FOURTH PERIODIC JI MONITORING REPORT

Version 2.0
25 October 2012

CONTENTS

SECTION A. General Project activity and monitoring information

A.1 Title of the project activity:

Implementation of Arc furnace Steelmaking Plant "Electrostal" at Kurakhovo, Donetsk region

A.2. JI registration number:

ITL Project ID: UA1000181

A.3. Short description of the project activity:

The purpose of this project is to reduce emissions of greenhouse gases by using modern technologies to improve steel production in the region. The project envisages the construction of a green field steel manufacturing plant, based on a modern electric arc furnace (EAF). The EAF installed allows production of steel from almost 100% scrap metal feedstock[1]. The new production facility will use less a carbon intensive method to produce steel than a typically used by the majority of existing Ukrainian enterprises. This will allow reducing of GHG emissions.

A.4. Monitoring period:

- Monitoring period starting date: 01/08/2011 at 00:00;
- Monitoring period closing date: 31/07/2012 at 24:00.

A.5. Methodology applied to the project activity:

The JI specific approach is used for the monitoring of emission reductions in accordance with the "Guidance on criteria for baseline setting and monitoring" (version 02).

A.5.1. Baseline methodology:

A JI specific monitoring approach was developed for this project in line with the "Guidance on criteria for baseline setting and monitoring" (version 02). The resulting Monitoring Plan was determined as part of the determination process.

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

As it was planned, the first melting was finished at 02 March 2008. All necessary equipment for proper work was installed before this date. Official commissioning of the plant was carried on 16 December 2008 which can be explained by complexity of this bureaucratic procedure.

Therefore the project can be considered as implemented.

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[1] It is required to use iron as a source of carbon, in the amount of 5 kg per 1 tonne of steel. All pig iron used under the project is a scrap and therefore can be considered as a climate neutral.

Activity	Date in accordance with PDD	Actual date
Starting date of the project	27/02/2006	27/02/2006
First melting	02/03/2008	02/03/2008
Start date of monitoring period	-	01/04/2008
Official commissioning	-	16/12/2008

Table 1: Implementation plan

Letters of Approval were issued by both Parties:

- Letter of Approval from Ukraine #1243/23/7 dated 19/08/2010.
- Letter of Approval from Netherlands #2010JI11 dated 22/04/2010.

A.7. Intended deviations or revisions to the determined PDD:

There are no deviations or revisions to the determined PDD.

The actual emission reductions in the monitoring report are different from the forecast in the registered PDD:

	Data in the PDD	Data in this report
Emission reductions in 2011 (adjusted for the 5 month period), tCO_2e	202 567	186 131
Emission reductions in 2012 (adjusted for the 7 month period), tCO_2e	283 593	231 609
Total emission reductions in monitoring period, tCO_2e	486 160	417 740

Table 2: Emission reduction comparison

The differences are due to the fact that estimates in the PDD were based on forecasted data. As the result the emission reductions are lower than expected which is conservative.

A.8. Intended deviations or revisions to the determined monitoring plan:

There are no deviations to the determined monitoring plan.

A.9. Changes since last verification:

Not applicable.

A.10. Person(s) responsible for the preparation and submission of the monitoring report:

"Electrostal" Ltd. Alexander Serov, Head of technical department
Global Carbon B.V. Natallia Belskaya, JI Consultant

A.11. Person(s) responsible for the checking and approval of the monitoring report:

"Electrostal" Ltd. Matvey Lam, General Director

Global Carbon B.V. Natallia Belskaya, JI consultant.

SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period

For the monitoring period stated in A.4. the following parameter have to be collected and registered:

1. **Amount of steel produced under the project scenario**

   This parameter is metered in different places in the steel production chain with different meters. For monitoring purpose the final amount of steel obtained, which is going to be delivered to a client will be used. For accounting of steel delivered, motor-truck scales BTA-60 which is situated at the gateway to the plant can be used. It also possible to use railway truck scale VVET-150 at the railroad gateway, depending on what kind of transport is used. When empty truck/goods waggon is passing through the weight-bridge scales operator is registering its number in the database and system automatically measures its weight. On the way back, a loaded truck/ goods waggon is scaled once more and the system calculates the difference in weight which is equal to weight of steel transported. This value is collected and stored in the database and can reflect the steel production level during long period. Paper log books are filled out by operator simultaneously with automatic measurements. Reports of the shipping yard are preparing on the basis of these data.

   Technical department prepares technical reports based on data from reports of the shipping yard in monthly order. Technical reports are the main source of data for monitoring report.

2. **Electrodes consumption by EAF.**

   This parameter is metered in different places in the steel production chain with different meters. For accounting of electrodes delivered, motor-truck scales BTA-60 which is situated at the gateway to the plant can be used. It also possible to use railway truck scale VVET-150 at the railroad gateway, depending on what kind of transport is used. When empty the loaded truck/goods waggon is passing through the weight-bridge scales operator is registering its number in the database as well as kind of feedstock delivered. The system automatically measures its weight. On the way back, an empty truck/ goods waggon is scaled once more and the system calculates the difference in weight which is equal to weight of feedstock transported. This value is collected and stored in the database and can reflect the steel production level during long period. Paper log books are filled out by operator simultaneously with automatic measurements.

   In electrodes life logbook the actual rate of electrodes by the end of each shift is reflected. This logbook is filled in by duty shift and signed by shop foreman and steelmaker. Technical department prepares technical reports based on the data from electrodes life logbook in monthly order. Technical reports are the main source of data for monitoring report.

3. Oxygen consumption.

This parameter is metered in different places in the steel production chain with different meters. For monitoring purpose will be used commercial metering device (Optimass 8000) installed at the territory of the Linde plant[2]. Together with automatically measurements recorder from the “Electrostal” side clarifies the meter readings by phone and registers it to the log book daily. Internal meters onsite can be used for cross-checking. Monthly summary of these data used for monthly technical reports preparation by specialists of technical department of the plant. Technical reports are the main source of data for monitoring report.

4. Electricity consumption.

This parameter is metered in different places in the steel production chain with different meters. For monitoring purpose commercial metering device that meters electricity consumption by EAF and LF (ladle furnace) will be used. Automatic system for commercial accounting of power consumption (ASCAPC) is used based on “EuroAlpha Metronics” meter for registering and storing the data simultaneously with manual readings registration. Recorder registers readings concerning electricity consumption daily and fills it out to the log book. Internal meters onsite can be used for cross-checking. At the end of each month Delivery-Acceptance Acts from the energy supplier company are forwarded to “Electrostal” Ltd. These acts are the basis for payments. Data concerning electricity consumption by EAF and LF are included in these acts under “Tp №1” code.

Delivery-Acceptance Acts from the energy supplier company are the main source for monitoring purpose in the concept of electricity consumption level.

5. Natural gas consumption.

This parameter is metered by following systems:

a) Commercial metering and automatic calculation system “FLOWSIC600” is installed at gas distribution station (GDS), owned by UMG “Donbastransgas”, DK “Ukrtransgas” and NAK “Naftogazukraina”
b) Technical metering (Leader VG-1, serial #456) is installed at the gas distribution substation (GDS) owned by “Electrostal” Ltd. The system has all relevant metrological accreditation. Printed papers with hourly values for flow rate are issues in daily order. Flow rate is also registering in the logbook. For internal control it is possible to use internal meters.

For the monitoring purpose technical reports from energy department are used. Delivery-Acceptance Acts from “Donbastransgas” to “Electrostal” Ltd. are used for cross-check.

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[2] All oxygen consumed by Electrostal is produced by mini-plant Linde, which is situated on the Electrostal territory

6. Anthracite consumption.

This parameter is metered in different places in the steel production chain with different meters. For accounting of anthracite delivered, motor-truck scales BTA-60 which is situated at the gateway to the plant can be used. It also possible to use railway truck scale VVET-150 at the railroad gateway, depending on what kind of transport is used. When empty the loaded truck/goods waggon is passing through the weight-bridge scales operator is registering its number in the database as well as kind of feedstock delivered. The system automatically measures its weight. On the way back, an empty truck/ goods waggon is scaled once more and the system calculates the difference in weight which is equal to weight of feedstock transported. This value is collected and stored in the database and can reflect the steel production level during long period. Paper log books are filled out by operator simultaneously with automatic measurements. Internal meters onsite can be used for cross-checking.

Actual usage are metering by automatic hopper weigher, which loads the furnace in dependence of steelmaker's order. Floor scales also can be used for loading materials manually. Data concerning materials usage are recording into the heat reports through the PCS (process control system) and in manual mode. Every day Operator transferring the data from the heat reports into the database. Reports of the EAF and LF department are preparing in monthly base. Technical department prepares technical reports based on these reports in monthly order. Technical reports are the main source of data for monitoring report.

7. Lime consumption.

This parameter is metered in different places in the steel production chain with different meters. For accounting of lime delivered, motor-truck scales BTA-60 which is situated at the gateway to the plant can be used. It also possible to use railway truck scale VVET-150 at the railroad gateway, depending on what kind of transport is used. When empty the loaded truck/goods waggon is passing through the weight-bridge scales operator is registering its number in the database as well as kind of feedstock delivered. The system automatically measures its weight. On the way back, an empty truck/ goods waggon is scaled once more and the system calculates the difference in weight which is equal to weight of feedstock transported. This value is collected and stored in the database and can reflect the steel production level during long period. Paper log books are filled out by operator simultaneously with automatic measurements. Internal meters onsite can be used for cross-checking.

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8. Electrodes consumption by LF.

This parameter is metered in different places in the steel production chain with different meters. For accounting of electrodes delivered, motor-truck scales BTA-60 which is situated at the gateway to the plant can be used. It also possible to use railway truck scale VVET-150 at the railroad gateway, depending on what kind of transport is used. When empty the loaded truck/goods waggon is passing through the weight-bridge scales operator is registering its number in the database as well as kind of feedstock delivered. The system automatically measures its weight. On the way back, an empty truck/ goods waggon is scaled once more and the system calculates the difference in weight which is equal to weight of feedstock transported. This value is collected and stored in the database and can reflect the steel production level during long period. Paper log books are filled out by operator simultaneously with automatic measurements.

In electrodes life logbook the actual rate of electrodes by the end of each shift is reflected. This logbook is filled in by duty shift and signed by shop foreman and steelmaker. Technical department prepares technical reports based on the data from electrodes life logbook in monthly order. Technical reports are the main source of data for monitoring report.

9. **Amount of steel produced under the baseline.**

This data based on level of steel produced under the project scenario.

B.1. Monitoring equipment types

1. Motor-truck scales BTA-60
2. Railway truck scale VVET-150
3. Natural gas fiscal metering system "FLOWSIC600"
4. Oxygen flow rate meter "Optimass 8000"
5. Electricity meters "Alpha A1140"
6. Hopper weigher "BCS M584"
7. Floor scales "4BDU 1500 (1212)"

B.1.2. Table providing information on the equipment used:

ID	Parameter name	Units	Meter name	Serial number	Accuracy class or error	The last check date	The next check date
1	Motor-truck scales for metering income and outcome of feedstock and steel produced	kg	BTA-60	061002044	20 kg	22/06/2011 22/06/2012	22/06/2012 22/06/2013
2	Railway truck scales for metering income and outcome of feedstock and steel produced	t	VVET-150	061202763	50 kg	22/06/2011 22/06/2012	22/06/2012 22/06/2013
3(o)*	Metering system for natural gas consumption by the plant	m^3	FLOINEK	3060147	0.5%	04/11/2011	04/11/2013
3(t)*	Metering system for natural gas consumption by the plant	m^3	Leader VG-1	456	0.5%	20/12/2010	20/12/2012
3*	Metering system for natural gas consumption by the plant	m^3	FLOWSIC600	12058684	0.5%	11/06/2012	11/06/2014
4	Flow rate meter for oxygen consumption by the plant	m^3	Optimass 8000	G070000006200029 DN40	0.11%	03/01/2011	03/01/2013
5	Electricity consumption by EAF and LF	kWh	Alpha A1140	01144644	0.2	13/09/2006	13/09/2014
6	Hopper weigher	kg	BCS M584	07 M174	4	19/07/2011 02/07/2012	19/07/2012 02/07/2013
7	Floor scales	kg	4BDU 1500 (1212)	73642	1%	29/12/2011	29/12/2012

***3(o)** old meter operated until 01/06/2012

3(t) temporary meter operated from 01/06/2012 until 11/06/2012 (both date include)

3 new meter operated from 12/06/2012 and afterward

Table 2: Equipment used for monitoring activities

Calibration dates are provided in following formats:

- DD/MM/YYYY – exact date;
- MM/YYYY – month of the year in which calibration should be performed;
- Q/YYYY – quarter of the year in which calibration should be performed.

Calibration of the metering devices and equipment has been conducted on a periodic basis according to the procedures of the Host Party and internal company policies.

B.1.3. Calibration procedures

Calibration schedule has been developed in the plant. For all works concerning calibration Chief Metrologist is responsible.

For all the meters:

QA/QC procedures	Body responsible to calibration and certification
Maximum calibration interval for the Motor-truck scales is equal to 1 year	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine
Maximum calibration interval for the Railway truck scales is equal to 1 year	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine
Maximum calibration interval for the FLOWSIC600 is equal to 2 years	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine
Maximum calibration interval for the Optimass 8000 is equal to 2 years	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine
Maximum calibration interval for the Alpha A1140 meter is equal to 6 years	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine
Maximum calibration interval for the hopper weigher is equal to 1 year	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine
Maximum calibration interval for the floor scales is equal to 1 years	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine

Table 3: Calibration procedures

B.1.4. Involvement of Third Parties:

Checking and calibration of meters is under control of authorized representatives of the State Metrological System of Ukraine.

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

Scheme which describes data movement in the framework of the monitoring of emission reductions is the following:

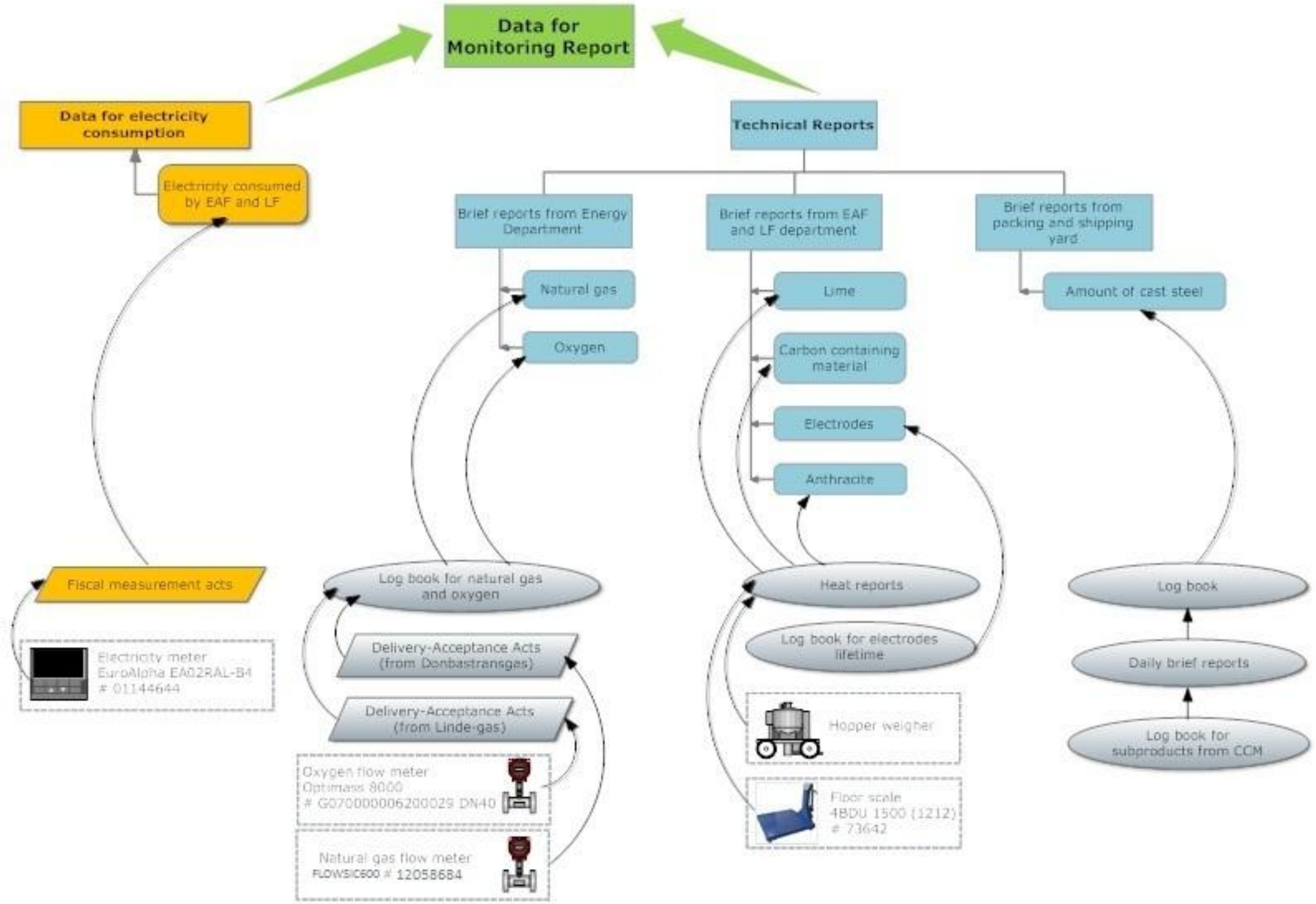

Figure 1: Data collection scheme

B.2.1. List of fixed default values and ex-ante baseline factors:

Variable	Source	Units	Value
Global baseline emission factor for steel produced $GlEF_{Bl,steel}$	Formula 1.1 in Annex 2 of determined PDD.	tCO_2/t steel	1.543
Baseline emission factor for electrodes consumption during the steelmaking process $EF_{electrodes,y}$	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 3: Industrial Processes and Product Use. Chapter 4: Metal Industry Emission, page 4.27, table 4.3 and Equation 1 in this document.	tCO_2/tonne	3.007
Baseline emission factor for electricity consumption during the steelmaking process (equal to the indirect specific carbon dioxide emissions from electricity consumption by the 1st class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052) in 2011 year[3] $EF_{electricity,y}$	Order of the National Environmental Investment Agency of Ukraine #75 from 12.05.2011.	$kgCO_2$/kWh = tCO_2/MWh	1.090*
Baseline emission factor for natural gas consumption during the steelmaking process $EF_{NG,y}$	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1: Introduction, page 24, table 1.4 and Equation 2 in this document.	tCO_2/1000 m^3	1.879
Baseline emission factor for anthracite consumption during the steelmaking process $EF_{antracite,y}$	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy. Chapter 1 Introduction, page 1.23, table 1.4 and page 1.14, table 1.1 and Equation 3 in this document.	tCO_2/tonne	2.346
Baseline emission factor for lime consumption during the steelmaking process $EF_{lime,y}$	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 3: Industrial Processes and Product Use Chapter 2: Mineral Industry Emissions, page 2.22, table 2.4.	tCO_2/tonne	0.770
Baseline emission factor for oxygen consumption during the steelmaking process $EF_{oxygen,y}$	Data from the "Electrostal" Ltd. were fixed in Annex 2 of determined PDD and Equation 4 in this document.	tCO_2/1000 m^3	1.445

** the latest available value is used for 2011 and 2012 years in this monitoring report*

[3] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

Table 4: Fixed parameters

Emission factor for electrodes consumption during the steelmaking process was calculated by following approach:

$$EF_{electrodes,y} = CC_{electrodes,y} \times {}^{44}/_{12},$$ (Equation 1)

where:

$CC_{electrodes,y}$ - carbon content in the electrodes, kg C/kg. This parameter is equal to 0.82 in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3 Industrial Processes and Product Use, Chapter 4 Metal Industry Emission, page 4.27, table 4.3;

44/12 – ratio of molecular weights of CO_2 and carbon (describes the process of oxidation (combustion) of the electrodes).

Having this, Emission factor for electrodes consumption during the steelmaking process is equal to 3.007 tCO_2/t.

Emission factor for natural gas consumption during the steelmaking process was calculated by following approach:

$$EF_{NG,y} = \frac{EF_{NG,IPCC,y} \times NCV_{NG,default} \times 4.187}{10^9},$$ (Equation 2)

where:

$EF_{NG,IPCC,y}$ – default emission factor for natural gas combustion, $kgCO_2/TJ$. This parameter is equal to 56100 $kgCO_2$/ TJ in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction (table 1.4, page 24);

$NCV_{NG,default}$ – NCV for natural gas. The value equal to 8000 kcal/m^3 is used at "Electrostal" Ltd. and many others as a default value[4].

4.187 – transition coefficient. 1 kcal = 4.187 kJ.

1000000 – transition coefficient to obtain resulting figure in $tCO_2/1000\ m^3$

Having this, Emission factor for natural gas combustion during the steelmaking process is equal to 1.189 $tCO_2/1000\ m^3$.

Emission factor for anthracite consumption during the steelmaking process was calculated by following approach:

$$EF_{antracite,y} = \frac{EF_{anthracite,IPCC,y} \times NCV_{anthracite,y}}{10^9},$$ (Equation 3)

where:

$EF_{anthracite,IPCC,y}$ – default emission factor for anthracite combustion, $kgCO_2/TJ$. This parameter is equal to 98 300 $kgCO_2/TJ$ in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction (table 1.4, page 1.23);

$NCV_{antracite,y}$ – NCV for anthracite. This parameter is equal to 23 865 kJ/kg in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction (table 1.1, page 1.14);

10^9 – transition coefficient to obtain resulting figure in tCO_2/t

Having this, Emission factor for anthracite consumption during the steelmaking process is equal to 2.346 tCO_2/t.

[4] http://www.complexdoc.ru/ntdtext/536274/6

Emission factor for lime consumption during the steelmaking process is based on value for dolomitic lime, in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Chapter 3, Table 2.4.

Emission factor for oxygen consumption during the steelmaking process was calculated by following approach:

$$EF_{oxygen,y} = \frac{G_{electricity_{oxygen,y}}}{G_{oxygen,y}} \times 10^3 \times EF_{electricity,y}, \qquad \text{(Equation 4)}$$

where:

$G_{electricity\_oxygen,y}$ - fixed amount of electricity consumed by oxygen plant in 2009 was equal to 22 760 MWh.

$G_{oxygen,y}$ – fixed usage of oxygen for technological needs at Electrostal in 2009 was equal to 17 170 000 m^3.

$EF_{electricity,y}$ - Baseline emission factor for electricity consumption during the steelmaking process (equal to the indirect specific carbon dioxide emissions from electricity consumption by the 1^{st} class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 #1052).

Having this, Emission factor for oxygen consumption during the steelmaking process is equal to 1.445 $tCO_2/1000\ m^3$.

B.2.2. List of variables:

Variable	Source	Units	Calculation method	Meters used (as per B.1.2)
$Steel_{PL}$ Amount of steel produced under the project	Meters readings from Technical reports	t	This value obtained by direct measurement of weight of steel that going to be delivered to client	1, 2
$G_{electrodes\_EAF,y}$ Electrodes consumption	Meters readings from Technical reports	t	This value obtained by direct measurement of weight of electrodes that consumed by the plant	1, 2
$G_{oxygen,y}$ Oxygen consumption	Meters readings from Technical reports	1000 m^3	This value obtained by direct measurement of oxygen volume consumed by the plant	4
$G_{electricity\_EAF+LF,y}$ Electricity consumption	Meters readings from Delivery-Acceptance Acts	MWh	This value obtained by direct measurement of electricity amount consumed by EAF and LF	5
$G_{NG,y}$ Natural gas consumption	Meters readings from Technical reports	1000 m^3	This value obtained by direct measurement of natural gas volume consumed by the plant	3
$G_{antracite,y}$	Meters readings from	t	This value obtained by direct measurement of weight	6, 7

Anthracite consumption	Technical reports		of anthracite consumed by the plant	
$G_{lime,y}$ Lime consumption	Meters readings from Technical reports	t	This value obtained by direct measurement of weight of lime that going to be delivered to the plant	6, 7
$G_{electrodes\_LF,y}$ Electrodes consumption by ladle furnace	Meters readings from Technical reports	t	This value obtained by direct measurement of weight of electrodes consumed by the plant	1, 2
$Steel_{BL}$ Amount of steel produced under the baseline	Calculation	t	This data based on level of steel produced under the project scenario	1, 2

Table 5: Monitored variables

B.2.3. Data concerning GHG emissions by sources of the project activity:

Variable	Description	Units	Values
			01/08/2011 – 31/07/2012
$Steel_{PL}$	Amount of steel produced under the project	t	488 712.407
$G_{electrodes\_EAF,y}$	Electrodes consumption	t	882.183
$G_{oxygen,y}$	Oxygen consumption	1000 m^3	18 045.298
$G_{electricity\_EAF+LF,y}$	Electricity consumption	MWh	234 799.810
$G_{NG,y}$	Natural gas consumption	1000 m^3	5 558.594
$G_{antracite,y}$	Anthracite consumption	t	7 160.29
$G_{lime,y}$	Lime consumption	t	30 951.107
$G_{electrodes\_LF,y}$	Electrodes consumption by ladle furnace	t	203.21

Table 6: Data that were collected in the monitoring of GHG emissions by sources of the project activity

B.2.4.Data concerning GHG emissions by sources of the baseline:

Variable	Description	Units	Values
			01/08/2011 – 31/07/2012
$Steel_{BL}$	Amount of steel produced under the baseline	t	488 712.407

Table 7: Data that were collected in the monitoring of GHG emissions by sources of the baseline

B.2.5.Data concerning leakage:

Not applicable

B.2.6.Data concerning environmental impacts:

According to calculations made in EIA made for this project, emissions of air pollutants were considered as insignificant.

Management of the plant are very serious considering the environment. The most modern gas cleaning system was installed for exhausted gases treatment. Permit the emission of harmful substances into the atmosphere #1413845600-3 was issued 08 December 2008 and is valid until 08 December 2013. As a reporting form for air pollutants issued into the atmosphere, official statistic form 2-TP Air uses.
Due to the modern water recycling system existence and functioning in the plant, no discharge of sewage waters exists.

Proposed project also create some additional negative effects, such as noise and vibration. These effects can negatively influence working conditions of the staff. To investigate this influence the district sanitation and epidemiological service makes the measurements in half-year frequency. As a result of these measurements the working condition cards for relevant workplaces are issue. If some parameters exceed the nominal permitted level, it is required to use means of individual protection by staff.

B.3. Special event log:

No special events have taken place during the current monitoring period.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

Roles and responsibilities of the technical staff in the framework of this monitoring report are the following:

Name	Position	Roles and responsibilities
Serov O.I.	Head of technical department	Preparation of the monthly technical reports (summary)
Hrapun V.S.	Deputy head of the Plant for electric equipment	Providing the Delivery-Acceptance Acts from the energy supplier company concerning electricity consumed by EAF and LF
Tolmachev S.D.	Senior EAF and LF shop foreman	Preparation of the EAF and LF shop technical reports
Dmitrenko V.F.	Head of energy department of the Plant	Preparation of the energy department technical reports (data for oxygen and natural gas consumption)
Bondar S.V.	Senior shipping yard foreman	Preparation of the shipping yard technical reports
Frolenkova N.P.	Acting head of central laboratory of the enterprise (ecologist)	Environmental impact data registration
Frolov N. A.	Metrology engineer	Ensuring of the metrological check of all monitoring equipment

Table 8: Roles and responsibilities

C.1.2. Trainings:

Existing staff was used for working in the turbine workshop after the relevant education provided in case of lack of qualification. Education was provided by "Electrostal" Ltd., equipment producers and specialized organizations.

C.2. Involvement of Third Parties:

"Electrostal" Ltd. has the own license which allows providing education on working specialties concerning iron and steel works. Therefore involvement of third parties not needed.

C.3. Internal audits and control measures:

Data relevant to the emission reduction calculation are daily registering in the log books. During the operation, there are minor variations in its level. Therefore, any measurement error can be easily identified, in case of getting values that significantly differ from the common (in case of equal conditions).

C.4. Troubleshooting procedures:

In case of failure of any equipment which leads to impossibility to exploit equipment and produce steel, the production line will be stopped until the malfunction is fixed. The production line is operating under control of modern automatic systems. Any variation in raw material consumption level or steel production level will be registered by relevant meters.

If the main metering device fails, and there is no reserve metering device available, the monitoring report will use indirect data and evidence, but only if their applicability (data and evidence) is justifiably proven. Likely, a conservative approach will be used.

SECTION D. Calculation of GHG emission reductions

D.1. Tables of formulas used:

Formula number from PDD	Formula	Formula description
(D.1.1)	$PE_y = PE_1 + PE_2 + PE_3 + PE_4 + PE_5 + PE_6$	Total project emissions calculation
(D.1.2)	$PE_{electrodes,y} = (G_{electrodes\_EAF,y} + G_{electrodes\_LF,y}) \times EF_{electrodes,y}$	Calculation of project emissions due to electrodes consumption
(D.1.3)	$PE_{oxygen,y} = G_{oxygen,y} \times EF_{oxygen,y}$	Calculation of project emissions due to oxygen consumption
(D.1.4)	$PE_{electricity,y} = G_{electricity_{EAF+LF,y}} \times EF_{electricity,y}$	Calculation of project emissions due to electricity consumption
(D.1.5)	$PE_{NG,y} = G_{NG,y} \times EF_{NG,y}$	Calculation of project emissions due to natural gas consumption
(D.1.6)	$PE_{antracite,y} = G_{antracite,y} \times EF_{antracite,y}$	Calculation of project emissions due to anthracite consumption
(D.1.7)	$PE_{lime,y} = G_{lime,y} \times EF_{lime,y}$	Calculation of project emissions due to lime consumption
(D.1.8)	$BE_y = Steel_{BL} \times GlEF_{Bl,steel}$	Total baseline emissions calculation
(D.1.9)	$Steel_{BL} = Steel_{PL}$	Baseline level of steel production calculation
(D.1.12)	$ER_y = BE_y - PE_y$	Calculation of emission reductions

Table 9: Calculation formulas

D.2. Description and justification of the uncertainties of measurements:

Accuracy index of all meters used allows making measurements with sufficient level of uncertainty (please see Table B.1.2.). Metrological check of all monitoring equipment in regular base allows to assure high quality of measurements. Therefore, measurement uncertainties are insignificant.

D.3. GHG emissions reduction (in accordance with Section B.2 of this document):

D.3.1. Project GHG emissions:

Project emissions one the sum of the GHG emissions values listed above can be considered.

$$PE_y = PE_1 + PE_2 + PE_3 + PE_4 + PE_5 + PE_6$$ (Formula number from PDD D.1.1)

$PE_1 - PE_6$ - GHG emissions relevant to the sources listed above, tCO_2e.

The value of each emission under the project scenario can be found by multiplying amount/volume of «pollutant» on relevant emission factor:

$$PE_{electrodes,y} = (G_{electrodes\_EAF,y} + G_{electrodes\_LF,y}) \times EF_{electrodes,y}$$ (Formula number from PDD D.1.2)

$$PE_{oxygen,y} = G_{oxygen,y} \times EF_{oxygen,y}$$ (Formula number from PDD D.1.3)

$$PE_{electricity,y} = G_{electricity_{EAF+LF,y}} \times EF_{electricity,y}$$ (Formula number from PDD D.1.4)

$$PE_{NG,y} = G_{NG,y} \times EF_{NG,y}$$ (Formula number from PDD D.1.5)

$$PE_{antracite,y} = G_{antracite,y} \times EF_{antracite,y}$$ (Formula number from PDD D.1.6)

$$PE_{lime,y} = G_{lime,y} \times EF_{lime,y}$$ (Formula number from PDD D.1.7)

Where,

$PE_{i,y}$- project GHG emissions for relevant source *i* for year *y*, tCO_2e.
$G_{i,y}$ - amount/volume of each source *i* for year *y*. These data are the monitoring parameters (units are different; please see Table D.1.1.1 for details).
$EF_{i,y}$ - factor of emission for each source *i* for year *y*, tCO_2/amount or tCO_2/volume (units are different; please see Table D.3.1 below for details).

	01/08/2011 – 31/07/2012
Project GHG emissions, tCO_2e	336 343

Table 10: Project GHG emissions

D.3.2. Baseline GHG emissions:

GHG emissions in the baseline scenario can be found by the following formula:

$$BE_y = Steel_{BL} \times GlEF_{Bl,steel}, \text{ where}$$ (Formula number from PDD D.1.8)

$Steel_{BL}$ - Amount of steel produced under the baseline, t

$GlEF_{Bl,steel}$ - Global emission factor for steel production, tCO_2 /t steel. $GlEF_{Bl,steel}$= 1.543 tCO_2/t steel in accordance with registered PDD (Annex 3, Key elements for the monitoring plan, page 50. Please follow the link for more information:http://www.neia.gov.ua/nature/doccatalog/document?id=117623).

In accordance with approach chosen, steel production levels for baseline and for the project scenario are the same, therefore:

$$Steel_{BL} = Steel_{PL}$$ (Formula number from PDD D.1.9)

	01/08/2011 – 31/07/2012
Baseline GHG emissions, tCO_2e	754 083

Table 11: Baseline GHG emissions

D.3.3. Leakage:

In accordance with the PDD no leakages are envisages.

	01/08/2011 – 31/07/2012
Leakages, tCO_2e	0

Table 12: Leakages

D.3.4. Summary of the GHG emissions reductions during the monitoring period:

The annual GHG emissions reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$ (Formula number from PDD D.1.12)

ER_y - The annual GHG emissions reductions, tCO_2e;

BE_y - Baseline GHG emissions in the year *y*, tCO_2e;

PE_y - Project GHG emissions in the year *y*, tCO_2e;

	01/08/2011 – 31/07/2012
Baseline GHG emissions, tCO_2e	754 083
Project GHG emissions, tCO_2e	336 343
Leakages, tCO_2e	0
GHG emission reductions, tCO_2e	417 740

Table 13: GHG emission reductions

Annex 1

Definitions and acronyms

CH_4	METHANE
CO_2	CARBON DIOXIDE
GWP	GLOBAL WARMING POTENTIAL
IPCC	INTERGOVERMENTAL PANEL ON CLIMATE CHANGE
PDD	PROJECT DESIGN DOCUMENT
CDM	CLEAN DEVELOPMENT MECHANISM
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE
CD	COMPACT DISC
IPCC	INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE
EAF	ELECTRIC ARC FURNACE
LF	LADLE FURNACE
GDS	GAS DISTRIBUTION SUBSTATION

Definitions

Baseline The scenario that reasonably represents what would have happened to greenhouse gases in the absence of the proposed project, and covers emissions from all gases, sectors and source categories listed in Annex A of the Protocol and anthropogenic Removals by sinks, within the project boundary.

Emissions reductions Emissions reductions generated by a JI project that have not undergone a verification or determination process as specified under the JI guidelines, but are contracted for purchase.

Global Warming Potential (GWP) An index that compares the ability of greenhouse gases to absorb heat in the atmosphere in comparison to carbon dioxide. The index was established by the Intergovernmental Panel of Climate Change.

Greenhouse gas (GHG) A gas that contributes to climate change. The greenhouse gases included in the Kyoto Protocol are: carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorcarbons (HFCs), Perfluorcarbons (PFCs) and Sulphurhexafluoride (SF6).

Joint Implementation (JI) Mechanism established under Article 6 of the Kyoto Protocol. JI provides Annex I countries or their companies the ability to jointly implement greenhouse gas emissions reduction or sequestration projects that generate Emissions Reduction Units.

Monitoring plan Plan describing how monitoring of emission reductions will be undertaken. The monitoring plan forms a part of the Project Design Document (PDD).