Monitoring report

over period: 01.01.2010 – 31.12.2010

JOINT IMLEMENTATION PROJECT

“Reconstruction of the oxygen compressor plant at the JSC “Zaporizhstal”, Ukraine”

The Project Developer

General Director
CJSC “National Carbon
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Seal

The Project Owner

Deputy Chairman of Board,
Technical Director
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Seal

Zaporizhya

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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.

Sectoral scope: (3) Energy demand

Date: 02.03.2011

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.

A.3. 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 project "Reconstruction of the oxygen compressor plant at the JSC "Zaporizhstal", Ukraine" has received the Letters of Approval from the Host party (Ukraine) and from the Third party (Switzerland).[1] The ITL project ID is UA1000189.

[1] The Letters of Approval are attached.

A.4. Deviations and corrections of approved PDD

Absent.

A.5. Monitoring period

Date of the start of monitoring: 01.01.2010

Date of the end of monitoring: 31.12.2010

A.6. Monitoring results for the current period

Period of monitoring	Project emissions (tCO_2-eq.)	Leakages (tCO_2-eq.)	Baseline emissions (tCO_2-eq.)	Emission reductions (tCO_2-eq.)
01.01.2010 - 31.12.2010	399,868	-	498,003	98,135

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

A.7.1. Methodology for the baseline

Baseline for the project "Reconstruction of the oxygen compression plant" 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 "Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01)".

A.7.2. Methodology for monitoring

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

- 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 data of barometric pressure taken from the independent organization ensures the quality of data used and results of emissions calculation;

- 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.

All the above deviations and corrections of approved monitoring plan are verified.[2]

The List of parameters that are monitored throughout the crediting period stated in the Monitoring report for current monitoring period (section B.1.2) was completed with parameter $N_{day,j}$ (Number of days then the OCP was operated in operating conditions j). In the previous monitoring period (2008-2009) this parameter ($N_{day,j}$) was used for calculation of baseline emissions (according to the formulas D.2, D.2.1-2.4 of the monitoring plan) but was not stated in the List of monitored parameters. The monitoring procedures including QA/QC procedures were not changed.

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

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[2] http://ji.unfccc.int/JIITLProject/DB/DHPBSAFIRHMN55DS7FFABELK8NAVMP/details

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

№	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	Global Carbon B. V.: "Ukraine - Assessment of new calculation of CEF"	$EF_{CO2,ELEC,y}$ = 0.896 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	$SP_{oxygen,BL,j}$ = 60,000 m^3/hour, 62,000 m^3/hour, 64,000 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

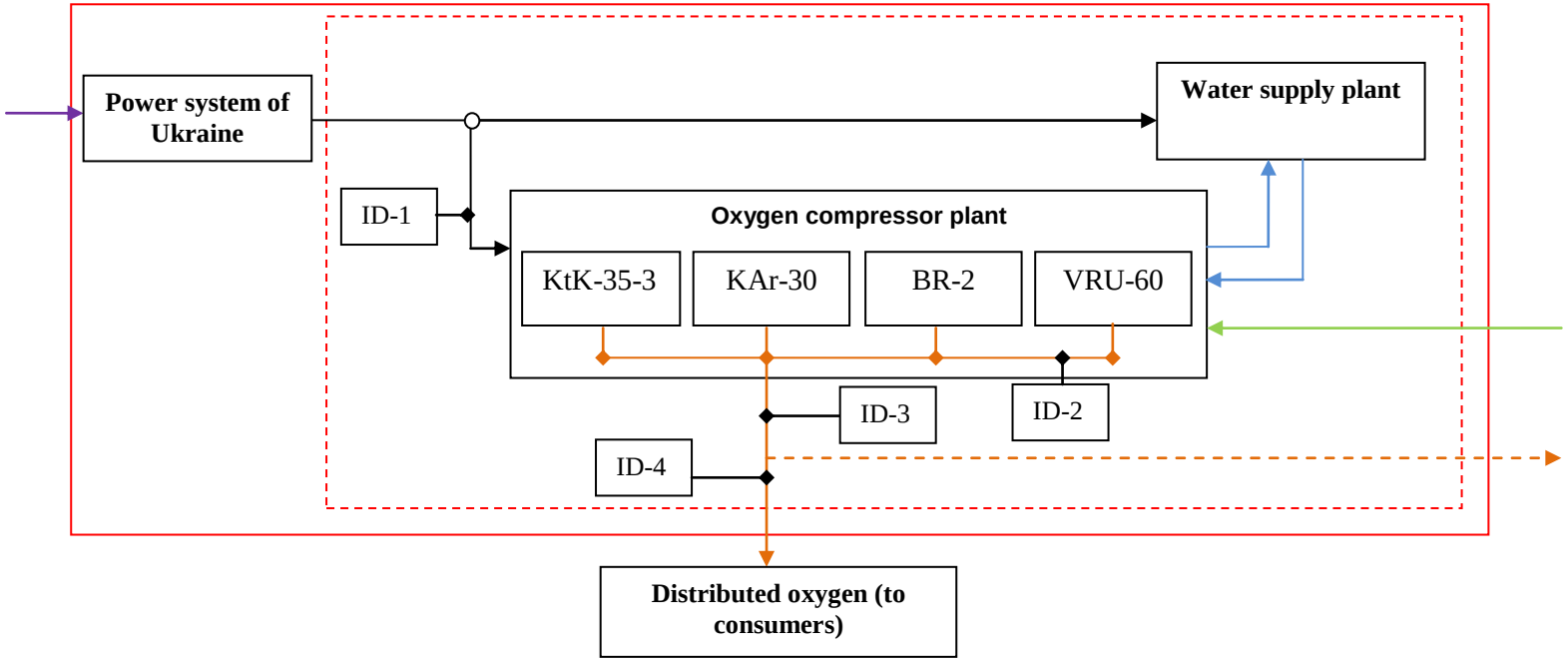
№	Data variable	Description	Data unit	Source of data	Comment
1.	ID-1, $EC_{OCP,PJ,y}$	Electric power consumption by the OCP	MWh	Electric power meter	To be registered by the plant of networks and substations
2.	ID-2, $P_{oxygen,VRU-60,y}$	Oxygen production in the air-separation unit VRU-60	thousand m^3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

(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).

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[3]	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

[3] 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 8.2-13-10 “Integrated quality system. Monitoring of GHGs emission reductions”, approved by Order #98 of JSC “Zaporizhstal” dated on 05.03.2010.

In monitoring of GHGs emission reductions by the project “Reconstruction of the oxygen compressor plant” participate 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.

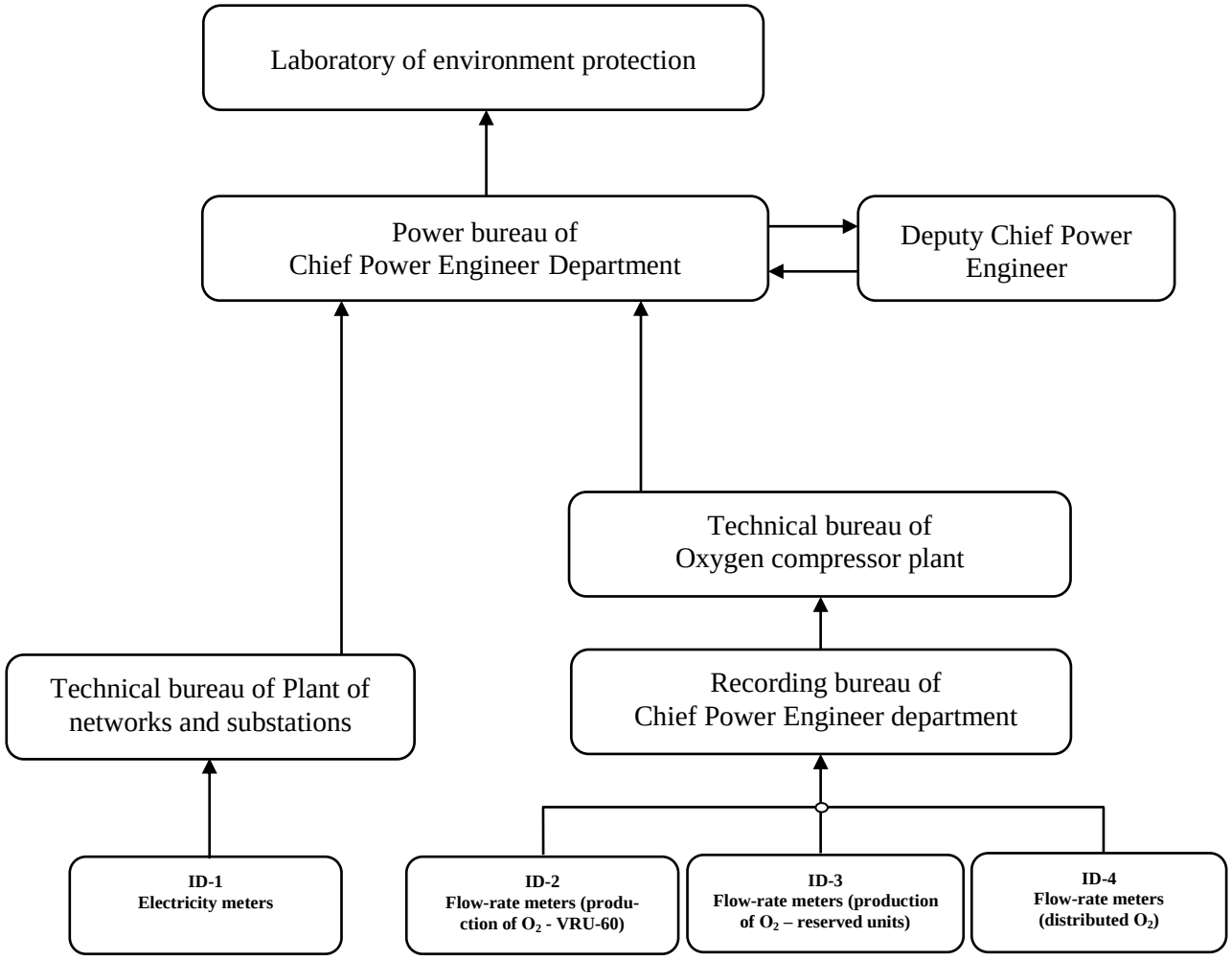


Table B.2-1. Departments of the company participating in GHGs emission monitoring, responsible specialists and their functions.

№	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 monitoring of 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

Basic information of used meters for monitoring of GHG emission reductions is provided in the table B.3-1, B.3-2 and B.3-3.

Table B.3-1. The meters for electricity consumption.[4]

№	Location of meters: Substation, connection	Type of meters[5]	№ of meters (before replacement)	Date of last verification	№ of meters (after replacement)	Date of current verification	Date of next verification
1.	M1 : 55-1/12	EA05RL-B-4	01103326	03.09.2004	01103338	21.08.2010	21.08.2016
2.	M1 : 55-2/63	EA05RL-B-4	01103286	03.09.2004	01103311	21.08.2010	21.08.2016
3.	M1 : 55-3/48	EA05RL-B-4	01103159	03.09.2004	01103220	15.09.2010	15.09.2016
4.	M1 : 55-4/62	EA05RL-B-4	01103210	03.09.2004	01103321	15.09.2010	15.09.2016
5.	M1 : СД-1/1	EA05RALX-B-4	01059599	24.03.2009	01050771	09.11.2010	09.11.2016
6.	M1 : СД-2/40	EA05RALX-B-4	01059545	24.03.2009	01059590	23.09.2010	23.09.2016
7.	M1 : СД-6/16	EA05RALX-B-4	01103390	03.09.2004	01050778	02.11.2010	02.11.2016
8.	M1 : СД-17/58	EA05RALX-B-4	01103408	03.09.2004	01059584	02.11.2010	02.11.2016
9.	ПС-10 : КТП-ККЦ/6к	EA05RL-B-4	01103218	03.09.2004	01103223	15.09.2010	15.09.2016
10.	M3 : 55-5/3	EA05RL-B-4	01112347	04.03.2005	01103231	15.09.2010	15.09.2016
11.	M3 : 355-1/21	EA05RL-B-4	01112353	04.03.2005	01103339	15.09.2010	15.09.2016
12.	M3 : 355-2/30	EA05RL-B-4	01112334	04.03.2005	01103288	15.09.2010	15.09.2016
13.	M3 : СД-26/9	EA05RALX-B-4	01103410	03.09.2004	01089275	23.09.2010	23.09.2016
14.	M3 : СД-21/27	EA05RALX-B-4	01126401	28.09.2005	-	-	28.09.2011
15.	M3 : СД-29/29	EA05RALX-B-4	01126395	28.09.2005	-	-	28.09.2011
16.	M3 : СД-20/12	EA05RALX-B-4	01133560	27.03.2009	01059589	24.11.2009	24.11.2015
17.	M3 : СД-23/14	EA05RALX-B-4	01126402	28.09.2005	-	-	28.09.2011

[4] 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.
[5] Type of meters: microprocessor electronic meters - “Euro-Alpha”

№	Location of meters: Substation, connection	Type of meters[5]	№ of meters (before replacement)	Date of last verification	№ of meters (after replacement)	Date of current verification	Date of next verification
18.	М3 : СД-27/18	EA05RALX-B-4	01103384	03.09.2004	01103398	02.11.2010	02.11.2016
19.	М3 : СД-28/20	EA05RALX-B-4	01103396	03.09.2004	01144050	06.09.2006	06.09.2012
20.	М3 : СД-30/28	EA05RALX-B-4	01126399	28.09.2005	-	-	28.09.2011
21.	М3 : СД-32/45	EA05RALX-B-4	01126397	28.09.2005	-	-	28.09.2011
22.	М3 : СД-31/47	EA05RALX-B-4	01059532	05.03.2009	01050775	01.07.2010	01.07.2016
23.	М3 : СД-33/49	EA05RALX-B-4	01059594	24.11.2009	-	-	24.11.2015
24.	М3 : СД-34/51	EA05RALX-B-4	01050766	24.11.2009	-	-	24.11.2015
25.	М3 : СД-22/42	EA05RALX-B-4	01103415	03.09.2004	01089278	23.09.2010	23.09.2016
26.	М3 : СД-35/46	EA05RALX-B-4	01059531	24.11.2009	-	-	24.11.2015
27.	М3 : СД-36/48	EA05RALX-B-4	01103393	03.09.2004	01059555	23.09.2010	23.09.2016
28.	М3 : АД-1/19	EA05RALX-B-4	01103397	03.09.2004	01059569	23.09.2010	23.09.2016

Table B.3-2. Flow-rate meters for oxygen production in air-separation units and oxygen distribution.

№	Location of meters	Type of meters	№ of meters	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[6]	8066805	13.08.2009	11.08.2010	11.08.2011

[6] 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).

№	Location of meters	Type of meters	№ of meters	Date of last verification	Date of current verification	Date of next verification
2.	Oxygen Compressor Plant	Primary sensor: Rosemount 3051-CD Second meter: Controller ACS VRU	8066806	13.08.2009	11.08.2010	11.08.2011
B. Meters for oxygen production in KtK-35-3[7]						
3.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: ВФС Second meter: КСФ-3	12215 3539 18	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	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	08.04.2009 08.04.2009 14.05.2009	04.04.2010 04.04.2010 13.05.2010	04.04.2011 04.04.2011 13.05.2011
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	08.04.2009 08.04.2009 14.05.2009	14.04.2010 14.04.2010 13.05.2010	14.04.2011 14.04.2011 13.05.2011

[7] 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 last verification	Date of current verification	Date of next verification
7.	Oxygen Compressor Plant	Primary sensor: ДМ-3583 Second meter: КСД-250 Second meter: ДИСК-250	58848 68583 53353	08.04.2009 08.04.2009 14.05.2009	14.04.2010 14.04.2010 26.05.2010	14.04.2011 14.04.2011 26.05.2011
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	21.05.2009 13.05.2009[8]	26.05.2010 25.11.2010	26.05.2011 25.11.2012
9.	Oxygen Compressor Plant (input in Open-hearth plant №2)	Primary sensor: ДМ-3583 Second meter: КСД-3	61341 202713	14.05.2009 14.05.2009	13.05.2010 13.05.2010	13.05.2011 13.05.2011
10.	Oxygen Compressor Plant (input in Open-hearth plant №3)	Primary sensor: ДМ-3583 Second meter: КСД-3	41087 104941	14.05.2009 14.05.2009	13.05.2010 13.05.2010	13.05.2011 13.05.2011
11.	Oxygen Compressor Plant (input in Dneprospecstal)	Primary sensor: ДМ-3583 Second meter: КСД-3	40445 118805	14.05.2009 14.05.2009	13.05.2010 13.05.2010	13.05.2011 13.05.2011
12.	Oxygen Compressor Plant (input in autogenous plant)	Primary sensor: ДМ-3583 Second meter: КСД-3	481 250891	14.05.2009 14.05.2009	14.05.2010 14.05.2010	14.05.2011 14.05.2011
13.	Oxygen Compressor Plant (input in autogenous plant)	Primary sensor: ДМ-3583 Second meter: КСД-3	24020 59498	14.05.2009 14.05.2009	13.05.2010 13.05.2010	13.05.2011 13.05.2011
14.	Oxygen Compressor Plant (input in heat and power plant)	Primary sensor: АРГ 31.2 Second meter: ДИСК-250	171 1511	28.12.2009 14.05.2009	- 13.05.2010	28.12.2011 13.05.2011

[8] Calibration.

Table B.3-3. 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 "Zaporozhya" Scientific production centre of standardization, metrology and certification"

Table B.3-4. 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[9]
10.	КСД-3	once a year
11.	АРГ 31.2	once every 2 years

[9] 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 will be 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 monitoring period (01.01.2010-31.12.2010) were undertaken the planned repair works on air separation unit VRU-60 in period 01.08.2010-12.08.2010. In this period were in operation the reserved units KAr-30 and BR-2. The air separation unit VRU-60 was put into operation after repair works on 13.08.2010. The air separation units KAr-30 and BR-2 were put into preservation on 13.08.2010. The information about mentioned date and provided works is stated in the aggregates journals according to the procedures described in the section C.3 of the monitoring report. Taken into account that the planned repair works would be provided also in the absence of the project the calculation of the emission reductions in period 01.08.2010-12.08.2010 were not provided.

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 8.2-13-10 "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.

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 8.2-13-10 "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.

Quality of the GHG emission reductions monitoring is also ensured by internal audit procedures specified in area of STP 8.2-13-10 "Monitoring of GHG emission reductions" by Direction JSC "Zaporizhstal" #349 dated on 01.09.2010. Technical department is responsible for internal audit. The results of internal audits provided during monitoring period are presented in the protocols of internal audits.

C.2. Participation of third parties

Verification of meters are provided by State enterprise "Zaporozhya' Scientific production centre 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.

<u>The procedures of troubleshooting for main project equipment:</u>

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.

<u>The procedures of troubleshooting for measuring devices:</u>

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.

During the monitoring period (01.01.2010-31.12.2010) were undertaken the planned repair works on air separation unit VRU-60 in period 01.08.2010-12.08.2010. In this period were in operation the reserved units KAr-30 and BR-2. The air separation unit VRU-60 was put into operation after repair works on 13.08.2010. The air separation units KAr-30 and BR-2 were put into preservation on 13.08.2010. The information about mentioned date and provided works is stated in the aggregates journals according to the procedures described above. Taken into account that the planned repair works would be provided also in the absence of the project the calculation of the emission reductions in period 01.08.2010-12.08.2010 were not provided.

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 (01.01.2010-31.12.2010) are shown below.

Year/Month	Project emissions (tCO_2-eq.)
January	32,388
February	27,559
March	31,851
April	28,631
May	39,914
June	38,810
July	41,455
August	20,342
September	32,081
October	34,515
November	34,647
December	37,675
Total in 2010	399,868

D.2. GHGs baseline emissions

Calculation of GHGs by the baseline is shown in the Annex 2. Results of baseline emissions for the period (01.01.2010-31.12.2010) are shown below.

Year/Month	Baseline emissions (tCO_2-eq.)
January	40,588
February	38,513
March	37,689
April	39,925
May	51,345
June	50,263
July	57,562
August	27,563
September	38,739
October	38,674

Year/Month	Baseline emissions (tCO_2-eq.)
November	38,026
December	39,116
Total in 2010	498,003

D.3. Leakages

Not applicable.

D.4. Calculation of GHGs emission reductions

Year/Month	Project emissions (tCO_2-eq.)	Leakages (tCO_2-eq.)	Baseline emissions (tCO_2-eq.)	Emission reductions (tCO_2-eq.)
January	32,388	-	40,588	8,200
February	27,559	-	38,513	10,954
March	31,851	-	37,689	5,838
April	28,631	-	39,925	11,294
May	39,914	-	51,345	11,431
June	38,810	-	50,263	11,453
July	41,455	-	57,562	16,107
August	20,342	-	27,563	7,221
September	32,081	-	38,739	6,658
October	34,515	-	38,674	4,159
November	34,647	-	38,026	3,379
December	37,675	-	39,116	1,441
Total in 2010	399,868	-	498,003	98,135

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

Source of data	Project emissions (tCO_2-eq.)	Leakages (tCO_2-eq.)	Baseline emissions (tCO_2-eq.)	Emission reductions (tCO_2-eq.)
Estimated data[10]	387,327	-	495,897	108,570
Actual data	399,868	-	498,003	98,135
Deviations[11]	+12,541 (+3.2%)	-	+2,106 (+0.4%)	-10,435 (-9.6%)

[10] 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).

[11] Deviations are calculated as the difference between actual (monitoring report for 2010) and estimated data. Deviations = (Actual data – Estimated data).

Deviations of actual emission reductions from estimated in the PDD can be in general explained by increase of actual emissions in project scenario on 12,541 tCO_2 because of planned repair works on air separation unit VRU-60 and operation of reserved units. The effectiveness of oxygen production in reserved units is less than in VRU-60.

Annex 1

GHGs project emissions calculation

Calculation of CO_2 emissions according to the Project scenario for the period January - June 2010

Parameter	Index in PDD	Data unit	January	February	March	April	May	June
Formula D.1								
Electricity consumption in OCP	$EC_{OCP,PJ,y}$	MWh	36,146.9	30,757.6	35,548.3	31,954.7	44,547.4	43,314.8
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	0.896	0.896	0.896	0.896	0.896	0.896
Project emissions	$PE_{EC,y}$	tCO_2	32,388	27,559	31,851	28,631	39,914	38,810

Calculation of CO_2 emissions according to the Project scenario for the period July - December 2010

Parameter	Index in PDD	Data unit	July	August	September	October	November	December
Formula D.1								
Electricity consumption in OCP	$EC_{OCP,PJ,y}$	MWh	46,267.1	22,703.4	35,804.7	38,520.7	38,668.2	42,047.6
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	0.896	0.896	0.896	0.896	0.896	0.896
Project emissions	$PE_{EC,y}$	tCO_2	41,455	20,342	32,081	34,515	34,647	37,675

Annex 2

GHGs baseline emissions calculation

Calculation of baseline emissions for January-June of 2010

Parameter	Index in PDD	Data unit	January	February	March	April	May	June
Formula D.2.4								
Electricity consumption in OCP (Project scenario)	$EC_{OCP,\ PJ,\ y}$	MWh	36,146.9	30,757.6	35,548.3	31,954.7	44,547.4	43,314.8
Oxygen production in VRU-60	$P_{oxygen,VRU-60,y}$	thous. $m^3(O_2)$	35,620.9	28,852.0	37,725.5	30,980.1	32,126.5	30,046.7
Production of oxygen in reserved units	$P_{oxygen,RASU,y}$	thous. $m^3(O_2)$	-	-	-	-	11,569.2	14,526.7
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1.015	1.066	0.942	1.031	1.019	0.972
Formula D.2.1								
Oxygen production (baseline)	$P_{oxygen,BL,y}$	thous. $m^3(O_2)$	44,640.0	40,320.0	44,640.0	43,200.0	56,209.2	57,726.7
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1.015	1.066	0.942	1.031	1.019	0.972
Electricity consumption in OCP (baseline)	$EC_{OCP,BL,y}$	MWh	45,299.3	42,983.1	42,063.8	44,559.0	57,304.8	56,096.7
Formula D.2								
Electricity consumption (baseline)	$EC_{OCP,BL,y}$	MWh	45,299.3	42,983.1	42,063.8	44,559.0	57,304.8	56,096.7
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	0.896	0.896	0.896	0.896	0.896	0.896
Baseline emissions	$BE_{EC,y}$	tCO_2	40,588	38,513	37,689	39,925	51,345	50,263

Calculation of baseline emissions for July-December of 2010

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	46,267.1	22,703.4	35,804.7	38,520.7	38,668.2	42,047.6
Oxygen production in VRU-60	$P_{oxygen,VRU-60,y}$	thous. $m^3(O_2)$	27,997.6	19,917.9	35,775.0	39,839.0	39,360.9	42,995.6
Production of oxygen in reserved units	$P_{oxygen,RASU,y}$	thous. $m^3(O_2)$	14,835.9	1,048.6	-	-	-	-
Specific electricity consumption for oxygen production in OCP	$SEC_{oxygen,BL}$	MWh/thous. $m^3(O_2)$	1.080	1.083	1.001	0.967	0.982	0.978
Formula D.2.1								
Oxygen production (baseline)	$P_{oxygen,BL,y}$	thous. $m^3(O_2)$	59,475.9	28,408.6	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. $m^3(O_2)$	1.080	1.083	1.001	0.967	0.982	0.978
Electricity consumption in OCP (baseline)	$EC_{OCP,BL,y}$	MWh	64,243.5	30,762.0	43,235.9	43,162.8	42,439.7	43,655.7
Formula D.2								
Electricity consumption (baseline)	$EC_{OCP,BL,y}$	MWh	64,243.5	30,762.0	43,235.9	43,162.8	42,439.7	43,655.7
CO_2 emission factor	$EF_{CO2,ELEC,y}$	tCO_2/MWh	0.896	0.896	0.896	0.896	0.896	0.896
Baseline emissions	$BE_{EC,y}$	tCO_2	57,562	27,563	38,739	38,674	38,026	39,116