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Annual monitoring report

1st quarter 2011

JI project

Revamping and Modernization of the Alchevsk Steel Mill, Ukraine

Version 2 dated 1st of August 2011

Track 1 JI Registration Reference UA 1000022

ІНСТИТУТ ПРОБЛЕМ ЕКОЛОГІЇ
ТА ЕНЕРГОЗБЕРЕЖЕННЯ

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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.

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-Furnac (LF) and Vacuumator (VD Plant), which together displaces 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 01/01/2011 till 31/03/2011.

Version of the document – #2 dated 1st of August 2011

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 #1,2. 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 as it is required by the Joint Implementation Project Design Document (PDD).

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 joint implementation 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 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.

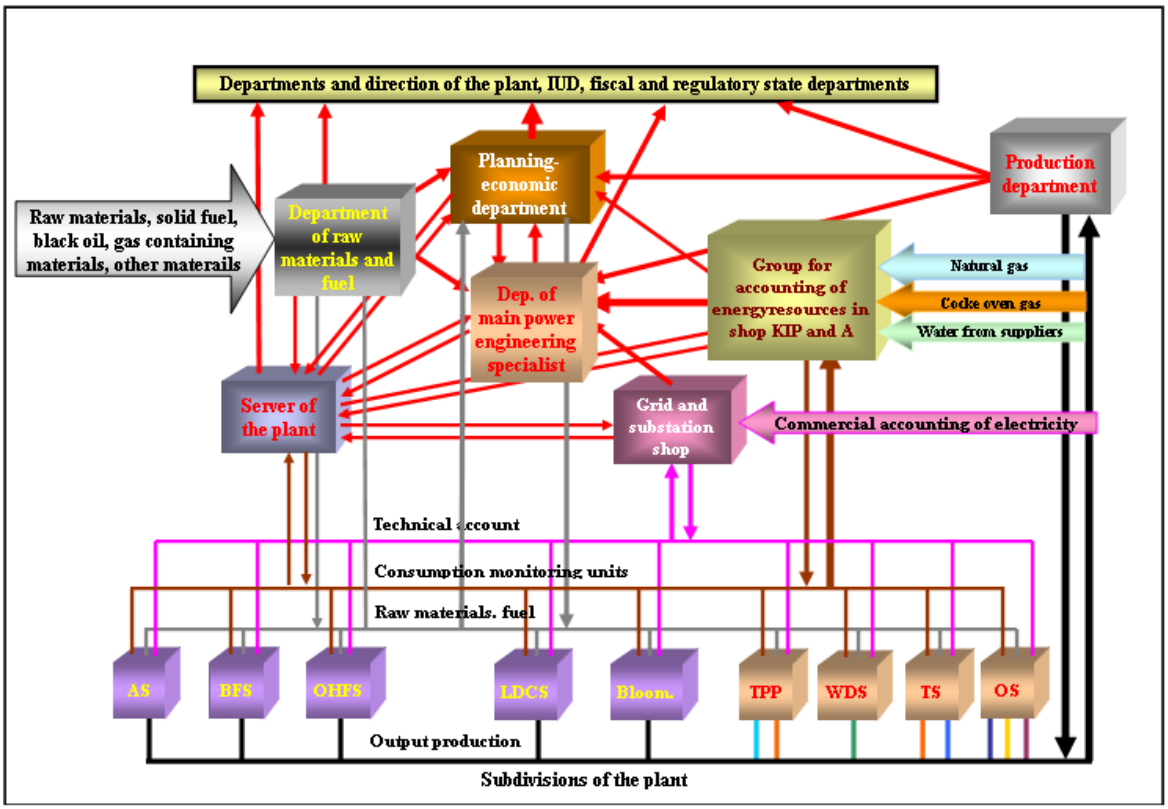
Within project boundaries for the calculation of the amount of CO_2 emissions for electricity from grid the emission factor was used according to the new decree of NEIA for the 1st – class electricity consumers - 1,090 kg CO_2/kWh. The utilization of the emission factor for the 1st-class electricity 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;
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.

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

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 wilth 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).

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 projectline tables, presented below.

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	

Baseline

ID Number	Data variable	Units	January 2011	February 2011	March 2011
	Baseline Emissions (BE)	Tonnes CO_2	**947 268**	**1 032 991**	**1 197 744**
B-1	**Total Steel Output (TSO)**	Tonnes	274 125	302 971	349 143
B-2	**Total CO_2 of Pig Iron (TCPI)**	Tonnes CO_2	**832 188**	**929 463**	**1 079 487**
B-3	**Total CO_2 from Fuel Consumption in Pig Iron production (TCFCPI)**	Tonnes CO_2	**61 643**	**71 307**	**83 182**
B-4	**Percentage of Total amount of Pig Iron Produced Used in project Steel Making Activity (PII)**	share	**1,00**	**1,00**	**1,00**
B-5	**Total Pig Iron Input into Steel Making Process (TPII)**	Tonnes	282 570	312 304	359 899
B-6	**Total Pig Iron Produced (TPIP)**	Tonnes	282 570	312 304	359 899
B-7	**Quantity of each fuel (fpi) used in making Pig Iron (Q_{fpi})**				
	NG	m^3,	30 204 406	37 503 886	41 100 898
	COG	1000 m^3	6 834	2 150	8 557
B-8	**Emission factor of each fuel (fpi) EF_{fpi}**				
	NG[3]	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG[4]	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
B-9	**Total CO_2 from Electricity used in Pig Iron production (TCEPI)**	Tonnes CO_2	**47 291**	**47 691**	**54 974**
B-10	**Electricity Consumed in producing Pig Iron (ECPI)**	MWh	43 387	43 753	50 435
B-11	**Emissions Factor for Electricity Consumption in making Pig Iron (EFECPI)**[5]	Tonnes CO_2/MWh	1,090	1,090	1,090
B-12	**Total CO_2 from inputs into Pig Iron (TCIPI)**	Tonnes CO_2	**723 254**	**810 465**	**941 331**
B-13	**Total Carbon from Fuel Consumption in Sintering (TCFIO)**	Tonnes CO_2	**16 278**	**16 333**	**17 905**
B-14	**Quantity of each fuel (fio) used in Sintering (Q_{fio})**				
	NG	m^3	4 142 372	4 098 647	4 196 395
	COG	ths. m^3	10 739	10 934	12 665
B-15	**Emission factor of each fuel in Sintering (fio) EF_{fio}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2	0,79824	0,79824	0,79824

[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.

		per 1000 m3			
B-16	**Total CO_2 from Electricity used in Sintering (TCEIO)**	Tonnes CO_2	**19 577**	**21 908**	**23 947**
B-17	**Electricity Consumed in Sintering (ECIO)**	MWh	17 960	20 099	21 970
B-18	**Emissions Factor for Electricity Consumption in Sintering (EFECIO)**	Tonnes CO_2/MWh	1,090	1,090	1,090
B-19	**Total CO_2 from Reducing Agents (TCRAPI)**	Tonnes CO_2	**622 604**	**690 977**	**802 254**
	Total Reducing Agent	Tonnes	166 315	183 163	211 171
	Default Emission Factor[6]	Tonnes CO_2/Tonne	3,66	3,66	3,66
	Total Reducing Agent	Tonnes	5 556	8 241	11 747
	Default Emission Factor[7]	Tonnes CO_2/Tonne	2,50	2,50	2,50
B-20	**Total CO_2 from limestone (TCLPI) in Pig iron production**	Tonnes CO_2	**64 794**	**81 246**	**97 225**
	Total Limestone	Tonnes	96 851	130 499	157 524
	Default Emission Factor[8]	Tonnes CO_2/Tonne	0,44	0,44	0,44
	Total dolomite	Tonnes	46 499	49 951	58 522
	Default Emission Factor[9]	Tonnes CO_2/Tonne	0,477	0,477	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	**91 401**	**77 537**	**88 329**
B -25	**Total CO_2 emissions from fuel consumption in the furnace process (TCFCFP)**	Tonnes CO_2	**44 421**	**27 344**	**31 123**
B -26	**Quantity of each fuel (ffp) used in furnace process (Q_{ffp})**				
	NG	m^3	10 418 181	11 751 243	13 298 657
	COG	ths. m^3	28 440	3 701	4 309
	Total Reducing Agent	Tonnes	354	391	451
	Total Reducing Agent	Tonnes	417	461	532

[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).

B -27	**Emission factor of each fuel in furnace process (ffp) EF_{ffp}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
	Default Emission Factor	Tonnes CO_2/Tonne	3,66	3,66	3,66
	Default Emission Factor	Tonnes CO_2/Tonne	2,50	2,50	2,50
B -28	**Total CO_2 emissions from electricity consumption in the furnace process (TCECFP)**	Tonnes CO_2	**34 681**	**36 699**	**41 753**
B -29	**Electricity Consumed in furnace process (ECFP)**	MWh	31 817	33 668	38 306
B -30	**Emissions Factor for Electricity Consumption in furnace process (EFECFP)**	Tonnes CO_2/MWh	1,090	1,090	1,090
B -31	**Total CO_2 emissions from inputs to the furnace process (TCIFP)**	Tonnes CO_2	**12 299**	**13 494**	**15 453**
B -32	**Total CO_2 from Argon entering the furnace (TCAFP)**	Tonnes CO_2	**27**	**31**	**48**
B -33	**Total CO_2 from steam production in furnace process (TCSFP)**	Tonnes CO_2			
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	**448**	**395**	**346**
B -37	**Quantity of each fuel (fca) used in compressed air production in furnace process (Q_{fca})**				
	NG	m^3			
	COG	ths. m^3			
B -38	**Emission factor of each fuel in furnace process (fca) EF_{fca}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 m3			
B -39	**Electricity Consumed in making compressed air for the furnace process in steel making (ECCA)**	MWh	411	363	317
B -40	**Emissions Factor for Electricity Consumption (EFECCA)**	Tonnes CO_2/MWh	1,090	1,090	1,090
B -41	**Total CO_2 from oxygen**	Tonnes CO_2			

	production (TCOFP)				
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	1,090	1,090
B-46	**Total CO_2 from limestone for furnace process (TCLFP)**	Tonnes CO_2	**11 823**	**13 068**	**15 059**
	Total Limestone	Tonnes	25 887	28 611	32 971
	Default Emission Factor	Tonnes CO_2/Tonne	0,44	0,44	0,44
	Total dolomite	Tonnes	908	1 004	1 157
	Default Emission Factor	Tonnes CO_2/Tonne	0,477	0,477	0,477
B-47	**Total CO_2 from blooming (TCBM)**	Tonnes CO_2	**23 680**	**25 992**	**29 929**
B-48	**Total CO_2 from fuel consumption in blooming (TCFCBM)**	Tonnes CO_2	**5 919**	**6 540**	**7 537**
B-49	**Quantity of each fuel (fbm) used in blooming (Q_{fbm})**				
	NG	m^3	313 777	346 796	399 646
	COG	1000 m^3	6 683	7 387	8 512
B -50	**Emission factor of each fuel in blooming (fbm) EF_{fbm}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
B-51	**Total CO_2 from electricity consumption in blooming (TCECBM)**	Tonnes CO_2	**17 761**	**19 452**	**22 391**
B-52	**Electricity Consumed in blooming (ECBM)**	MWh	16 295	17 846	20 543
B-53	**Emissions Factor for Electricity Consumption in blooming (EFECBM)**	Tonnes CO_2/MWh	1,090	1,090	1,090

Project line

ID number	Data variable	Units	January 2011	February 2011	March 2011
	Project Emissions (PE)	Tonnes CO_2	**871 273**	**912 763**	**1 052 388**
P-1	**Total Steel Output (TSO)**	Tonnes	274 125	302 971	349 143
P-2	**Total CO_2 of Pig Iron (TCPI)**	Tonnes CO_2	**814 493**	**865 791**	**1 001 738**
P-3	**Total CO_2 from Fuel Consumption for Pig Iron (TCFCPI)**	Tonnes CO_2	**43 605**	**52 098**	**61 319**

P-4	**Percentage of Total amount of Pig Iron Produced Used in project Steel Making Activity (PII)**	share	**1,00**	**1,00**	**1,00**
P-5	**Total Pig Iron Input into Steel Making Process (TPII)**	Tonnes	269 156	280 800	322 324
P-6	**Total Pig Iron Produced (TPIP)**	Tonnes	269 156	280 800	322 324
P-7	**Quantity of each fuel (fpi) used in making Pig Iron (Q_{fpi})**				
	NG	m^3	20 667 868	27 254 592	29 739 009
	COG	1000 m^3	6 461	1 911	7 610
P-8	**Emission factor of each fuel in Pig Iron Production (fpi) EF_{fpi}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
P-9	**Total CO_2 from Electricity used in Pig Iron production (TCEPI)**	Tonnes CO_2	**44 417**	**42 285**	**48 617**
P-10	**Electricity Consumed in producing Pig Iron (ECPI)**	MWh	40 749	38 794	44 603
P-11	**Emissions Factor for Electricity Consumption in Pig Iron Production (EFECPI)**	Tonnes CO_2/MWh	1,090	1,090	1,090
	Total Electricity Used in Steel Making Process				
	Grid Emission Factor	Tonnes CO_2/MWh	1,090	1,090	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	0,00186	0,00186	0,00186
P-12	**Total CO_2 from inputs into Pig Iron (TCIPI)**	Tonnes CO_2	**726 471**	**771 408**	**891 802**
P-13	**Total CO_2 from Fuel Consumption in Sintering (TCFIO)**	Tonnes CO_2	**21 440**	**21 093**	**23 589**
P-14	**Quantity of each fuel (fio) used in Sintering (Q_{fio})**				
	NG	m^3	7 135 867	7 138 197	7 824 357
	COG	1000 m^3	10 229	9 831	11 342
P-15	**Emission factor of each fuel in Sintering (fio) EF_{fio}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
P-16	**Total CO_2 from Electricity used in Sintering (TCEIO)**	Tonnes CO_2	**18 985**	**20 107**	**21 897**

P-17	**Electricity Consumed in Sintering (ECIO)**	MWh	17 418	18 447	20 089
P-18	**Emissions Factor for Electricity Consumption (EFECIO)**	Tonnes CO_2/MWh	1,090	1,090	1,090
P-19	**Total CO_2 from Reducing Agents (TCRAPI)**	Tonnes CO_2	**593 049**	**621 274**	**718 495**
	Total Reducing Agent	Tonnes	158 420	164 686	189 124
	Default Emission Factor	Tonnes CO_2/Tonne	3,66	3,66	3,66
	Total Reducing Agent	Tonnes	5 293	7 410	10 521
	Default Emission Factor	Tonnes CO_2/Tonne	2,50	2,50	2,50
P-20	**Total CO_2 from limestone (TCLPI) in Pig iron production**	Tonnes CO_2	**92 997**	**108 933**	**127 821**
	Total Limestone	Tonnes	125 836	155 861	184 826
	Default Emission Factor	Tonnes CO_2/Tonne	0,440	0,440	0,440
	Total dolomite	Tonnes	78 888	84 600	97 480
	Default Emission Factor	Tonnes CO_2/Tonne	0,477	0,477	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	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
P-24	**Total CO_2 emissions from the furnace process (TCFP)**	Tonnes CO_2	**42 843**	**31 374**	**35 037**
P-25	**Total CO_2 emissions from fuel consumption in the furnace process (TCFCFP)**	Tonnes CO_2	**12 362**	**3 959**	**4 662**
P-26	**Quantity of each fuel (ffp) used in furnace process (Q_{ffp})**				
	NG	m^3	981 000	786 949	804 950
	COG	1000 m^3	12 046	1 640	1 898
	Total Reducing Agent	Tonnes	0	0	4
	Total Reducing Agent	Tonnes	369	476	655
P-27	**Emission factor of each fuel in the furnace process (ffp) EF_{ffp}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
	Default Emission Factor	Tonnes CO_2/Tonne	3,66	3,66	3,66
	Default Emission Factor	Tonnes CO_2/Tonne	2,50	2,50	2,50
P-28	**Total CO_2 emissions from**	Tonnes CO_2	**28 989**	**26 659**	**29 193**

	electricity consumption in the furnace process (TCECFP)				
P-29	**Electricity Consumed in the furnace process (ECFP)**	MWh	26 595	24 458	26 783
P-30	**Emissions Factor for Electricity Consumption in the furnace process (EFECFP)**	Tonnes CO_2/MWh	1,090	1,090	1,090
P-31	**Total CO_2 emissions from inputs to the furnace process (TCIFP)**	Tonnes CO_2	**1 492**	**755**	**1 182**
P-32	**Total CO_2 from Argon entering the furnace (TCAFP)**	Tonnes CO_2	**31**	**33**	**51**
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	**171**	**143**	**125**
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	0,00186	0,00186	0,00186
	COG	Tonnes CO_2 per 1000 Nm^3	0,79824	0,79824	0,79824
P-39	**Electricity Consumed in making compressed air for the furnace process (ECCA)**	MWh	157	131	115
P-40	**Emissions Factor for Electricity Consumption in compressed air production (EFECCA)**	Tonnes CO_2/MWh	1,090	1,090	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	1,090	1,090
P-46	**Total CO_2 from limestone for furnace process (TCLFP)**	Tonnes CO_2	**1 290**	**579**	**1 006**
	Total Limestone	Tonnes	2 931	1 316	2 286
	Default Emission Factor	Tonnes CO_2/Tonne	0,440	0,440	0,440
	Total dolomite	Tonnes	0	0	0
	Default Emission Factor	Tonnes CO_2/Tonne	0,477	0,477	0,477
P-47	**Total CO_2 from casting (TCBM)**	Tonnes CO_2	**13 938**	**15 598**	**15 613**
P-48	**Total CO_2 from fuel consumption in casting (TCFCBM)**	Tonnes CO_2	**628**	**791**	**789**
P-49	**Quantity of each fuel (fbm) used in casting (Q_{fbm})**				
	NG	m^3	254 962	330 939	338 526
	coal electrodes	Tonnes	43	49	45
P-50	**Emission factor of each fuel used in casting (fbm) EF_{fbm}**				
	NG	Tonnes CO_2 per m^3	0,00186	0,00186	0,00186
	coal electrodes[10]	Tonnes CO_2/Tonne	3,6	3,6	3,6
P-51	**Total CO_2 from electricity consumption in casting (TCECBM)**	Tonnes CO_2	**13 310**	**14 807**	**14 824**
P-52	**Electricity Consumed in casting (ECBM)**	MWh	12 211	13 584	13 600
P-53	**Emissions Factor for Electricity Consumption in casting (EFECBM)**	Tonnes CO_2/MWh	1,090	1,090	1,090

The amount of emission reductions that were actually generated in the first quarter of 2011 is higher than it was expected in PDD because of the following reason. The baseline of the project is developed based on the real steel manufacturing process as well as projectline. Taking into account the implication of economy of scale and the fact that loading factor for baseline was much lower than for projectline, the emission reductions were more sensitive to change of specific energy consumption per 1 t of slabs produced than actually envisaged in the PDD. However this influence was beyond of project participants' control and fully based on market situation and requirements.

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

[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).

6. Emission reductions

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

	January 2011	February 2011	March 2011	1st quarter 2011
Baseline Emissions, t CO_{2e}	947 268	1 032 991	1 197 744	**3 178 003**
Project Emissions, t CO_{2e}	871 273	912 763	1 052 388	**2 836 424**
Emission Reductions, t CO_{2e}	**75 995**	**120 228**	**145 356**	**341 579**

7. 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 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.

Monitoring equipment meets 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 standards. 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 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.

[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 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 project documentation and monitoring plan.

8. 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.

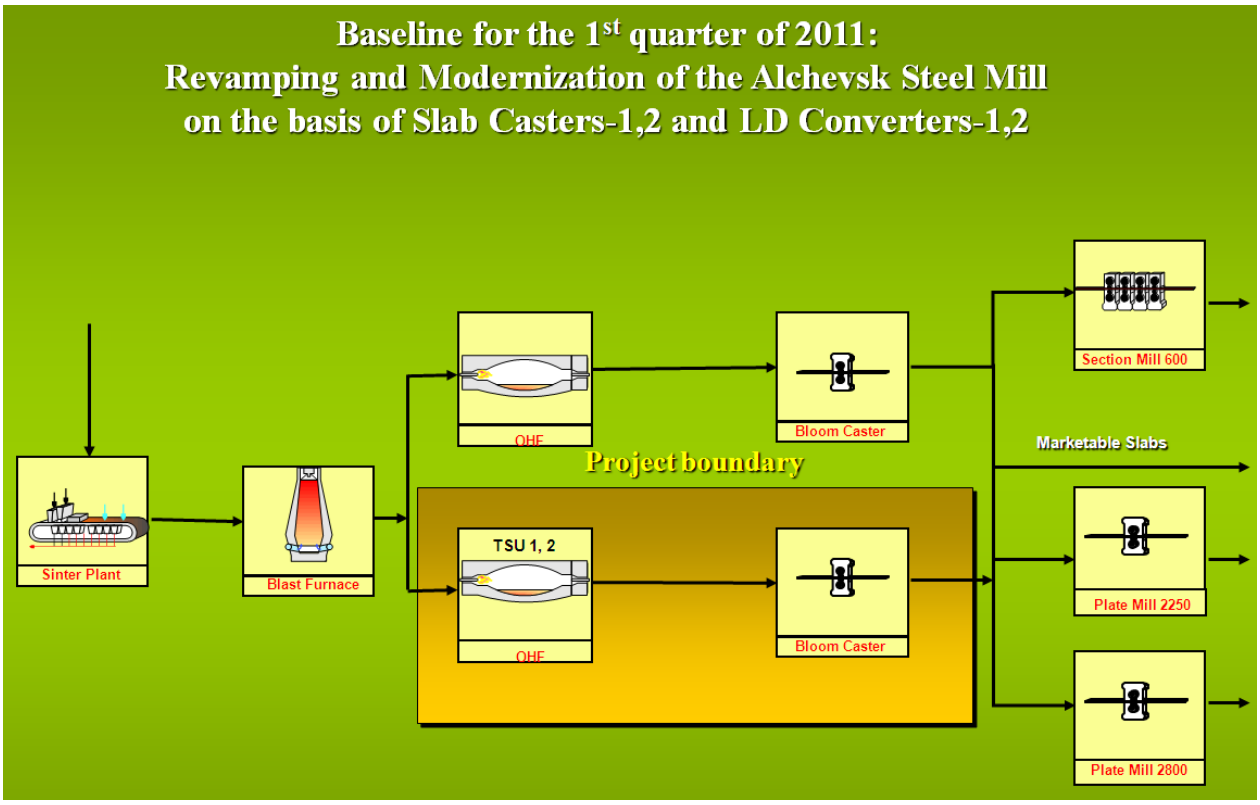
Data are collected in the electronic database of PJSC "AISW" and in printed documents. Also data are systematized in the documents of the daily, monthly and annually registration. All those documents are saved in the planning-economic department.

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.

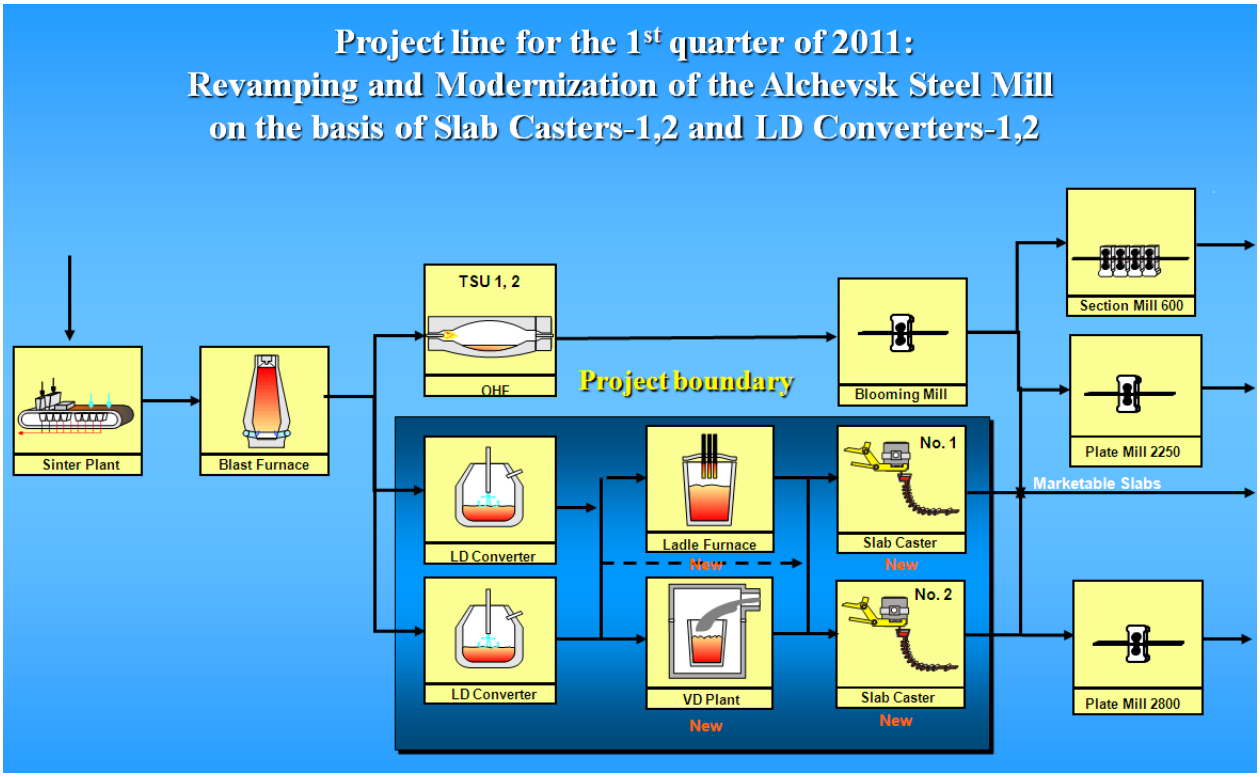
The direction of PJSC "AISW" has organized appropriate staff training to operate the project equipment. Thus, the trainings were conducted at the Ukrainian and foreign plants in order to operate Slab Casters and LD Converters. With the project equipment introduction the workers of PJSC "AISW" have the opportunity to update their working skills, stimulated by the permanent educational theoretical and practical courses at the Steel Plant. The information about the trainings can be given additionally.

9. 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	250В-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
B-7 P-7	Power plant Natural gas consumption meter	ДИСК-250 Метран	93038 295314	Once a year
B-7 P-7	Power plant Natural gas consumption meter	ДИСК-250 Метран	93041 295315	Once a year
B-7 P-7	BF-1 Coke oven gas consumption meter	РМТ-69 Метран	300-05-02 495684	Once a year
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	538188	Once in 4 years
	Electricity supply meter #4	Сазу - ИТ	317168	Once in 4 years
	Electricity supply meter #13	Сазу-И670м	376204	Once in 4 years
	Electricity supply meter #14	Сазу-ИТ	702005	Once in 4 years
	Electricity supply meter	Сазу-ИТ	214911	Once in 4 years

	#18			
	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	317168	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	1224597	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	891419	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 7			
	Electricity supply meter #11	Сазу-И670м		Once in 4 years
	Electricity supply meter #15	Сазу-И670м		Once in 4 years
	Electricity supply meter #16	Сазу-И670м		Once in 4 years
B-10 P-10	Electric substation 31			
	Electricity supply meter #11	Сазу-И670м		Once in 4 years
	Electricity supply meter #15	Сазу-И670м		Once in 4 years
	Electricity supply meter #16	Сазу-И670м		Once in 4 years
B-10 P-10	Electric substation 31			
	Electricity supply meter	Сазу-И670м	730277	Once in 4 years

	#9			
	Electricity supply meter #14	Сазу-И687	085327	Once in 4 years
	Electricity supply meter #21	Сазу-И670м	821109	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
	Electricity supply meter	Сазу-И670м		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 #4	Сазу-И681	031638	Once in 4 years
	Electricity supply meter #25	Сазу-И670	962120	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 Teplyaki			
	Electricity supply meter #10-1	Сазу-И670м		Once in 4 years
	Electricity supply meter #10-2	Сазу-И670м		Once in 4 years
	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	Scales for weighting	2315ВВ-150Э/2СД	15	Once a year

B-20 B-26 B-46 P-19 P-20 P-26 P-46	coke, coal, limestone, dolomite and pellets			
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	84581	Once in 4 years

	Electricity supply meter #20	Сазу-И670м	144256	Once in 4 years
	Electricity supply meter #25	Сазу-И670м	150493	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
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
B-49	Blooming Coke oven gas consumption meter	ДИСК-250 Метран	105272 62996	Once a year
B-49	Blooming Coke oven gas consumption meter	ДИСК-250 Метран	72733 62994	Once a year
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

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