SECOND PERIODIC ANNUAL JI MONITORING REPORT

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SECTION A. General Project activity information

A.1 Title of the project activity:

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

Sectoral scope: 9 (Metal Production)

Date: 19 April 2011

Version: 2.0

A.2. JI registration number:

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:

01.06.2010 – 28.02.2011

A.5. Methodology applied to the project activity (incl. Version number):

For the emission reduction calculation and monitoring, the project developer proposes to use a JI specific approach in accordance with the JI Guidance on Criteria for Baseline Setting and Monitoring, Version 02[2]. No approved CDM methodologies are used.

A.5.1. Baseline methodology:

The baseline scenario has been identified as the most plausible scenario among all realistic and credible alternatives.

The main assumption of the proposed method for estimation the baseline emission is that steel production levels for baseline and for the project scenario are the same. Therefore baseline emissions can be calculated based on the project amount of steel produced and emission factor relevant to the technology (set of technologies) that was considered as a baseline.

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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.

[2] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

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It was assumed that without the project implementation the same volume of billets would be produced by other metallurgical plants in Ukraine. The metallurgical market in Ukraine is very flexible in a sense that plants are not working on full load and hence it is easily possible to have all Electrostal production produced by other plants.

Therefore emission factor for the common practice in Ukraine concerning steel production have to be chosen. In the methodology used it is envisage using global emission factor for metallurgical sector in Ukraine based on the following:

- emissions factors relevant to the main technologies in the Ukrainian market
- share of these technologies;

Historically, three types of technologies are in use in the Ukraine: Basic Oxygen Furnace (BOF), Electric Arc Furnace (EAF) and Open Hearth Furnace (OHF).

World Steel Statistical Yearbook 2008[3] describes share of metallurgical methods for Ukrainian market as follows:
BOF 51.7%; EAF 3.7%; OHF 44.6%

Therefore, global emission factor for steel production can be found, using the following formula:

$$GlEF_{Bl,steel} = EF_{BOF} \times \omega_{BOF} + EF_{EAF} \times \omega_{EAF} + EF_{OHF} \times \omega_{OHF}, \text{ where}$$

EF_{BOF} – emission factor for steel making process based on basic oxygen furnaces, t CO_2 /t steel

EF_{EAF} – emission factor for steel making process based on electric arc furnaces, t CO_2 /t steel

EF_{OHF} – emission factor for steel making process based on open hearth furnaces, t CO_2 /t steel
ω_{BOF} , ω_{EAF}, ω_{OHF} – Share of relevant technology in the market, %

For the baseline scenario there are no national sectoral emission factors that have been developed. Therefore, IPCC[4] (Volume 3 "Metal Industry") emission factors should be used. Emission factor for Electric Arc Furnace is calculated in accordance with the project data for raw material consumption and steel production level. This approach has the following advantages:

- Project equipment is one of the most modern technologies in the world, that is conservative;
- Project equipment uses metal scrap instead of iron, which is conservative.

[3] http://www.worldsteel.org/index.php?action=publicationdetail&id=81

[4] 2006 IPCC Guidelines for National Greenhouse Gas Inventories

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A.5.2. Monitoring methodology:

Approach used for calculation of emission reduction can be explained as follows. All source of feed-stock consumed due to steelmaking can be considered as a "pollutant". Emission level of this source can be estimated with help of relevant emission factor. Thus, the emission factor relevant for EAF steelmaking process will be obtained. Emission level for project condition will be compared to emission level under the baseline, using the following data:

- Emission factors for different processes and technologies in Ukraine;
- Dispersion of these technologies;

Main assumptions which have been made for baseline emissions calculation:

- Amount of steel produced under the baseline is equal to amount of steel produced under the project activity.

- In case of absence of the project, all products, similar to ones produced under the project activity, would be produced by other enterprises in Ukraine, which used different technologies. The ratio of these technologies is based on real historical data.

- As an electricity source, technological electricity consumption for EAF and LF was used.

- In case of unavailability of national sectoral emission factors, 2006 IPCC Guidelines for National Greenhouse Gas Inventories emission factors have to be used as the default.

The following sources of emissions can be observed during the EAF operation:

1. Electrodes consumption by EAF
2. Oxygen consumption
3. Electricity consumption by EAF and LF
4. Natural gas consumption
5. Anthracite consumption (includes all anthracite sources)
6. Lime consumption (includes lime, magnesite and dolomite sources)
7. Electrodes consumption by LF

Taking into account the information given above, the monitoring plan should include the following positions:

- Amount of steel produced under the project activity
- Electrodes consumption by EAF
- Oxygen consumption
- Electricity consumption by EAF and LF
- Natural gas consumption
- Anthracite consumption (includes all anthracite sources)
- Lime consumption (includes lime, magnesite and dolomite sources)
- Electrodes consumption by LF

It has to be noted that all metal feedstock (including pig iron) used as the main source for steelmaking process comes from metal scrap. This allows considering this feedstock as climate neutral.

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

As it was planned, the first melting was finished at 2 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.

Activity	Date in accordance with PDD	Actual date	Notes
Starting date of the project	27 February 2006	27 February 2006	Minutes #10/1 of the total collections of participants of "Electrostal" Ltd.
First melting	2 March 2008	2 March 2008	
Start date of monitoring period	-	1 April 2008	First technical report covers period 1.04.2008-31.12.2008 Second technical report covers period 1.01.2010-28.02.2011
Official commissioning	-	16 December 2008	

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

There are no deviations or revisions to the determined PDD

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.

- Lennard de Klerk, Director

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SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4.

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 after CCM, 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. Technical reports of the shipping yard are preparing on the basis of these data.

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

2. **Electrodes consumption.**

   This parameter is metered in different places in the steel production chain with different meters. For monitoring purpose data from the electrodes life logbook will be used. In this 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. 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.

   Technical department prepares technical reports based on the data from electrodes life logbook in monthly order. These reports are the main source of data for monitoring report.

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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[5]. 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 report preparation by specialists of technical department of the plant.

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 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 LLC Electrostal. These acts are the basis for payments. Data concerning electricity consumption by EAF and LF are included in these acts under the "T1-110/35 kV" code for period 06-12.2010 and "Tr № 1" code for period 01-02.2011.

Mentioned acts 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 "Flowtek" 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 LLC "Electrostal". 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 Delivery-Acceptance Acts from "Donbastransgas" to LLC "Electrostal" are used, as well as technical reports from energy department.

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

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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. Technical reports of the EAF and LF department are preparing in monthly base.

Technical department prepares technical reports based on these reports in monthly order. These 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.

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. Technical reports of the EAF and LF department are preparing in monthly base.

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

8. **Electrodes consumption by ladle furnace (LF).**

This parameter is metered in different places in the steel production chain with different meters. For monitoring purpose data from the electrodes life logbook will be used. In this 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. 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.

Technical department prepares technical reports based on the data from electrodes life logbook in monthly order. These 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 "Flowtech";
4. Oxygen flow rate meter "Optimass 8000"
5. Electricity meters "Alpha A1140"
6. Hopper weigher "BCS M584";
7. Floor scales 4BDU 1500 (1212)

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B.1.2. Table providing information on the equipment used (incl. manufacturer, type, serial number, date of installation, date of last calibration, information to specific uncertainty, need for changes and replacements):

Meter ID number	Parameter name	Units	Meter name	Serial number	Accuracy index	Date of installation	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	2008	June 2009	June 2010
2	Railway truck scales for metering income and outcome of feedstock and steel produced	t	VVET-150	061202763	50 kg	2008	June 2010	June 2011
3	Metering system for natural gas consumption by the plant	m^3	Flowtech	3060147	0.5%	2008	April 2009	12.11.2011
4	Flow rate meter for oxygen consumption by the plant	m^3	Optimass 8000	G070000006200029 DN40	0.11%	2008	03.01.2011	January 2013
5	Electricity consumption by EAF and LF	kWh	Alpha A1140	01144644	0.2	2006	September 2006	September 2014
6	Hopper weigher	kg	BCS M584	07 M174	4 [6]	2007[7]	05.08.2010	05.08.2011
7	Floor scales	kg	4BDU 1500 (1212)	73642	1%	2007	28.01.2011	29.01.2012

[6] Official class index is 4. Minimum sensitivity of the device is 2 kg. Therefore at maximum load equal to 2000 kg, possible uncertainty will be 0.1%

[7] No passport for this devise exists, because this weigher is the part of the whole steelmaking complex. As an indirect installation date 2007 year where all complex was installed can be used.

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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	The body responsible to calibration and certification
Maximum calibration interval for the Motor-truck scales is equal to 1 year	Derzhspozhivstandart of Ukraine
Maximum calibration interval for the Railway truck scales is equal to 1 year	Derzhspozhivstandart of Ukraine
Maximum calibration interval for the Flowtech is equal to 2 years	Derzhspozhivstandart of Ukraine
Maximum calibration interval for the Optimass 8000 is equal to 2 years	Derzhspozhivstandart of Ukraine
Maximum calibration interval for the Alpha A1140 meter is equal to 16 years	Derzhspozhivstandart of Ukraine
Maximum calibration interval for the hopper weigher is equal to 1 year	Derzhspozhivstandart of Ukraine
Maximum calibration interval for the floor scales is equal to 3 years	Derzhspozhivstandart of Ukraine

B.1.4. Involvement of Third Parties:

Checking and calibration of meters is under control of territorial state authority Derzhspozhivstandart 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:

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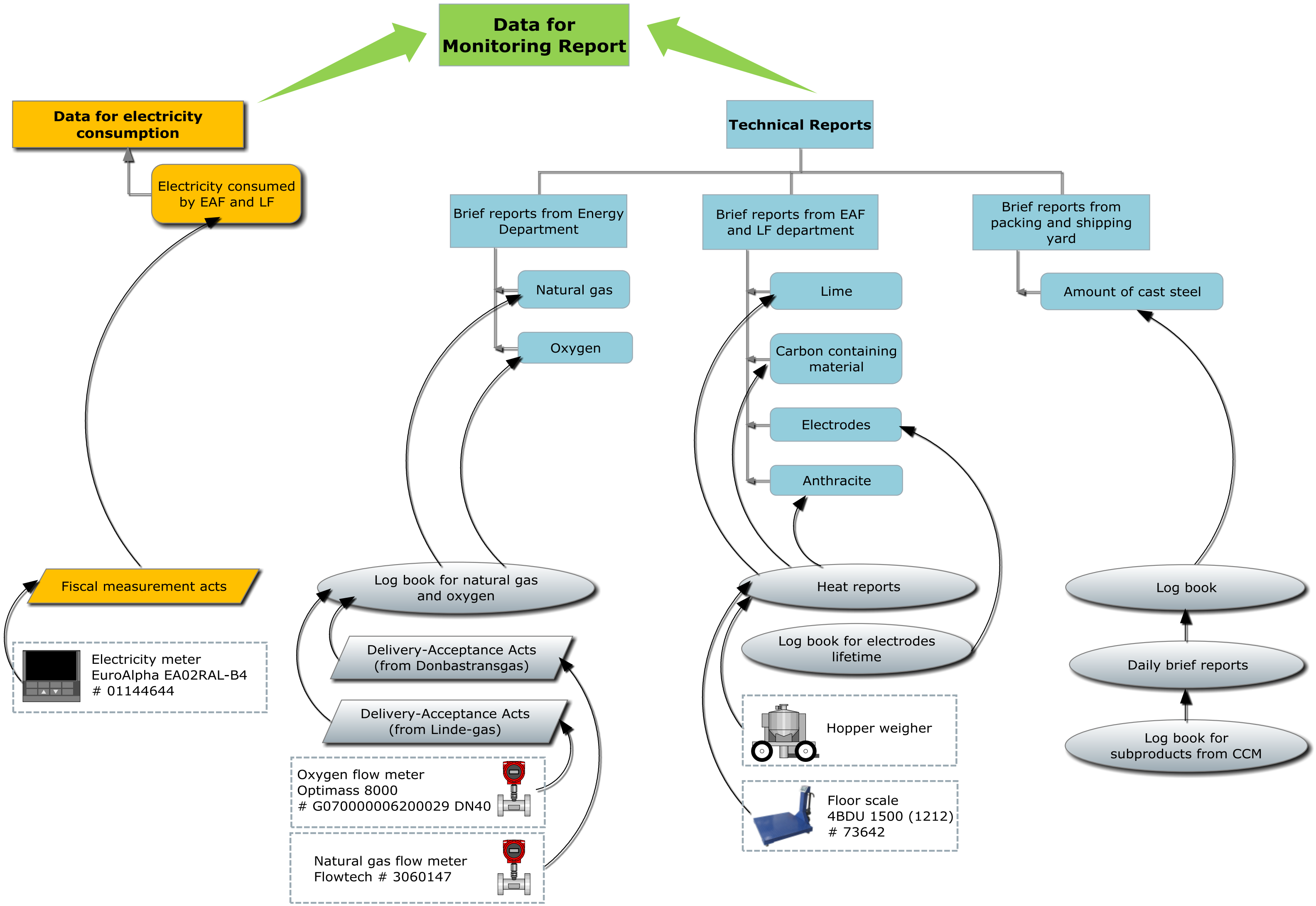
Data for Monitoring Report
Data for electricity consumption
Electricity consumed by EAF and LF
Fiscal measurement acts
Electricity meter EuroAlpha EA02RAL-B4 # 01144644
Technical Reports
Brief reports from Energy Department
Natural gas
Oxygen
Log book for natural gas and oxygen
Delivery-Acceptance Acts (from Donbastransgas)
Delivery-Acceptance Acts (from Linde-gas)
Oxygen flow meter Optimass 8000 # G070000006200029 DN40
Natural gas flow meter Flowtech # 3060147
Brief reports from EAF and LF department
Lime
Carbon containing material
Electrodes
Anthracite
Heat reports
Log book for electrodes lifetime
Hopper weigher
Floor scale 4BDU 1500 (1212) # 73642
Brief reports from packing and shipping yard
Amount of cast steel
Log book
Daily brief reports
Log book for subproducts from CCM

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

Variable	Source	Units	Value
Global baseline emission factor for steel produced $GlEF_{Bl,steel}$	This value was calculated using the formula 1.1 in Annex 2, 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, Chapter 4, Metal Industry Emission (table 4.3, page 27);	tCO_2/tonne	3.007
Baseline emission factor for electricity consumption during the steelmaking process (emission factor for JI project which reduce electricity consumption from the grid) $EF_{electricity,y}$	"Standardized emission factors for the Ukrainian electricity grid" research (please find in Annex 2), made by Global Carbon and positively determined by TÜV SÜD	tCO_2/MWh	0.896
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 (table 1.4, page 24)	$tCO_2/1000\ m^3$	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 (table 1.4, page 23 and table 1.2, page 18)	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. Chapter 3, Table 2.4. Value for dolomitic lime for developing countries.	tCO_2/tonne	0.770
Baseline emission factor for oxygen consumption during the steelmaking process $EF_{oxygen,y}$	This value was calculated based on data from the Electrostal plant concerning electricity transferring level for oxygen production.	$tCO_2/1000\ m^3$	1.188

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

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$EF_{electrodes,y} = CC_{electrodes,y} \times {}^{44}/_{12}$, 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, Chapter 4, Metal Industry Emission (table 4.3, page 27);
44/12 – ratio of molecular weights of CO2 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 t CO2/t.

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

$EF_{NG,y} = \frac{EF_{NG,IPCC,y} \times NCV_{NG,default} \times 4.187}{1000000}$, where:

$EF_{NG,IPCC,y}$ – default emission factor for natural gas combustion, kg CO2/TJ. This parameter is equal to 56100 or 56.1 kg CO2/ GJ 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/m3 is used at Electrostal plant and many others as a default value.
4.187 – transition coefficient. 1 kcal = 4.187 kJ.
1000000 – transition coefficient to obtain resulting figure in tCO2/1000 m3

Having this, Emission factor for natural gas combustion during the steelmaking process is equal to 1.189 t CO2/1000 m3.

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

$EF_{antracite,y} = \frac{EF_{anthracite,IPCC,y} \times NCV_{anthracite,y}}{10^9}$, where:
$EF_{anthracite,IPCC,y}$ – default emission factor for anthracite combustion, kg CO2/TJ. This parameter is equal to 98 300 kg CO2/TJ in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction (table 1.4, page 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 1.2, page 18);
10^9 – transition coefficient to obtain resulting figure in tCO2/t

Having this, Emission factor for anthracite consumption during the steelmaking process is equal to 2.346 t CO2/t.

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

B.2.2. List of variables:

Variable	Source	Units	Calculation method	ID number of meters used (in accordance with Table B.1.2)
$Steel_{PL}$ Amount of steel produced under the project	Meters readings	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	t	This value obtained by direct measurement of weight of electrodes that going to be delivered to the plant	1, 2
$G_{oxygen,y}$ Oxygen consumption	Meters readings	th. m3	This value obtained by direct measurement of oxygen volume consumed by the plant	4
$G_{electricity\_EAF+LF,y}$ Electricity consumption	Meters readings	MWh	This value obtained by direct measurement of electricity amount consumed by EAF and LF	5
$G_{NG,y}$ Natural gas consumption	Meters readings	th. m3	This value obtained by direct measurement of natural gas volume consumed by the plant	3
$G_{antracite,y}$ Anthracite consumption	Meters readings	t	This value obtained by direct measurement of weight of electrodes that going to be delivered to the plant	6, 7
$G_{lime,y}$ Lime consumption	Meters readings	t	This value obtained by direct measurement of weight of electrodes that going to be delivered to the plant	6, 7
$G_{electrodes\_LF,y}$ Electrodes consumption by ladle furnace	Meters readings	t	This value obtained by direct measurement of weight of electrodes that going to be delivered to 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

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

Variable	Description	Units	Values
			01.06.2010 – 28.02.2011
$Steel_{PL}$	Amount of steel produced under the project	t	**315,168.50**
$G_{electrodes\_EAF,y}$	Electrodes consumption	t	**616.83**
$G_{oxygen,y}$	Oxygen consumption	th. m3	**12,373.84**
$G_{electricity\_EAF+LF,y}$	Electricity consumption	MWh	**147,443.03**
$G_{NG,y}$	Natural gas consumption	th. m3	**4,030.89**
$G_{antracite,y}$	Anthracite consumption	t	**6,332.63**
$G_{lime,y}$	Lime consumption	t	**17,718.64**
$G_{electrodes\_LF,y}$	Electrodes consumption by ladle furnace (LF)	t	**181.49**

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

Variable	Description	Units	Values
			01.06.2010 – 28.02.2011
$Steel_{BL}$	Amount of steel produced under the baseline	t	**315,168.50**

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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 8 December 2008 and is valid until 8 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 (SES) 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.

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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)
Fainkukhin L.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

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” plant, equipment producers and specialized organizations.

C.2. Involvement of Third Parties:

Electrostal” Ltd has the own license[8] which allows providing education on working specialties concerning iron and steel works. Therefore involvement of third parties not needed.

[8] License of Ministry of Education and Science of Ukraine No 363304

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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 works 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.

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SECTION D. Calculation of GHG emission reductions

D.1. Tables of formulas used:

Formula number from PDD	**Formula**	**Formula description**
(D.1.1)	$PE_y = PE_1 + PE_2 + \cdots + PE_6$	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)	$ER_y = BE_y - PE_y - LE_y$	Calculation of emission reductions

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 emissions:

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

$$PE_y = PE_1 + PE_2 + \cdots + PE_6, \text{ where} \quad \text{(Equation 1)}$$

$PE_1 - PE_6$ - Emissions relevant to the sources listed above, t $CO_{2\ eq}$.

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

$$PE_{electrodes,y} = (G_{electrodes\_EAF,y} + G_{electrodes\_LF,y}) \times EF_{electrodes,y} \quad \text{(Equation 2)}$$

$$PE_{oxygen,y} = G_{oxygen,y} \times EF_{oxygen,y} \quad \text{(Equation 3)}$$

$$PE_{electricity,y} = G_{electricity_{EAF+LF,y}} \times EF_{electricity,y} \quad \text{(Equation 4)}$$

$$PE_{NG,y} = G_{NG,y} \times EF_{NG,y} \quad \text{(Equation 5)}$$

$$PE_{antracite,y} = G_{antracite,y} \times EF_{antracite,y} \quad \text{(Equation 6)}$$

$$PE_{lime,y} = G_{lime,y} \times EF_{lime,y} \quad \text{(Equation 7)}$$

Where,

$PE_{i,y}$- project emissions for relevant source *i* for year *y*, t $CO_{2\ eq}$.
$G_{i,y}$ - 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*, t CO_2/amount (units are different; please see Table D.3.1 below for details).

	01.06.2010 – 28.02.2011
Project emissions, t CO2	185,280

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D.3.2. Baseline emissions:

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

$$BE_y = Steel_{BL} \times GlEF_{Bl,steel}, \text{ where} \qquad \text{(Equation 8)}$$

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

$GlEF_{Bl,steel}$ - Global emission factor for steel production, t CO_2 /t steel. $GlEF_{Bl,steel}$= 1.543 t CO_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:

$$Steel_{BL} = Steel_{PL} \qquad \text{(Equation 9)}$$

	01.06.2010 – 28.02.2011
Baseline emissions, t CO2	486,323

D.3.3. Leakage:

In accordance with the PDD no leakages are envisages.

	01.06.2010 – 28.02.2011
Leakages, t CO_2	0

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

The annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \ ,$$ (Equation 10)

ER_y - The annual emission reductions, t CO_2 eq.;

BE_y - Baseline emissions in the year *y*, t CO_2 eq.;

PE_y - Project emissions in the year *y*, t CO_2 eq.;

LE_y - Leakages due to the project realization in the year *y*, t CO_2 eq.

	01.06.2010 – 28.02.2011
Baseline emissions, t CO_2	486 323
Project emissions, t CO_2	185,280
Leakages, t CO_2	0
Emission reductions, t CO_2	301,043
Total during current monitoring period, t CO_2	**301,043**

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