring

D.1. GHGs project emissions

Calculation of GHGs project emissions is shown in the Annex 1. Results of project emissions monitoring for the period (01.07.2011 – 29.02.2012) are shown below.

Table D.1-1. GHG emissions in project scenario in July 2011 – February 2012.

№	Month	Value, t CO_2-eq.
1.	July 2011	42 829
2.	August 2011	42 524
3.	September 2011	42 100
4.	October 2011	43 137
5.	November 2011	37 861
6.	December 2011	42 783
7.	January 2012	43 696
8.	February 2012	41 171
9.	Total	336 101

D.2. GHGs baseline emissions

Calculation of GHGs by the baseline is shown in the Annex 2. Results of baseline emissions for the period (01.07.2011 – 29.02.2012) are shown below.

Table D.2-1. GHG emissions in baseline scenario in July 2011 – February 2012.

№	Month	Value, t CO_2-eq.
1.	July 2011	50 366
2.	August 2011	50 250
3.	September 2011	48 406
4.	October 2011	51 445
5.	November 2011	55 512
6.	December 2011	50 847
7.	January 2012	49 804
8.	February 2012	52 755
9.	Total	409 385

D.3. Leakages

Not applicable.

D.4. Calculation of GHGs emission reductions

Table D.4-1. Calculation of GHGs emission reductions in July 2011 – February 2012.

№	Month	Project emissions (tCO_2-eq.)	Leakages (tCO_2-eq.)	Baseline emissions (tCO_2-eq.)	Emission reductions (tCO_2-eq.)
1.	July 2011	42 829	-	50 366	7 537
2.	August 2011	42 524	-	50 250	7 726
3.	September 2011	42 100	-	48 406	6 306
4.	October 2011	43 137	-	51 445	8 308
5.	November 2011	37 861	-	55 512	17 651
6.	December 2011	42 783	-	50 847	8 064
7.	January 2012	43 696	-	49 804	6 108
8.	February 2012	41 171	-	52 755	11 584
9.	Total	336 101	-	409 385	73 284

D.5. Deviations of actual emission reductions from emission reductions estimated in PDD

Table D.5-1. Deviations of actual emission reductions in July 2011 – February 2012 from estimated emission reductions.

№	Parameter	Emission reductions (tCO_2-eq.)
1.	Estimated data[13]	72 132
2.	Actual data	73 284
3.	Deviations[14]	+ 1 152

Deviations of actual emission reductions from estimated value in July 2011 – February 2012 are insignificant – less than 2%. The deviations are to explained by oxygen consumption decrease at JSC "Zaporizhstal" at the current monitoring period in comparison to the forecasted data used for GHG emission reductions estimation.

[13] The provided estimated data is determined based on Revision of the monitoring plan Version 01 of 15.09.2010. Addition to the Monitoring report version 05 of 27.11.2009 for period 01.01.2008-31.12.2008.

[14] Deviations are calculated as the difference between actual (monitoring report) and estimated (PDD) data. Deviations = (Actual data – Estimated data).

Annex 1

GHGs project emissions calculation

Calculation of CO_2 emissions according to the project scenario for the period July - December 2011

Parameter	Index in PDD	Data unit	July	August	September	October	November	December
Formula D.1								
Electricity consumption in OCP	$EC_{OCP,PJ,y}$	MWh	39 292,5	39 012,7	38 623,5	39 575,0	34 735,0	39 250,3
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	1,090	1,090	1,090	1,090	1,090	1,090
Project emissions	$PE_{EC,y}$	tCO_2	42 829	42 524	42 100	43 137	37 861	42 783

Calculation of CO_2 emissions according to the project scenario for the period January - February 2012

Parameter	Index in PDD	Data unit	January	February
Formula D.1				
Electricity consumption in OCP	$EC_{OCP,PJ,y}$	MWh	40 087,7	37 771,3
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	1,090	1,090
Project emissions	$PE_{EC,y}$	tCO_2	43 696	41 171

Annex 2

GHGs baseline emissions calculation

Calculation of baseline emissions for the period July - December 2011

Parameter	Index in PDD	Data unit	July	August	September	October	November	December
Formula D.2.4								
Electricity consumption in OCP (Project scenario)	$EC_{OCP, PJ, y}$	MWh	39 292,5	39 012,7	38 623,5	39 575,0	34 735,0	39 250,3
Oxygen production in VRU-60	$P_{oxygen,VRU-60,y}$	thous. $m^3(O_2)$	37 959,6	37 776,3	37 571,8	37 430,9	29 463,8	37 560,3
Production of oxygen in reserved units	$P_{oxygen,RASU,y}$	thous. $m^3(O_2)$	-	-	-	-	-	-
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1,035	1,033	1,028	1,057	1,179	1,045
Formula D.2.1								
Oxygen production (baseline)	$P_{oxygen,BL,y}$	thous. $m^3(O_2)$	44 640,0	44 640,0	43 200,0	44 640,0	43 200,0	44 640,0
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1,035	1,033	1,028	1,057	1,179	1,045
Electricity consumption in OCP (baseline)	$EC_{OCP,BL,y}$	MWh	46 207,5	46 101,1	44 409,2	47 197,0	50 928,7	46 648,5
Formula D.2								
Electricity consumption (baseline)	$EC_{OCP,BL,y}$	MWh	46 207,5	46 101,1	44 409,2	47 197,0	50 928,7	46 648,5
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	1,090	1,090	1,090	1,090	1,090	1,090
Baseline emissions	$BE_{EC,y}$	tCO_2	50 366	50 250	48 406	51 445	55 512	50 847

Calculation of baseline emissions for the period January - February 2012

Parameter	Index in PDD	Data unit	January	February
Formula D.2.4				
Electricity consumption in OCP (Project scenario)	$EC_{OCP, PJ, y}$	MWh	40 087,7	37 771,3
Oxygen production in VRU-60	$P_{oxygen,VRU-60,y}$	thous. $m^3(O_2)$	39 165,0	32 590,0
Production of oxygen in reserved units	$P_{oxygen,RASU,y}$	thous. $m^3(O_2)$	-	-
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1,024	1,159
Formula D.2.1				
Oxygen production (baseline)	$P_{oxygen,BL,y}$	thous. $m^3(O_2)$	44 640,0	41 760,0
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1,024	1,159
Electricity consumption in OCP (baseline)	$EC_{OCP,BL,y}$	MWh	45 691,7	48 399,2
Formula D.2				
Electricity consumption (baseline)	$EC_{OCP,BL,y}$	MWh	45 691,7	48 399,2
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	1,090	1,090
Baseline emissions	$BE_{EC,y}$	tCO_2	49 804	52 755