Developed by

Director
Vovchak V.V.

_____
(signature)

(L.S.)

Approved by

Director general
Shevchenko T.G.

_____
(signature)

(L.S.)

Annual monitoring report

4th quarter 2011

JI project

Revamping and Modernization of the Alchevsk Steel Mill, Ukraine

Version 2 dated 29th of March 2012

Track 1 JI Registration Reference UA 1000022

ІНСТИТУТ ПРОБЛЕМ ЕКОЛОГІЇ
ТА ЕНЕРГОЗБЕРЕЖЕННЯ

Table of contents

List of abbreviations

PJSC "AISW" – Public Joint Stock Company "Alchevsk Iron and Steel Works";

JI – Joint Implementation;

Slab Caster – Slab Casting Machine;

LF – Ladle Furnace;

FER – Fuel and Energy Resources;

PDD – Project Design Document.

1. Introduction and project description

The modernization program of Public Joint Stock Company "Alchevsk Iron and Steel Mill" (PJSC "AISW"), which was started in 2004, pursues complex goals: implementation of energy efficient technologies to increase competitiveness of the plant, improvement of ecological impacts, and also expansion of market presence due to increase of manufacture capacity.

The realization of the technical revamping and modernization of the steel manufacturing process, which envisaged displacement old Open-Hearth Furnaces (OHF's) by the complex of oxygen-converter shop with two new LD Converters, was the top priority task of the project. LD Converters are joined together into one cycle with two Slab Casters, with Ladle-Furnace (LF) and Vacuumator (VD Plant), which together displace the Blooming Mills. From the beginning it was envisaged that the project will be implemented as Joint Implementation (JI) project under the Kyoto protocol on climate change.

Before the project implementation PJSC "AISW" was using a traditional steel making technology: OHF's, Ingot Casting and Blooming Mills. According to this technology, around 20-21% of produced slabs in cutoff pieces were returned back to the OHF's.

According to the investment plan the project envisages the following basic Phases:

#1 – installation of Slab Caster #1 along with LF;
#2 – installation of Slab Caster #2 along with VD Plant;
#3 – installation of LD Converter #2;
#4 – installation of LD Converter #1;
#5 – reconstruction of Oxygen Plant #4;
#6 – installation of Oxygen Plant #7;
#7 – installation of Oxygen Plant #8.

Phases 5-7 aimed to reconstruction and introduction of Oxygen Plants are indissolubly linked with the operation of main steel facilities (Phases #1-4).

With the project implementation, generally with introduction of new Slab Casters with LF's and VD Plant, only around 3% of steel in cutoff pieces returns back to OHF's or to the LD Converters for recasting. As a result, such a difference between projectline and baseline scenarios leads to economy of pig iron, natural gas and also blast furnace gas, which is then used as the result of project activity, for blast furnace blowing production at the existing power plant. However the project leads to increase of electricity consumption in comparison with the baseline.

In general the JI project leads to reduction of fuel and energy resources (FER) consumption and, therefore, to GHG emission reductions.

2. Project monitoring period and version of the document

The emission reductions, examined in this report, include the period from 01/10/2011 till 31/12/2011.

Version of the document – # 2 dated 29th of March 2012.

3. Current status of the project

Phases #1 and #2 were implemented: Slab Caster #1 was implemented in August 2005 and Slab Caster # 2 – in March 2007.

The implementation of LD Converter #2 (Phase #3) was completed in January 2008 (it had to be finished in the third quarter of 2007). Such a delay was caused by the financial, technical and customs difficulties and also by the delay of equipment supply.

LD Converter #1 was implemented in September 2008 (completion of Phase #4). However then, in about a month, the operation of LD Converter #1 was suspended because of financial and economic crisis. LD Converter #1 was launched again in March 2009.

The reconstruction of Oxygen Plant #4 (Phase #5) was completed on 30th of September 2005 (almost together with Slab Caster #1).

The installation of Oxygen Plant #7 (Phase #6) was completed on 19th of March 2008 (according to the previous plan it should have been completed in the third quarter of 2007). The delay was caused by the same reasons (financial, technical and customs difficulties), which were mentioned for the Phase #3, because Oxygen Plant #7 supplies oxygen for LD Converter #2.

The installation of Oxygen Plant #8 (Phase #7) was completed on 10th of December 2009 (according to the previous plan it should have been completed in the third quarter of 2009). Such a delay was caused by a lack of money for balancing and commissioning of the facility, which was caused by global financial and economic crisis.

Thereby, all basic units, mentioned in Phases of project implementation, were operational in the reporting period.

During reporting monitoring period the level of OHF steel and rolled-formed slabs output (baseline slabs) was decreased. The main volume of slabs was manufactured at Slab Casters #1 and #2. The productivity decrease in the baseline has caused the increase of constant FER consumption data (increase of specific FER per 1 ton of steel output). At the same time, the productivity increase in the projectline (at LD Converters and Slab Casters instead of OHF's) has caused the decrease of specific FER consumption data.

The emission reductions, examined in this monitoring report, were generated during the whole monitoring period. The monitoring was based on actual data (mentioned in the

reporting documents) of output production and FER consumption in projectline and in baseline scenarios and carried out according to the revised monitoring plan that was finally determined in the verification report for the second quarter of 2011.

4. Sustainability – economic and social well-being

The project consists in the increase of energy efficiency, which reduces consumption of FER per 1 ton of steel output and improvement of the environmental safety due to replacing the main technological components by the modern equipment, highly efficient gas cleaning and aspiration facilities, which stops the increase of mass pollution formation due to raise of output. Besides, according to the project almost all new facilities are constructed with the complex of circulating water supply, which leads to reduction of sewage water and harmful substances spillage into the surface basins.

Therefore the realization of JI project leads to significant improvement of environmental and working conditions at the Steel Mill not only because of GHG emission reductions, but also from reduction of harmful substances discharge.

In addition, project implementation leads to increase of payments to the budgets of all levels and, therefore, to increase of inhabitants social well being.

5. Parameters being monitored according to the PDD and the revised monitoring plan

Under the monitoring plan outlined in the PDD (section D.1, paragraph 7), ERUPT emission factors for electricity from the grid are to be used and are to be replaced by national emission factors once they will be available. On May 12, 2011 the Order of the National Environmental Investment Agency of Ukraine (NEIA) № 75[1] regarding approval of specific indicators of carbon dioxide emissions for the year 2011 was issued.

Within project boundaries for the calculation of the amount of CO_2 emissions for electricity from grid the emission factor was used according to the new Order of NEIA for the 1st – class electricity consumers - 1,090 kg CO_2/kWh. The utilization of the emission factor for the 1st-class electricity consumers is justified by the resolution of National Electricity Regulatory Commission of Ukraine № 1052 of 13 August 1998[2], according to the resolution the 1st – class electricity consumers are the consumers, who:

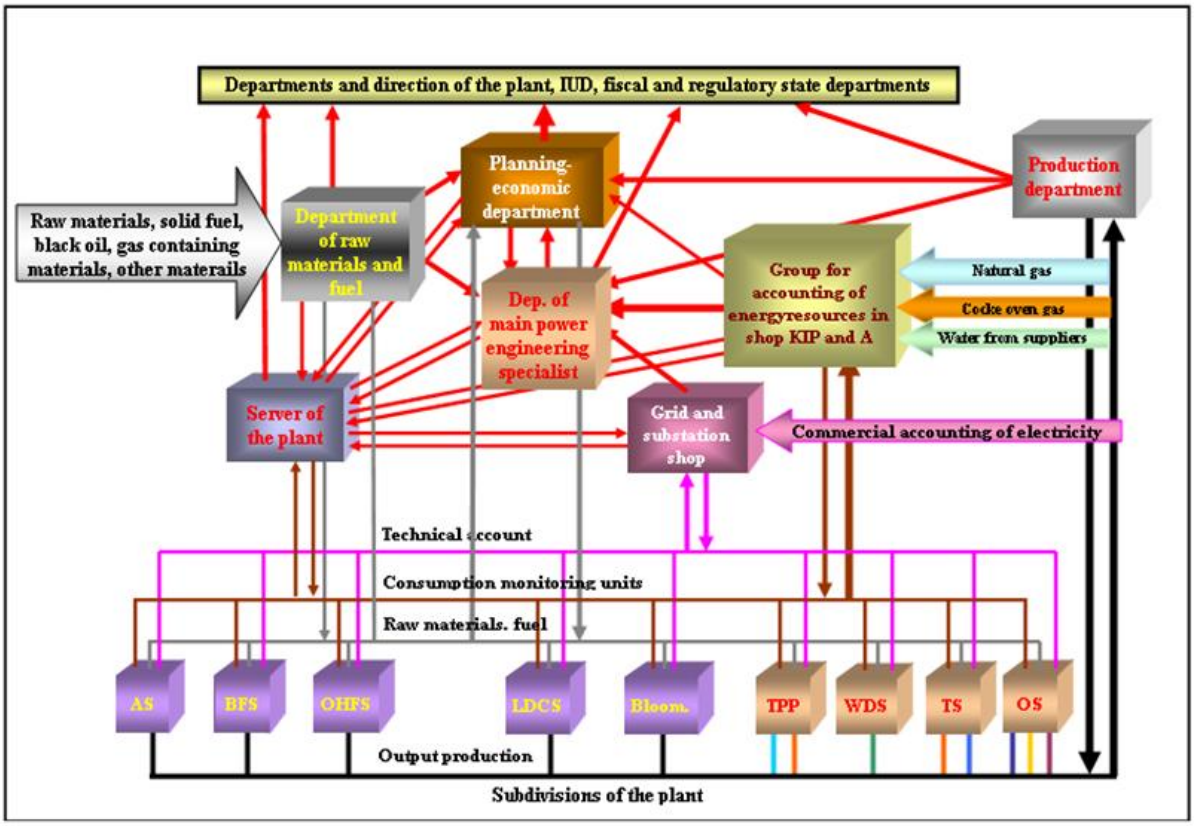
1) receive electricity from electricity supplier at the point of sale of electricity with the degree of voltage 27.5 kV and above;
2) connected to the power rails of power plants (except hydroelectric, which produce electricity periodically), as well as to power rails of substations of the electricity grid with voltage of 220 kV and above, regardless voltage level at the point of sale of electricity by the power supplier to consumer;

[1] http://www.neia.gov.ua/nature/doccatalog/document?id=127498.
[2] http://energetik.org.ua/node/90.

3) is the industrial enterprise with average monthly rate of electricity consumption - 150 million kWh and above for the technological needs of production, regardless of the voltage level at the point of sale of electricity by the power supplier to consumer.

Based on the information stated above, PJSC "AISW" refers to the 1st – class electricity consumers, which can be proven by the agreements on electricity supply to PJSC "AISW", which are stored at the plant.

The Schematic drawing of information preparation and supply system, which are used in this monitoring report, is presented below.



Legend:
AS - agglomeration shop with limestone section; BFC - blast furnace shop; OHFS - open hearth furnace shop; LDCS - LD Convertor shop; Bloom.- blooming; TPP - thermal power plant (blowing production, heat power); WDS - water delivery shop (pump over of technocal and circulating water); TS - thermal shop (compressed air production and secondary heat power); OS - oxygen shop (oxygen, nitrogen, agron production).

The emission factor for natural gas is identified in the following way:

1) Emission factor for natural gas consumption during this monitoring period is based on actual calorific value of natural gas consumed under the project activity. Calorific value of natural gas during this monitoring period is provided below:

- during the fourth quarter of 2011 = 7970 kcal/m^3.

Thus specific values of carbon dioxide emission factors for fuel based on specific carbon content or calorific value of fuel are used for calculation of emission reductions. Emission factors for coke, coal, coal electrodes, lime and dolomite are based on IPCC data due to the fact that national data are not officially approved by the national designating entity.

6. Project line and baseline emissions

Colors that are used in the tables are described below:

Projectline	Baseline
Name of each indicator	Name of each indicator
Volume of FER consumption	Volume of FER consumption
Emission factor for FER	Emission factor for FER
Volume of CO_2 emissions	
Blank cell	

All data, used in this chapter, are based on information, confirmed by PJSC "AISW" documents. This information is available to the verifier, also regarding the interconnection with the baseline and project line tables, presented below.

Baseline

ID Number	Data variable	Units	4th quarter 2011
	Baseline Emissions (BE)	**Tonnes CO_2**	**2 104 495**
B-1	**Total Steel Output (TSO)**	**Tonnes**	642 371
B-2	**Total CO_2 of Pig Iron (TCPI)**	**Tonnes CO_2**	**1 892 943**
B-3	**Total CO_2 from Fuel Consumption in Pig Iron production (TCFCPI)**	**Tonnes CO_2**	**75 988**
B-4	**Percentage of Total amount of Pig Iron Produced Used in project Steel Making Activity (PII)**	**share**	**1,00**
B-5	**Total Pig Iron Input into Steel Making Process (TPII)**	**Tonnes**	662 160
B-6	**Total Pig Iron Produced (TPIP)**	**Tonnes**	662 160
B-7	**Quantity of each fuel (fpi) used in making Pig Iron (Q_{fpi})**		
	NG	**m^3,**	35 191 432
	COG	**1000 m^3**	12 671
B-8	**Emission factor of each fuel (fpi) EF_{fpi}**		
	NG[3]	**Tonnes CO_2 per m^3**	0,00187
	COG[4]	**Tonnes CO_2 per 1000 m^3**	0,79824
B-9	**Total CO_2 from Electricity used in Pig Iron production (TCEPI)**	**Tonnes CO_2**	**154 253**
B-10	**Electricity Consumed in producing Pig Iron (ECPI)**	**MWh**	141 517
B-11	**Emissions Factor for Electricity Consumption in making Pig Iron (EFECPI)**[5]	**Tonnes CO_2/MWh**	1,090
B-12	**Total CO_2 from inputs into Pig Iron (TCIPI)**	**Tonnes CO_2**	**1 662 702**
B-13	**Total Carbon from Fuel Consumption in Sintering (TCFIO)**	**Tonnes CO_2**	**37 763**
B-14	**Quantity of each fuel (fio) used in Sintering (Q_{fio})**		
	NG	**m^3**	9 400 858
	COG	**1000 m^3**	25 263
B-15	**Emission factor of each fuel in Sintering (fio) EF_{fio}**		
	NG	**Tonnes CO_2 per m^3**	0,00187

[3] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 2), Chapter 1 (Energy), Table 1-1 (continued), page 1.13 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref1.pdf).
[4] In accordance with "National GHG inventory of Ukraine, period 1990-2008", Table P2.7, page 264 (http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php).
[5] In accordance with the Order of the National environmental investment agency of Ukraine #75 dated 12th of May 2011 – http://www.neia.gov.ua/nature/doccatalog/document?id=127498.

	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
B-16	**Total CO_2 from Electricity used in Sintering (TCEIO)**	**Tonnes CO_2**	**46 517**
B-17	**Electricity Consumed in Sintering (ECIO)**	**MWh**	42 676
B-18	**Emissions Factor for Electricity Consumption in Sintering (EFECIO)**	**Tonnes CO_2/MWh**	1,090
B-19	**Total CO_2 from Reducing Agents (TCRAPI)**	**Tonnes CO_2**	**1 398 985**
	Total Reducing Agent (coke)	**Tonnes**	325 864
	Default Emission Factor (coke)[6]	**Tonnes CO_2/Tonne**	3,66
	Total Reducing Agent (coal)	**Tonnes**	82 529
	Default Emission Factor (coal)[7]	**Tonnes CO_2/Tonne**	2,50
B-20	**Total CO_2 from limestone (TCLPI) in Pig iron production**	**Tonnes CO_2**	**179 437**
	Total Limestone	**Tonnes**	240 414
	Default Emission Factor (limestone)[8]	**Tonnes CO_2/Tonne**	0,44
	Total dolomite	**Tonnes**	154 411
	Default Emission Factor (dolomite)[9]	**Tonnes CO_2/Tonne**	0,477
B-21	**Total CO_2 from steam production in Pig Iron Production (TCSPI)**	**Tonnes CO_2**	
B-22	**Quantity of each fuel (fspi) used in steam production in Pig Iron Production (Q_{fspi})**		
	fuel 1		
	fuel 2		
B-23	**Emission factor of each fuel in steam production (fspi) EF_{fspi}**		
	fuel 1		
	fuel 2		
B-24	**Total CO_2 emissions from the furnace process (TCFP)**	**Tonnes CO_2**	**157 323**
B -25	**Total CO_2 emissions from fuel consumption in the furnace process (TCFCFP)**	**Tonnes CO_2**	**52 743**
B -26	**Quantity of each fuel (ffp) used in furnace process (Q_{ffp})**		
	NG	**m^3**	24 413 450
	COG	**1000 m^3**	1 958
	Total Reducing Agent (coke)	**Tonnes**	829
	Total Reducing Agent (coal)	**Tonnes**	978
B -27	**Emission factor of each fuel in furnace process (ffp) EF_{ffp}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
	Default Emission Factor (coke)	**Tonnes CO_2/Tonne**	3,66
	Default Emission Factor (coal)	**Tonnes CO_2/Tonne**	2,50
B -28	**Total CO_2 emissions from electricity consumption in the furnace process (TCECFP)**	**Tonnes CO_2**	**76 211**
B -29	**Electricity Consumed in furnace process (ECFP)**	**MWh**	69 918
B -30	**Emissions Factor for Electricity Consumption in furnace process (EFECFP)**	**Tonnes CO_2/MWh**	1,090
B -31	**Total CO_2 emissions from inputs to the furnace process (TCIFP)**	**Tonnes CO_2**	**28 370**
B -32	**Total CO_2 from Argon entering the furnace (TCAFP)**	**Tonnes CO_2**	**70**
B -33	**Total CO_2 from steam production in furnace process**	**Tonnes CO_2**	

[6] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Table 2-12, page 2.26 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref2.pdf) and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3 Industrial Processes and Product Use, Chapter 4 Mineral Industries Emissions, Section 4.2.2.3 *Choice of Emission Factors*, Table 4.1, page 4.25 (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_4_Ch4_Metal_Industry.pdf).

[7] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Table 2-12, page 2.26 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref2.pdf).

[8] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Section 2.5.2 *Emissions estimation methodology for CO_2*, page 2.10 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref1.pdf).

[9] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Section 2.5.2 *Emissions estimation methodology for CO_2*, page 2.10 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref1.pdf).

	(TCSFP)		
B -34	Quantity of each fuel (fsp) used in steam production in furnace process (Q_{fsp})		
	fuel 1		
	fuel 2		
B -35	Emission factor of each fuel in furnace process (fsp) EF_{fsp}		
	fuel 1		
	fuel 2		
B -36	Total CO_2 from compressed air production in furnace process (TCCAFP)	Tonnes CO_2	593
B -37	Quantity of each fuel (fca) used in compressed air production in furnace process (Q_{fca})		
	NG	m^3	
	COG	1000 m^3	
B -38	Emission factor of each fuel in furnace process (fca) EF_{fca}		
	NG	Tonnes CO_2 per m^3	0,00187
	COG	Tonnes CO_2 per 1000 m3	
B -39	Electricity Consumed in making compressed air for the furnace process in steel making (ECCA)	MWh	544
B -40	Emissions Factor for Electricity Consumption (EFECCA)	Tonnes CO_2/MWh	1,090
B -41	Total CO_2 from oxygen production (TCOFP)	Tonnes CO_2	
B -42	Quantity of each fuel (fop) used in oxygen production (Q_{fop})		
	fuel 1		
	fuel 2		
B -43	Emission factor of each fuel in oxygen production (fop) EF_{fop}		
	fuel 1		
	fuel 2		
B -44	Electricity Consumed in making oxygen (ECOP)	MWh	
B-45	Emissions Factor for Electricity Consumption in making oxygen (EFECOP)	Tonnes CO_2/MWh	1,090
B-46	Total CO_2 from limestone for furnace process (TCLFP)	Tonnes CO_2	27 706
	Total Limestone	Tonnes	60 662
	Default Emission Factor (limestone)	Tonnes CO_2/Tonne	0,44
	Total dolomite	Tonnes	2 128
	Default Emission Factor (dolomite)	Tonnes CO_2/Tonne	0,477
B-47	Total CO_2 from blooming (TCBM)	Tonnes CO_2	54 229
B-48	Total CO_2 from fuel consumption in blooming (TCFCBM)	Tonnes CO_2	13 878
B-49	Quantity of each fuel (fbm) used in blooming (Q_{fbm})		
	NG	m^3	735 289
	COG	1000 m^3	15 662
B -50	Emission factor of each fuel in blooming (fbm) EF_{fbm}		
	NG	Tonnes CO_2 per m^3	0,00187
	COG	Tonnes CO_2 per 1000 m^3	0,79824
B-51	Total CO_2 from electricity consumption in blooming (TCECBM)	Tonnes CO_2	40 351
B-52	Electricity Consumed in blooming (ECBM)	MWh	37 019
B-53	Emissions Factor for Electricity Consumption in blooming (EFECBM)	Tonnes CO_2/MWh	1,090

Project line

ID number	Data variable	Units	4th quarter 2011
	Project Emissions (PE)	Tonnes CO_2	1 821 024
P-1	Total Steel Output (TSO)	Tonnes	642 371
P-2	Total CO_2 of Pig Iron (TCPI)	Tonnes CO_2	1 749 262

P-3	**Total CO_2 from Fuel Consumption for Pig Iron (TCFCPI)**	**Tonnes CO_2**	**43 971**
P-4	**Percentage of Total amount of Pig Iron Produced Used in project Steel Making Activity (PII)**	**share**	**1,00**
P-5	**Total Pig Iron Input into Steel Making Process (TPII)**	**Tonnes**	584 426
P-6	**Total Pig Iron Produced (TPIP)**	**Tonnes**	584 426
P-7	**Quantity of each fuel (fpi) used in making Pig Iron (Q_{fpi})**		
	NG	**m^3**	18 741 588
	COG	**1000 m^3**	11 136
P-8	**Emission factor of each fuel in Pig Iron Production (fpi) EF_{fpi}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
P-9	**Total CO_2 from Electricity used in Pig Iron production (TCEPI)**	**Tonnes CO_2**	**134 882**
P-10	**Electricity Consumed in producing Pig Iron (ECPI)**	**MWh**	123 745
P-11	**Emissions Factor for Electricity Consumption in Pig Iron Production (EFECPI)**	**Tonnes CO_2/MWh**	1,090
	Total Electricity Used in Steel Making Process		
	Grid Emission Factor	**Tonnes CO_2/MWh**	1,090
	CHP Plant Emission Factor	**Tonnes CO_2/MWh**	
	Total Electricity Produced by CHP	**MWh**	
	Blast Furnace Gas	**1000 m^3**	
	NG	**m^3**	
	Emission factor for BFG	**Tonnes CO_2 per 1000 m^3**	
	Emission factor NG	**Tonnes CO_2 per m^3**	0,00187
P-12	**Total CO_2 from inputs into Pig Iron (TCIPI)**	**Tonnes CO_2**	**1 570 410**
P-13	**Total CO_2 from Fuel Consumption in Sintering (TCFIO)**	**Tonnes CO_2**	**49 296**
P-14	**Quantity of each fuel (fio) used in Sintering (Q_{fio})**		
	NG	**m^3**	16 826 757
	COG	**1000 m^3**	22 297
P-15	**Emission factor of each fuel in Sintering (fio) EF_{fio}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
P-16	**Total CO_2 from Electricity used in Sintering (TCEIO)**	**Tonnes CO_2**	**41 894**
P-17	**Electricity Consumed in Sintering (ECIO)**	**MWh**	38 435
P-18	**Emissions Factor for Electricity Consumption (EFECIO)**	**Tonnes CO_2/MWh**	1,090
P-19	**Total CO_2 from Reducing Agents (TCRAPI)**	**Tonnes CO_2**	**1 234 753**
	Total Reducing Agent (coke)	**Tonnes**	287 610
	Default Emission Factor (coke)	**Tonnes CO_2/Tonne**	3,66
	Total Reducing Agent (coal)	**Tonnes**	72 841
	Default Emission Factor (coal)	**Tonnes CO_2/Tonne**	2,50
P-20	**Total CO_2 from limestone (TCLPI) in Pig iron production**	**Tonnes CO_2**	**244 467**
	Total Limestone	**Tonnes**	304 381
	Default Emission Factor (limestone)	**Tonnes CO_2/Tonne**	0,440
	Total dolomite	**Tonnes**	231 738
	Default Emission Factor (dolomite)	**Tonnes CO_2/Tonne**	0,477
P-21	**Total CO_2 from steam production in Pig Iron Production (TCSPI)**	**Tonnes CO_2**	
P-22	**Quantity of each fuel (fspi) used in steam production in Pig Iron Production (Q_{fspi})**		
	NG	**m^3**	
	COG	**1000 m^3**	
P-23	**Emission factor of each fuel in Steam Production (fspi) EF_{fspi}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
P-24	**Total CO_2 emissions from the furnace process (TCFP)**	**Tonnes CO_2**	**51 762**
P-25	**Total CO_2 emissions from fuel consumption in the furnace process (TCFCFP)**	**Tonnes CO_2**	**8 466**

P-26	**Quantity of each fuel (ffp) used in furnace process (Q_{ffp})**		
	NG	**m^3**	1 420 316
	COG	**1000 m^3**	1 156
	Total Reducing Agent (coke)	**Tonnes**	14
	Total Reducing Agent (coal)	**Tonnes**	1 934
P-27	**Emission factor of each fuel in the furnace process (ffp) EF_{ffp}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
	Default Emission Factor (coke)	**Tonnes CO_2/Tonne**	3,66
	Default Emission Factor (coal)	**Tonnes CO_2/Tonne**	2,50
P-28	**Total CO_2 emissions from electricity consumption in the furnace process (TCECFP)**	**Tonnes CO_2**	**42 388**
P-29	**Electricity Consumed in the furnace process (ECFP)**	**MWh**	38 888
P-30	**Emissions Factor for Electricity Consumption in the furnace process (EFECFP)**	**Tonnes CO_2/MWh**	1,090
P-31	**Total CO_2 emissions from inputs to the furnace process (TCIFP)**	**Tonnes CO_2**	**909**
P-32	**Total CO_2 from Argon entering the furnace (TCAFP)**	**Tonnes CO_2**	**71**
P-33	**Total CO2 from steam production in the furnace process (TCSFP)**	**Tonnes CO_2**	
P-34	**Quantity of each fuel (fsp) used in steam production in the furnace process (Q_{fsp})**		
	NG	**m^3**	
	COG	**1000 m^3**	
P-35	**Emission factor of each fuel in the furnace process (fsp) EF_{fsp}**		
	fuel 1		
	fuel 2		
P-36	**Total CO_2 from compressed air production for the furnace process (TCCAFP)**	**Tonnes CO_2**	**173**
P-37	**Quantity of each fuel (fca) used in compressed air production (Q_{fca})**		
	NG	**m^3**	
	COG	**1000 m^3**	
P-38	**Emission factor of each fuel in compressed air production (fca) EF_{fca}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	COG	**Tonnes CO_2 per 1000 m^3**	0,79824
P-39	**Electricity Consumed in making compressed air for the furnace process (ECCA)**	**MWh**	159
P-40	**Emissions Factor for Electricity Consumption in compressed air production (EFECCA)**	**Tonnes CO_2/MWh**	1,090
P-41	**Total CO_2 from oxygen production (TCOFP)**	**Tonnes CO_2**	
P-42	**Quantity of each fuel (fop) used in oxygen production (Q_{fop})**		
	fuel 1		
	fuel 2		
P-43	**Emission factor of each fuel in oxygen production (fop) EF_{fop}**		
	fuel 1		
	fuel 2		
P-44	**Electricity Consumed in making oxygen (ECOP)**	**MWh**	
P-45	**Emissions Factor for Electricity Consumption in making oxygen (EFECOP)**	**Tonnes CO_2/MWh**	1,090
P-46	**Total CO_2 from limestone for furnace process (TCLFP)**	**Tonnes CO_2**	**664**
	Total Limestone	**Tonnes**	1 509
	Default Emission Factor (limestone)	**Tonnes CO_2/Tonne**	0,440
	Total dolomite	**Tonnes**	0
	Default Emission Factor (dolomite)	**Tonnes CO_2/Tonne**	0,477
P-47	**Total CO_2 from casting (TCBM)**	**Tonnes CO_2**	**19 999**

P-48	**Total CO_2 from fuel consumption in casting (TCFCBM)**	**Tonnes CO_2**	**1 075**
P-49	**Quantity of each fuel (fbm) used in casting (Q_{fbm})**		
	NG	**m^3**	574 102
	coal electrodes	**Tonnes**	0
P-50	**Emission factor of each fuel used in casting (fbm) EF_{fbm}**		
	NG	**Tonnes CO_2 per m^3**	0,00187
	Default Emission Factor (coal electrodes)[10]	**Tonnes CO_2/Tonne**	3,6
P-51	**Total CO_2 from electricity consumption in casting (TCECBM)**	**Tonnes CO_2**	**18 925**
P-52	**Electricity Consumed in casting (ECBM)**	**MWh**	17 362
P-53	**Emissions Factor for Electricity Consumption in casting (EFECBM)**	**Tonnes CO_2/MWh**	1,090

The insignificant difference between the value of emission reduction that were actually generated during the fourth quarter of 2011 and emission reduction estimated in the registered PDD is caused by following reasons: the baseline of the project is developed based on the real steel manufacturing process as well as the project line; the emission reductions are more sensitive to change of specific energy consumption per 1 t of slabs produced than actually envisaged in the PDD because of impact of economy of scale and the fact that loading factor for baseline is much lower than for project line; the market influence on the scrap iron specific consumption; use of national and specific emission factors.

The calculations of GHG emission reductions, indicated in the tables, are based on the real data of FER consumption both for baseline and project line, according to the methodology. The emission reductions data are given in the next chapter.

7. Emission reductions

Following table shows emission reductions through the project[11]:

	4th quarter 2011
Baseline Emissions, t CO_{2e}	**2 104 495**
Project Emissions, t CO_{2e}	**1 821 024**
Emission Reductions, t CO_{2e}	**283 471**

8. Measures to ensure the accuracy of the results

The monitoring of JI project indicators of at PJSC "AISW" is realized on regular basis where the system of data collection on FER consumption is being used. The data needed for the monitoring of the project is collected during the process of normal equipment use. The production facilities of the plant are equipped with the measuring devices such as scales, meters and gas, water, steam, electricity consumption meters[12]. The monitoring of

[10] In accordance with Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Reference Manual (Volume 3), Chapter 2 (Industrial Processes), Table 2-12, page 2.26 (http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref2.pdf).
[11] Project and baseline emissions (which are provided in this chapter) are rounded to the whole figure (1t) and are based on calculations which are demonstrated in the attached excel file. The file is provided to the verifier.
[12] The list of monitoring equipment is provided in Annex 1 of this monitoring report.

the project forms an organic part of routine monitoring of manufacturing process. This allows receiving data regarding the project continuously.

PJSC "AISW" uses the accredited system of quality regulation according to the requirements of the ISO 9001 standard. The Guiding Metrological Instructions were developed in accordance with ISO 9001. They secure required level of accuracy by using monitoring equipment and by the possibility to crosscheck the data adequacy.

Thus during this monitoring period, namely 06/10/2011 unplanned audit on compliance to the standard of ISO 9001:2000 Quality Management System was conducted. The report on internal audit dated 29/11/2011 was provided to the verifiers.

Monitoring equipment met the regulatory requirements of Ukraine regarding accuracy and measurement error. All the equipment used for monitoring purposes, are in line with national legislative requirements and standards and also with ISO 9001 standard. The accuracy of devices is guaranteed by the manufacturers; the error is calculated and confirmed by device certificates. All monitoring equipment is covered by the detailed verification (calibration) plan. The verification process is under strict control. All measuring equipment is included in the verification schedule and verified with established periodicity. According to the schedule of verification, all devices are in satisfactory condition. The documented instructions to operate the facilities are stored at the working places.

The environmental management standard ISO 14001[13] has been implemented and certified at AISW. The standard determines the procedures related to collection and archiving of data on environmental impacts within activity of the plant and, accordingly, the proposed project activity. The report on internal audit Environmental Management System 2011 dated 27/01/2012 was provided to the verifiers.

The monitoring procedures are quite comprehensible, because they had already been used at PJSC "AISW" for measuring input and output production parameters, and also for receiving data on level of FER and raw-materials consumption. The most effective accessible methods are used for the error minimization. Generally the error level is low for all parameters (less than 2%) that are subjected to the monitoring. Thus, the measurements uncertainty level corresponded with technologies, used in the production process, and is taken into the account when the data are taken from devices.

The procedures of receiving data for monitoring execution and responsibility for its realization at PJSC "AISW" are regulated by the normative documents of PJSC "AISW" and by the "Guiding Meteorological Instructions" in accordance with PDD and revised monitoring plan that was finally determined in the verification report for the second quarter of 2011.

[13] Reference to the certificate: http://www.amk.lg.ua/index.php?option=com_content&view=article&id=35%3Atuv-thueringen-en-iso-management-system&catid=6&Itemid=14&lang=ru.

9. Roles and obligations

The Chief Metrological Specialist of the PJSC "AISW" is in charge for maintenance of the facilities and monitoring equipment as well as for their accuracy required by Regulation PP 229-Э-056-863/02-2005 of "Metrological services of the metallurgical mills" and by "Guiding Metrological Instructions". In case of defect, discovered in the monitoring equipment, the actions of the staff are determined in Guiding Metrological Instructions. The measurements are conducted constantly in automatic regime.

Data are collected in the electronic database of PJSC "AISW" and in printed documents. Also data are systematized in the documents of the daily, monthly and annually registration. All those documents are saved in the planning-economic department.

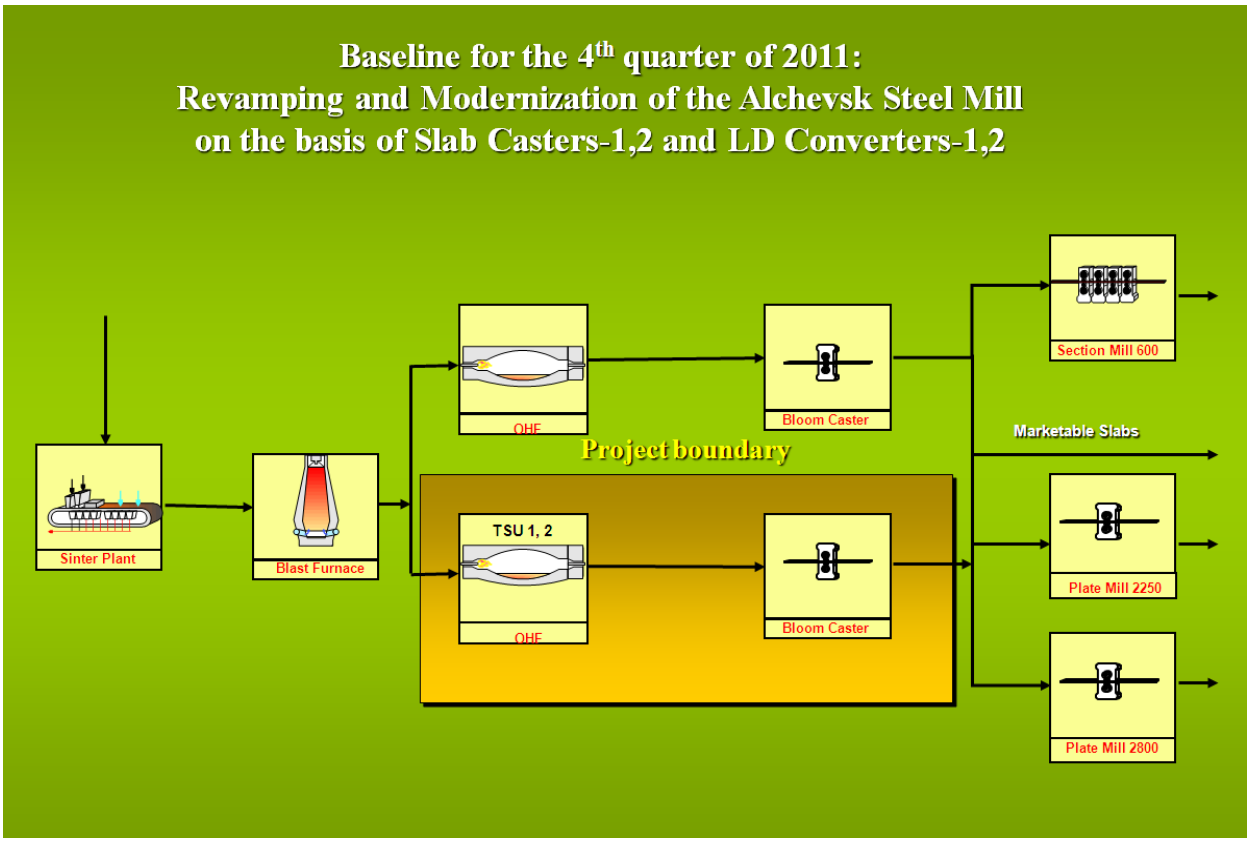
According to the order #95 dated 01/02/2012 on appointment of responsible persons for the monitoring of JI Projects under the Kyoto Protocol and also on the period of monitoring data storage at the plant, the data that are required to be monitored are kept during all crediting period and for two years after the last transfer of emission reductions units (ERUs) under the project.

The measurement results are being used by the Chief power-engineering specialist department, by the following services and technical staff of the Steel Mill. They are reflected in the technological instructions of production processes regime and also in the "Guiding Metrological Instructions" revised versions. The monitoring data reports and calculations are under the competence of the Chief power-engineering specialist assistant in accordance to the interior orders of the Steel Mill.

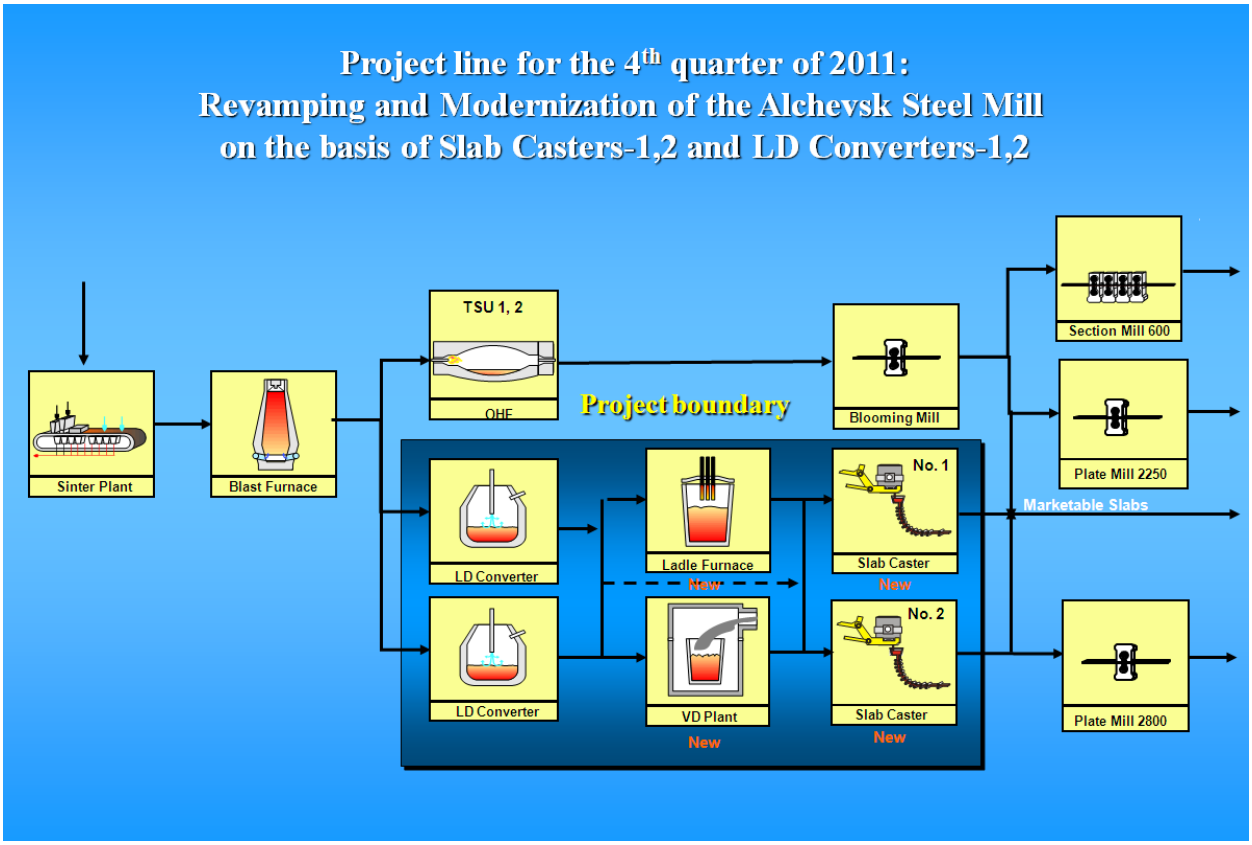
With the project equipment introduction the workers of AISW have the opportunity to update their working skills, stimulated by the theoretical and practical trainings and studies to operate the project equipment that is implemented under the project at the Steel Mill. Thus during this monitoring period the direction of AISW organized professional training for sinter plant, blast-furnace shop and oxygen-converter plant staff under the programs of AISW staff professional training. The certificate on professional training during fourth quarter of 2011 was provided to the verifiers.

10. Schemes for estimate of emission reductions

The baseline is the prolongation of the PJSC "AISW" historical practice of steel output; it means that situation observed in the baseline is the hypothetical situation of what could be without project implementation. The project baseline measures are represented at the picture below.



The projectline measures (the situation, formed during the monitoring period) are examined at the picture below.



Annex 1 Monitoring equipment

Classification number	Object and name of the measured parameter	Type of means of measured equipment	Serial number	Frequency of verification (calibration)
B-1 P-1	Scales for weighting steel slabs	Roller bed scales	R1-M1	Once a year
B-1 P-1	Scales for weighting steel slabs	Roller bed scales	R2-M1	Once a year
B-1 P-1	Scales for weighting steel slabs	Roller bed scales	R1-M2	Once a year
B-1 P-1	Scales for weighting steel slabs	Roller bed scales	R2-M2	Once a year
B-5 P-5	Scales for weighting pig iron	250B-250	1	Once a year
B-7 P-7	BF-1 Natural gas consumption meter	Сафир	02320193	Once a year
B-7 P-7	BF-3 Natural gas consumption meter	ДИСК-250 Сафир	51458 01522624	Once a year
B-7 P-7	BF-4 Natural gas consumption meter	ДИСК-250 Сафир	22526 05900228	Once a year
B-7 P-7	BF-5 Natural gas consumption meter	ДИСК МЕТРАН	10334 000225	Once a year Once in 2 years
B-7 P-7	Power plant Natural gas consumption meter	ДИСК-250 Метран	93038 295314	Once a year Once in 2 years
B-7 P-7	Power plant Natural gas consumption meter	ДИСК-250 Метран	93041 295315	Once a year Once in 2 years
B-7 P-7	BF-1 Coke oven gas consumption meter	РМТ-69 Метран	300-05-02 495684	Once a year Once in 2 years
B-7 P-7	BF-3 Coke oven gas consumption meter	КСД-3 ДМ 3583	331200 0220	Once a year
B-10 P-10	Electric substation 1			
	Electricity supply meter #8	Сазу-И670м	023867	Once in 4 years
	Electricity supply meter #4	Сазу - ИТ	317168	Once in 4 years
	Electricity supply meter #13	Сазу-И670м	208209	Once in 4 years
	Electricity supply meter #14	Сазу-ИТ	702005	Once in 4 years
	Electricity supply meter #18	Сазу-ИТ	214911	Once in 4 years
	Electricity supply meter #19	Сазу-И670м	538091	Once in 4 years
B-10 P-10	Electric substation 1-a			
	Electricity supply meter #2	Сазу-И670м	908676	Once in 4 years

	Electricity supply meter #4	Сазу-ИТ	604782	Once in 4 years
	Electricity supply meter #11	Сазу-И670м	112022	Once in 4 years
B-10 P-10	Electric substation 1-b			
	Electricity supply meter #1	Сазу-И681	222604	Once in 4 years
	Electricity supply meter #3	Сазу-И670м	643800	Once in 4 years
B-10 P-10	Electricity supply meter #4	Сазу-И670м	366657	Once in 4 years
	Electricity supply meter #5	Сазу-И670м	890182	Once in 4 years
	Electricity supply meter #9	Сазу-И670м	954652	Once in 4 years
	Electricity supply meter #13	Сазу-И670м	716010	Once in 4 years
	Electricity supply meter #18	Сазу-И670м	686790	Once in 4 years
	Electricity supply meter #19	Сазу-И670м	043426	Once in 4 years
	Electricity supply meter #22	Сазу-И670м	862947	Once in 4 years
B-10 P-10	Electric substation 31			
	Electricity supply meter #9	Сазу-И670м	492796	Once in 4 years
	Electricity supply meter #14	Сазу-И687	669248	Once in 4 years
	Electricity supply meter #21	Сазу-И670м	845858	Once in 4 years
B-10 P-10	Electric substation for PCI system			
	Electricity supply meter	Сазу-И687	085327	Once in 4 years
B-10 P-10	Electricity supply meter	Сазу-И670м	730277	Once in 4 years
	Electricity supply meter	Сазу-И687	085327	Once in 4 years
B-10 P-10	Electric substation Teplyaki			
	Electricity supply meter #38	Сазу-И681	224606	Once in 4 years
B-10 P-10	Electric substation 9			
	Electricity supply meter #25	Сазу-И670	115623	Once in 4 years
B-14 P-14	Natural gas consumption meter	ДИСК-250 Сафир	52206 09942204	Once a year
B-14 P-14	Coke oven gas consumption meter	ДИСК-250 Сафир	51232 08876120	Once a year
B-17 P-17	Electric substation 9			
	Electricity supply meter #21	Сазу-И670м	775495	Once in 4 years
	Electricity supply meter #24	Сазу-И670м	776978	Once in 4 years
	Electricity supply meter #28	Сазу-И670м	006458905	Once in 4 years
	Electricity supply meter #31	Сазу-И670м	005428005	Once in 4 years
B-19 B-20 B-26 B-46 P-19 P-20 P-26 P-46	Scales for weighting coke, coal, limestone, dolomite and pellets	ВЭТВ-50Д	213	Once a year

B-19 B-20 B-26 B-46 P-19 P-20 P-26 P-46	Scales for weighting coke, coal, limestone, dolomite and pellets	2315ВВ-150Э/2СД	15	Once a year
B-19 B-20 B-26 B-46 P-19 P-20 P-26 P-46	Scales for weighting coke, coal, limestone, dolomite and pellets	2361ВВ-80Э/1Д	61	Once a year
B-19 B-20 B-26 B-46 P-19 P-20 P-26 P-46	Scales for weighting coke, coal, limestone, dolomite and pellets	2315ВВ-150Э/2СД	15	Once a year
B-19 B-20 B-26 B-46 P-19 P-20 P-26 P-46	Scales for weighting coke, coal, limestone, dolomite and pellets	2361ВВ-80Э/1Д	61	Once a year
B-19 B-20 B-26 B-46 P-19 P-20 P-26 P-46	Scales for weighting coke, coal, limestone, dolomite and pellets	Т675 П-200	0084	Once a year
B-26	OHF shop Natural gas consumption meter	ДИСК-250 EJA	00076 27E709699	Once a year
P-26	LD-Converter shop Natural gas consumption meter	СПГ 762 EJA 110 A	1104 91G627701	Once a year
B-29 P-29	Electric substation "Metallurgical"			
	Electricity supply meter #9	Сазу-И670м	492796	Once in 4 years
	Electricity supply meter #15	Сазу-И670м	084840	Once in 4 years
	Electricity supply meter #20	Сазу-И670м	144256	Once in 4 years

	Electricity supply meter #25	Сазу-И670м	017423	Once in 4 years
	Electricity supply meter #35	Сазу-И670м	283537	Once in 4 years
B-32 B-39 P-32 P-39	Substation Kislorodnaya 1			
	Electricity supply meter 1T 1V	LZQM	64832	Once in 6 years
	Electricity supply meter 1T 4V	LZQM	64811	Once in 6 years
	Electricity supply meter 2T 1V	LZQM	64839	Once in 6 years
	Electricity supply meter 2T 4V	LZQM	64812	Once in 6 years
P-49	Slab Casters Natural gas consumption meter	СПГ 762 EJA 110 A	1059 91FC04555	Once a year
P-49	Slab Casters Natural gas consumption meter	ДИСК-250 Метран	52511 11188	Once a year Once in 2 years
B-49	Blooming Natural gas consumption meter	OE-22-2M, Rosemount3095FB	007 0031319	Once a year
B-49	Blooming Natural gas consumption meter	ДИСК-250 Метран изм. кан.	51236 308530	Once a year Once in 2 years
B-49	Blooming Coke oven gas consumption meter	ДИСК-250 Метран	105272 62996	Once a year Once in 2 years
B-49	Blooming Coke oven gas consumption meter	ДИСК-250 Метран	72733 62994	Once a year Once in 2 years
B-52 P-52	Substation Prokat-110			
	Electricity supply meter #6	Сазу-И670м	064323	Once in 4 years
	Electricity supply meter #8	Сазу-И670м	881547	Once in 4 years
	Electricity supply meter #13	Сазу-И670м	041462606	Once in 4 years
	Electricity supply meter #16	Сазу-И670м	536854	Once in 4 years
	Electricity supply meter #34	Сазу-И670м	166993	Once in 4 years

General Director
PJSC “Alchevsk Iron and
Steel Works” **T.G.Shevchenko**

Chief Accountant
PJSC “Alchevsk Iron and
Steel Works” **V.P. Elchaninova**