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Revamping of sintering and blast-furnace production at OJSC “Dniprovsky Integrated Iron and Steel Works named after Dzerzhynsky”

UA1000274, Track 1

Annual Monitoring Report

Version 2 dated 5th of June 2012

Monitoring period: 1st January 2012 – 31st March 2012



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List of abbreviations

DIISW - PJSC «Dniprovsky Integrated Iron and Steel Works named after Dzerzhynsky»;
AIE – Accredited independent entity;
JI – Joint Implementation;
BF – Blast Furnaces;
SP – Sinter Plant;
FER – Fuel and Energy Resources.

1. Project summary

The proposed Joint Implementation project¹ considers complex resource-saving effect related with implementation of new SP and BF#4, gradual reconstruction of the remaining BFs ##8, 9, 12 and 1M with application of state of the art technologies and equipment. Also, project activity envisages technological improvements in the process of sintering and pig iron production.

The project measures and activities that have been and will be implemented at DIISW (concerning pig iron production process) lead to increase of SP and BFs productivity, reduction of specific coke, other fuel and materials consumption and, therefore, reduction of GHG emissions.

2. Status of the project pursuant to the monitoring period

Emission reductions during the period of 1st January 2012 to 31st March 2012 were achieved by implementation of the following measures:

#	Measures	2012	2013	2014	2015	2016	2017	2018	2019	2020
		0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	1	1	1
		4	5	6	7	8	9	0	1	2
1	Technological improvements of the BFs operation: - improvement of blast furnace coke quality; - decreasing the silicon content in the pig iron; - decreasing the BFs idle times and downtime; - partial substitution of the limestone by lime; - improvement of the quality of agglomerate.									
2	Renewal and reconstruction of BF#1M									
3	Implementation of a new oxygen plant AKAp 40/53-4									
4	Modernization of the sintering process: - improvements of solid fuel burning process, which is part of the sintering charge; - increase of the level of steel waste utilization; - implementation of the state-of-the-art dust suppression and gas purification facilities; - optimization of limestone decomposition reaction;									

¹ The letter of approval was received from the Government of Ukraine (State Environmental Investment Agency of Ukraine, reference: 2077/23/7 dated 08/08/2011) and from the Government of the Netherlands (Ministry of Economic Affairs, reference: 2011J15 of 10.05.2011).

	<ul style="list-style-type: none"> - improvement of natural gas burning process, which is supplied to burners for the ignition of sintering charge; - improvements of chemical composition of sinter charge; - reduction of fine fraction content in agglomerate. 									
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The following measures: *technological improvements of the BF's operation and modernization of the sintering process* are implemented from the beginning of the proposed project activity till 2020 (during the whole project lifetime).

3. Parameters monitored according to the monitoring plan

During the project activity the total pig iron production, fuel and energy resource consumption at the plant are being monitored. The baseline of the project is based on historical data of fuel and energy resources consumption for pig iron production at DIISW during the period of 01/01/1999 – 31/12/2003.

For the purpose of calculating GHG emission reduction units achieved by the project during the first quarter of 2012 the carbon emission factor for electricity consumption is based on the Order of the National Environmental Investment Agency of Ukraine № 75² dated 12/05/2011. In accordance with mentioned above decree issued by NEIA for the 1st – class electricity consumers the carbon emission factor equal to 1,090 kgCO_{2e}/kWh.

The use 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 1998³, 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.

Based on the information stated above, DIISW refers to the 1st – class electricity consumers⁴.

² <http://www.neia.gov.ua/nature/doccatalog/document?id=127498>.

³ <http://energetik.org.ua/node/90>.

⁴ The following information is proved by electricity supply agreements.

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

Colors that are used in the tables are described below:

Project line	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	

The emission factors for natural gas, coke and anthracite are identified in the following way:

1) Emission factor for natural gas consumption is based on fixed calorific value of natural gas which is in accordance with DIISW average historical data. Calorific value of natural gas is at the level of 8100 kcal/m³.

2) In order to calculate emission factor for coke due to its production and consumption based on actual carbon content, the following formula was used:

$$EF_{ra} = (C_{coke} * 44/12) + 0,56$$

where:

- EF_{ra} – emission factor for coke, tonnes CO_{2e}/tonne of coke;
- C_{coke} – carbon content of coke, %;
- 0,56 – CO_{2e} emission factor for coke production, tonnes CO_{2e}/tonne of coke produced.

The carbon content of coke is calculated by the following formula:

$$C_{coke} = 100 - (C_{ash} + C_{sulphur} + C_{volatile\ matters})$$

where:

- C_{ash} – ash content of coke, %;
- C_{sulphur} – sulfur content of coke, %;
- C_{volatile matters} – volatile matters content of coke, %.

3) In order to follow conservativeness of the approach, taking into account that various ranks of anthracite are consumed under the project activity in different technological processes and also because it is complicated to calculate actual weighted average of anthracite net calorific value, the carbon emission factor for anthracite is based on carbon

content of anthracite which is in accordance with IPCC 1996 data⁵ and on net calorific value of anthracite which in accordance with IPCC 2006 data⁶.

Project line

Classification number	Data variable	Unit	01/01/2012 – 31/03/2012
P-1	Total CO _{2e} in the project scenario (PE _i)	Tonnes CO _{2e}	2 306 815
P-2	Total CO _{2e} from Pig Iron (TCPI _{p,i})	Tonnes CO _{2e}	2 042 473
P-3	Total Pig Iron Output (TPII _{p,i})	Tonnes	809 646
P-4	Total CO _{2e} from fuel consumption in producing Pig Iron (TCFCPI _{p,i})	Tonnes CO _{2e}	116 331
P-5	Quantity of each fuel (fpi _p) used in making Pig Iron (Q _{fpi,p,i})	1000 m ³	
	Natural gas (NG)	1000 m ³	61 453
P-6	Emission factor of each fuel EF _{f,p}	Tonnes CO _{2e} /1000 m ³	
	Natural gas (NG) ⁷	Tonnes CO _{2e} /1000 m ³	1,89301
P-7	Total CO _{2e} from electricity consumption in producing Pig Iron (TCEPI _{p,i})	Tonnes CO _{2e}	79 146
P-8	Electricity Consumed in producing Pig Iron (ECPI _{p,i})	MWh	72 611
P-9	Emissions Factor for Electricity Consumption EF _{f,p} ⁸	Tonnes CO _{2e} /MWh	1,09
P-10	Total CO _{2e} from Inputs into Pig Iron (TCIPI _{p,i})	Tonnes CO _{2e}	1 846 996
P-11	Total CO _{2e} from fuel used to prepare Iron Ore (TCFIO _{p,i})	Tonnes CO _{2e}	6 943
P-12	Quantity of each fuel (fio _p) used in Sintering (Q _{fio,p,i})	1000 m ³	
	Natural gas (NG)	1000 m ³	3 668
P-13	Emission factor of each fuel EF _{f,p}	Tonnes CO _{2e} /1000 m ³	
	Natural gas (NG)	Tonnes CO _{2e} /1000 m ³	1,89301
P-14	Total CO _{2e} from electricity consumption in preparing iron ore (TCEIO _{p,i})	Tonnes CO _{2e}	34 931
P-15	Electricity Consumed in Sintering (ECIO _{p,i})	MWh	32 047

⁵ 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>.

⁶ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Section 1.4.2 *Emission Factors*, Table 1.2, page 18 - http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf.

⁷ Emission factor for natural gas is based on 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>) and fixed net calorific value of natural gas which is in accordance with DIISW average historical data.

⁸ <http://www.neia.gov.ua/nature/doccatalog/document?id=127498>.

P-16	Emissions Factor for Electricity Consumption $EF_{f,p}$	Tonnes CO_{2e} /MWh	1,09
P-17	Total CO_{2e} from Reducing Agents in Pig Iron Production ($TCRAPI_{p,i}$)	Tonnes CO_{2e}	1 750 774
P-18	Quantity of each reducing agent ($rap_{i,p}$) in Pig Iron Production ($Q_{rap_{i,p}}$)	Tonnes	
	Reducing agent (coke)	Tonnes	427 147
	Reducing agent (anthracite)	Tonnes	56 182
P-19	Emission factor of each reducing agent, $EF_{ra,p}$	Tonnes CO_{2e} /Tonne	
	Emission factor (coke) ⁹	Tonnes CO_{2e} /Tonne	3,754
	Default emission factor (anthracite) ¹⁰	Tonnes CO_{2e} /Tonne	2,62
P-20	Total CO_{2e} from other inputs ($TCOIP_{p,i}$)	Tonnes CO_{2e}	54 348
P-21	Quantity of each other input ($oip_{i,p}$) in Pig Iron Production ($Q_{oip_{i,p}}$)	Tonnes	
	Limestone	Tonnes	100 070
	Dolomite	Tonnes	12 361
	Pellets	Tonnes	147 366
P-22	Emission factor of each other input, $EF_{oi,p}$	Tonnes CO_{2e} /Tonne	
	Default emission factor (limestone) ¹¹	Tonnes CO_{2e} /Tonne	0,44
	Default emission factor (dolomite) ¹²	Tonnes CO_{2e} /Tonne	0,477
	Default emission factor (pellets) ¹³	Tonnes CO_{2e} /Tonne	0,03
P-23	Total tonnes of CO_{2e} related to the balance of process need of energy required for the project activity ($TCBPN_{p,i}$)	Tonnes CO_{2e}	264 342
P-24	Total CO_{2e} from fuel consumption for balance of process needs of project activity ($TCFCBPN_{p,i}$)	Tonnes CO_{2e}	30 311

⁹ Emission factor for coke consumption is based on actual carbon content of coke and emission factor for coke production which is in accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3 Industrial Processes and Product Use, Chapter 4 Metal 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).

¹⁰ 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>. and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Section 1.4.2 *Emission Factors*, Table 1.2, page 18 - http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf.

¹¹ 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 CO₂*, page 2.10 (<http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref1.pdf>).

¹² 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 CO₂*, page 2.10 (<http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2ref1.pdf>).

¹³ In accordance with 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3 Industrial Processes and Product Use, Chapter 4 Metal 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).

P-25	Quantity of each fuel ($fb_{pn,p}$) used for balance of process needs ($Q_{fbpn,p,i}$)	1000 m ³	
	Natural gas (NG)	1000 m ³	16 012
P-26	Emission factor of each fuel $EF_{f,p}$	Tonnes CO _{2e} /1000 m ³	
	Natural gas (NG)	Tonnes CO _{2e} /1000 m ³	1,89301
P-27	Total CO _{2e} from electricity consumption for balance of process needs of project activity ($TCEBPN_{p,i}$)	Tonnes CO _{2e}	234 031
P-28	Electricity Consumed for balance of process needs ($ECBPN_{p,i}$)	MWh	214 708
P-29	Emissions Factor for Electricity Consumption $EF_{f,p}$	Tonnes CO _{2e} /MWh	1,09

Baseline

Classification number	Data variable	Unit	01/01/2012 – 31/03/2012
			1999-2003 (baseline)
B-1	Total CO _{2e} in the baseline scenario (BE_i)	Tonnes CO _{2e}	40 369 268
B-2	Total CO _{2e} from Pig Iron ($TCPI_{b,i}$)	Tonnes CO _{2e}	34 528 062
B-3	Total Pig Iron Output ($TPII_{b,i}$)	Tonnes	12 160 278
B-4	Total CO _{2e} from fuel consumption in producing Pig Iron ($TCFCPI_{b,i}$)	Tonnes CO _{2e}	1 684 024
B-5	Quantity of each fuel (fpi_b) used in making Pig Iron ($Q_{fpi,b,i}$)	1000 m ³	
	Natural gas (NG)	1000 m ³	889 601
B-6	Emission factor of each fuel $EF_{f,b}$	Tonnes CO _{2e} /1000 m ³	
	Natural gas (NG)	Tonnes CO _{2e} /1000 m ³	1,89301
B-7	Total CO _{2e} from electricity consumption in producing Pig Iron ($TCEPI_{b,i}$)	Tonnes CO _{2e}	885 967
B-8	Electricity Consumed in producing Pig Iron ($ECPI_{b,i}$)	MWh	812 814
B-9	Emissions Factor for Electricity Consumption $EF_{f,b}$	Tonnes CO _{2e} /MWh	1,090
B-10	Total CO _{2e} from Inputs into Pig Iron ($TCIPI_{b,i}$)	Tonnes CO _{2e}	31 958 071
B-11	Total CO _{2e} from fuel used to prepare Iron Ore ($TCFIO_{b,i}$)	Tonnes CO _{2e}	232 381
B-12	Quantity of each fuel (fio_b) used in Sintering ($Q_{fio,b,i}$)	1000 m ³	
	Natural gas (NG)	1000 m ³	122 757
B-13	Emission factor of each fuel $EF_{f,b}$	Tonnes CO _{2e} /1000 m ³	
	Natural gas (NG)	Tonnes CO _{2e} /1000 m ³	1,89301

B-14	Total CO _{2e} from electricity consumption in preparing iron ore (TCEIO _{b,i})	Tonnes CO _{2e}	780 147
B-15	Electricity Consumed in Sintering (ECIO _{b,i})	MWh	715 731
B-16	Emissions Factor for Electricity Consumption EF _{f,b}	Tonnes CO _{2e} /MWh	1,090
B-17	Total CO _{2e} from Reducing Agents in Pig Iron Production (TCRAPI _{b,i})	Tonnes CO _{2e}	29 164 228
B-18	Quantity of each reducing agent (rapi _b) in Pig Iron Production (Q _{rapi,b,i})	Tonnes	
	Reducing agent (coke)	Tonnes	7 500 315
	Reducing agent (anthracite)	Tonnes	384 305
B-19	Emission factor of each reducing agent, EF _{ra,b}	Tonnes CO _{2e} /Tonne	
	Emission factor (coke)	Tonnes CO _{2e} /Tonne	3,754
	Default emission factor (anthracite)	Tonnes CO _{2e} /Tonne	2,62
B-20	Total CO _{2e} from other inputs (TCOIPi _{b,i})	Tonnes CO _{2e}	1 781 315
B-21	Quantity of each other input (oipi _b) in Pig Iron Production (Q _{oipi,b,i})	Tonnes	
	Limestone	Tonnes	2 063 162
	Dolomite	Tonnes	1 699 180
	Pellets	Tonnes	2 100 503
B-22	Emission factor of each other input, EF _{oi,b}	Tonnes CO _{2e} /Tonne	
	Default emission factor (limestone)	Tonnes CO _{2e} /Tonne	0,440
	Default emission factor (dolomite)	Tonnes CO _{2e} /Tonne	0,477
	Default emission factor (pellets)	Tonnes CO _{2e} /Tonne	0,030
B-23	Total tonnes of CO _{2e} related to the balance of process need of energy required for the project activity (TCBPN _{b,i})	Tonnes CO _{2e}	5 841 207
B-24	Total CO _{2e} from fuel consumption for balance of process needs of project activity (TCFCBPN _{b,i})	Tonnes CO _{2e}	1 208 402
B-25	Quantity of each fuel (fbpn _b) used for balance of process needs (Q _{fbpn,b,i})	1000 m ³	
	Natural gas (NG)	1000 m ³	638 349
B-26	Emission factor of each fuel EF _{f,b}	Tonnes CO _{2e} /1000 m ³	
	Natural gas (NG)	Tonnes CO _{2e} /1000 m ³	1,89301
B-27	Total CO _{2e} from electricity consumption for balance of process needs of project activity (TCEBPN _{b,i})	Tonnes CO _{2e}	4 632 805
B-28	Electricity Consumed for balance of process needs (ECBPN _{b,i})	MWh	4 250 280

B-29	Emissions Factor for Electricity Consumption $EF_{f,b}$	Tonnes CO _{2e} /MWh	1,090
B-30	Total CO _{2e} per 1 tonne of Pig Iron produced (TCPTPIP _b)	Tonnes CO _{2e} /1 t. of Pig Iron Produced	3,320
B-1	Total CO ₂ in the baseline scenario (BE _i) during the first quarter of 2012	Tonnes CO ₂	2 687 833

The calculations of GHG emission reductions, indicated in the tables, are based on the actual data of output, FER consumption, systemized in forms developed under the JI project according to the methodology. The information regarding emission reductions data are given in the next chapter.

Calculation of emission reductions is based on conservative assumptions, which can be proved by the following facts:

- the price of natural gas in the baseline period was lower than in the project line period. That's why there were no substitutions of natural gas by coal as it was in project line period. As a result, such substitution decreased the total amount of emission reductions;
- the quality of iron-bearing materials in project line period sometimes was lower in comparison with the baseline period. That was the reason of the total amount of emission reductions decrease.

No leakages are generated during considered monitoring period.

4. Emission reductions calculations

The emission reductions¹⁴, 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 under the project line and baseline scenarios as it is required by the JI Project Design Document (PDD).

	01/01/2012 – 31/03/2012
Baseline Emissions, t CO_{2e}	2 687 833
Project Emissions, t CO_{2e}	2 306 815
Emission Reductions, t CO_{2e}	381 018

The amount of emission reductions that was actually generated during the 1-st quarter of 2012 was lower than it was expected in PDD (approximately 564 959 tonnes of CO_{2e}) because of the following reasons. First of all, taking into account that during this monitoring period the quality of raw materials and other inputs consumed under the project activity was low, the actual level of specific fuel and energy resources consumption per unit of output was a bit higher than it was expected in PDD. Secondly, taking into account that such measures as technological improvements of the BFs operation and modernization of the sintering process were not fully implemented as planned, it has also influenced on decrease of actual volumes of emission reductions in comparison with estimations in PDD.

5. Measures to ensure the accuracy of the results

The quality assurance procedures are based on the Plant's ISO 9001:2001 quality management system (QMS), which was further upgraded to the more recent ISO 9001:2008¹⁵ version¹⁶. The QMS covers the whole of the Plant's production process. Furthermore, an OHSAS 18001:2007 industrial safety management system and an ISO 14001:2004 environmental management system were implemented in 2009¹⁷. Compliance audits for the mentioned above standards are performed in accordance with "Guidance on quality management systems" and other regulatory documents of DIISW. The bureau of standardized certification is responsible for management, realization and storage of audits data. The audits are conducted on monthly basis in accordance with schedule developed at

¹⁴ 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.

¹⁵ <http://www.dmkd.dp.ua/system/files/u21/sert.jpg>.

¹⁶ Certificates were issued by UkrSEPRO (# UA 2.008.06119 dated 21/06/2011) and TÜV THÜRINGEN (TIC 15 100 127865 dated 31/01/2012).

¹⁷ Relevant certificates were issued by TÜV THÜRINGEN (# TIC 15 116 10202 dated 02/03/2010 and # TIC 15 104 10697 dated 02/03/2010, respectively).

the beginning of each year by the group of accredited auditors of the bureau of standardized certification. In addition, the Plant has a number of other certificates¹⁸, which proof the project monitoring quality assurance.

During this monitoring period, planned audits on compliance to the standards of ISO 9001:2008, ISO 14001 and OHSAS 18001 (according to the schedule) were conducted. Audit reports are provided to the verifiers.

All the equipment used for monitoring purposes is in line with national legislative requirements and standards. The documented instructions to operate the facilities are stored at working places. Verification and calibration of equipment are conducted at the plant in accordance with in STP 230-35-07 Metrological Support of Measuring Equipment. List of monitoring equipment is provided in Annex 1. The data cross check as well as internal audits and corrective actions are taken as defined in STP 230-18-03 *Quality Management System Internal Audits* and according to the standards ISO 9001:2008, ISO 14001 and OHSAS 18001.

Taking into account that the list of monitoring equipment did not correspond with this monitoring period, the project developer has revised and updated it. Revision and update of the list of monitoring equipment was conducted as the result of such reasons below:

- 1) some monitoring devices were sent on scheduled or unscheduled verifications/calibrations and were replaced by other monitoring devices;
- 2) due to the fact that meters ## 170, 171 and 172 were not included in the previous list of monitoring equipment, but which are used for electricity accounting under the project activity, the project developer has included them in the list of monitoring equipment for this period;
- 3) taking into account that some electricity supply meters of induction type have several modifications, which characterize their constructional differences, some insignificant misstatements and inaccuracies (concerning the types of abovementioned equipment) were made by DIISW. In the same time, physical configuration, functions and technical characteristics of these electricity supply meters are identical and such modifications do not influence quality and accuracy of measurements;
- 4) the list of monitoring equipment was improved in comparison with the list for the previous monitoring period by taking into account all previously made inaccuracies/misprints concerning types and factory numbers of some monitoring devices.

The list of monitoring equipment is now in accordance with this specific monitoring period.

In case of having problems with certain monitoring equipment, the accounting system is organized in such way that allows double checking of all the data. Ultimately all information can be proven by independent invoices from the third parties.

¹⁸ Relevant information may be provided upon request.

6. Roles and obligations

Control over consumption of energy resources, input material and production is monitored by a separate unit of the steel mill (Unit for Control and Automation) with a help of different meters all operating in accordance to the national regulations of Ukraine and documented in Guiding Metrological Instructions of DIISW. Responsibilities for monitoring are defined in the table below¹⁹.

Responsibility	Specialist Responsible
Project coordinator	Technical Department Head
Collection, systematization, preparation and storage of data for the development of monitoring reports	Head of Planning-economic department, acting head of environment department
Data for Blast Furnaces	Blast Furnace Shop Manager
Data for Sinter Plant	Sinter Plant Manager
Metrological data	Chief Metrologist – head of metrology laboratory
Data for balance of process needs	Head of CHP, Chief Energy Specialist – head of chief energy specialist administration

The monitoring procedures and responsibilities at DIISW are regulated by STP 230-35-07 *Metrological Support of Measuring Equipment* and national regulations, including:

- 1) *Metrological Product Quality Assurance* (RMI-I-19.0.1-07);
- 2) *Metrological Due Diligence of Documentation* (RMI-I-19.0.2-07) and STP 11.02-00 *Organisation and Performance of Metrological Due Diligence of Standards and Technical Documentation*;
- 3) *Management of Metering Devices* (RMI-I-19.1.1-07).

The procedures for calibration of all monitoring equipment are described in RMI-I.19.0.1-07 and RMI-I.19.1.1-07.

Control of metering process and requirements to metrological support of metering equipment is assured as provided in DSTU 3921.1-1999 (ISO 10012-1:1992) *Requirements to Quality Assurance of Metering Equipment* and DSTU 3921.2- 2000 (ISO 10012-2:1997) *Quality Assurance by Means of Metering Equipment*²⁰.

The Chief Metrological Specialist (Head of I&C Department) is in charge for maintenance of the monitoring equipment and installations as well as for their accuracy required by paragraphs 2.1.1, 3.1.1, 7.1 of the Regulation PP 229-Э-056-863/02-2005 *On Metrological Services of the Iron Works*, STP 230-35-07 *Metrological Support of Measuring Equipment*,

¹⁹ Responsibility for data monitoring is determined by the Order # 327 issued by PJSC “DIISW” from 23.03.12.

²⁰ The instructions have been developed in accordance with ISO 9001:2001 requirements. They secure accuracy of all the measurements done using monitoring equipment.

Guideline on Plant Metrology Department, and I.19.0.1-07. In case of defect discovered in the monitoring equipment the actions of the personnel are determined by STP 230-35-07 *Metrological Support of Measuring Equipment, Guideline on Plant Metrology Department*, and I.19.0.1-07 (p.5.4.4).

The measurement of the parameters included into the monitoring plan of the project is envisaged by the provisions of the STP 230-35-07 *Metrological Support of Measuring Equipment, Guideline on Plant Metrology Department*, and I.19.0.1-07 (paragraph 5.3.2).

The measurements are conducted on continuous basis and automatically according to the STP 230-35-07 *Metrological Support of Measuring Equipment* and I-19.1.1-07 (p. 5.4). The results of the measurements are being used by relevant services and technical personnel of the Steel Mill.

Data on materials and FER consumption used for monitoring reports preparation are stored electronically and in printed documents in the bureau of chief accounting of the plant. Data was compiled in day-to-day records, quarterly records, and annual records. All records were finally stored in Planning Department. For emission reductions calculations Planning-economic department and Chief Energy Specialist department use costs data for the corresponding period.

DIISW has organized appropriate staff training to operate the project equipment. With the project equipment introduction the workers had the opportunity to update their working skills, stimulated by the permanent educational theoretical and practical courses at the Steel Plant. In the reporting period the following trainings were conducted²¹:

- The course on retraining and professional development of personnel in the Blast Furnace shop;
- The course on retraining and professional development of personnel in the Sinter Plant.

²¹ The confirming documents were provided to the verifier.

Annex 1: The list of monitoring equipment

Classification number	Explanation	Type of monitoring equipment	Serial number	Frequency of verification (calibration)	Date of last verification (calibration)
1	2	3	4	5	6
P-3 B-3	Scales for weighing pig iron	2390BB-200E/1C	90	Once a year	10.2011
P-5 B-5	BF-1m Natural gas consumption meter	Сапфир-М	02619588	Once in 2 years	04.2010
P-5 B-5	BF-1m Natural gas pressure meter	Сапфир –М	03484802	Once in 2 years	06.2010
P-5 B-5	BF-1m Natural gas consumption meter	Сапфир –М	03981694	Once in 2 years	04.2010
P-5 B-5	BF-1m Natural gas pressure meter	Сапфир –М	02800644	Once in 2 years	02.2012
P-5 B-5	BF-8 Natural gas consumption meter	Сапфир- М	03850732	Once in 2 years	07.2010
P-5 B-5	BF-8 Natural gas pressure meter	Сапфир- М	03393821	Once in 2 years	04.2010
P-5 B-5	BF-8 Natural gas consumption meter	Сапфир- М	03831731	Once in 2 years	02.2012
P-5 B-5	BF-8 Natural gas pressure meter	Сапфир – М	03483807	Once in 2 years	07. 2010

P-5 B-5	BF-9 Natural gas consumption meter	Метран-100	66737	Once a year	03.2012
P-5 B-5	BF-9 Natural gas pressure meter	Метран-100	65430	Once a year	03.2012
P-5 B-5	BF-9 Natural gas consumption meter	Метран-100	133425	Once a year	09.2011
P-5 B-5	BF-9 Natural gas pressure meter	Метран-100	135282	Once a year	06.2011
P-5 B-5	BF-12 Natural gas consumption meter	Сафир –М	10612957	Once in 2 years	07.2010
P-5 B-5	BF-12 Natural gas pressure meter	АИР-20	31275	Once a year	07.2011
P-5 B-5	BF-12 Natural gas consumption meter	Сапфир –М	07173694	Once in 2 years	07.2010
P-5 B-5	BF-12 Natural gas pressure meter	Сапфир –М	03493886	Once in 2 years	07.2010
P-8 B-8	Electric substation of Blast-furnace shop				
	Electricity meter #9	И670	130180	Once in 2 years	10.2010
	Electricity meter #10	И670	068744	Once in 2 years	12.2010
	Electricity meter #11	ИТ	111336	Once in 2 years	04.2010
	Electricity meter #12	ЕвроАльфа	01132780	Once in 8 years	02.2006
	Electricity meter #13	ЕвроАльфа	01132784	Once in 8 years	IV 2006

	Electricity meter #14	ЕвроАльфа	01132775	Once in 8 years	IV 2006
	Electricity meter #15	ЕвроАльфа	01132773	Once in 8 years	IV 2006
	Electricity meter #16	ЕвроАльфа	01132770	Once in 8 years	IV 2006
	Electricity meter #17	ЕвроАльфа	01132767	Once in 8 years	02.2006
	Electricity meter #18	ЕвроАльфа	01132769	Once in 8 years	IV 2006
	Electricity meter #19	ЕвроАльфа	01132774	Once in 8 years	02.2006
	Electricity meter #20	ЕвроАльфа	01132789	Once in 8 years	IV 2006
	Electricity meter #21	ЕвроАльфа	01132791	Once in 8 years	IV 2006
	Electricity meter #22	ЕвроАльфа	01132768	Once in 8 years	IV 2006
	Electricity meter #23	ЕвроАльфа	01132786	Once in 8 years	IV 2006
	Electricity meter #24	И670	193791	Once in 2 years	03.2012
	Electricity meter #26	И670	361580	Once in 2 years	05.2011
	Electricity meter #27	И670	304986	Once in 2 years	05.2011
	Electricity meter #28	И681	655731	Once in 2 years	05.2011
	Electricity meter #29	И670	905679	Once in 2 years	02.2011
P-12 B-12	Sinter plant Natural gas consumption meter	Сафир М Сафир М	03939733 03639990	Once in 2 years Once in 2 years	04.2011 01.2012
P-12 B-12	Sinter plant Natural gas pressure meter		08397518	Once in 2 years	04.2011
P-12 B-12	Sinter plant Natural gas pressure meter	Сапфир 2М	33822	Once a year	02.2012
P-15 B-15	Electric substation of Sinter plant				

	Electricity meter #1	И670М	365718	Once in 2 years	11.2011
	Electricity meter #2	И670	736250	Once in 2 years	10.2010
	Electricity meter #3	ИТ	113199	Once in 2 years	08.2011
	Electricity meter #4	И670М	429768	Once in 2 years	11.2011
	Electricity meter #5	И670Д	619098	Once in 2 years	09.2010
	Electricity meter #6	И670М	946661	Once in 2 years	11.2011
	Electricity meter #7	И670	130888	Once in 2 years	11.2011
	Electricity meter #8	ЕвроАльфа	01132785	Once in 6 years	02.2006
P-15 B-15	Electric substation of Lime shop				
	Electricity meter #69	И43	192130	Once in 2 years	10.2011
	Electricity meter #70	И670	473710	Once in 2 years	07.2010
	Electricity meter #71	И670	552166	Once in 2 years	06.2011
	Electricity meter #72	И670	584132	Once in 2 years	07.2010
P-18 B-18	Scales for weighing coke and anthracite	2370BB-150E/2C	70	Once a year	11.2011
P-18 B-18	Scales for weighing coke and anthracite	2329BB-50 E/1Д	29	Once a year	11.2011
P-21 B-21	Scales for weighing limestone, dolomite and pellets	2370BB-150E/2C	70	Once a year	11.2011
P-21 B-21	Scales for weighing limestone, dolomite and pellets	2329BB-50 E/1Д	29	Once a year	11.2011

P-25 B-25	CHP Natural gas consumption meter	Сапфир	517758	Once a year	09.2011
P-28 B-28	Electric substation of Water supply shop				
	Electricity meter #106	И670	095716	Once in 2 years	07.2010
	Electricity meter #107	ИТ	691814	Once in 2 years	03.2010
	Electricity meter #108	И670Д	363453	Once in 2 years	06.2011
	Electricity meter #109	И670	127301	Once in 2 years	07.2010
	Electricity meter #110	И670	771697	Once in 2 years	07.2010
	Electricity meter #111	И43	006194	Once in 2 years	12.2010
	Electricity meter #112	И43	047260	Once in 2 years	04.2011
	Electricity meter #113	И687	355820	Once in 2 years	05.2011
	Electricity meter #114	И670	146522	Once in 2 years	05.2010
	Electricity meter #115	И670	366136	Once in 2 years	05.2010
	Electricity meter #116	И670М	644511	Once in 2 years	08.2010
	Electricity meter #117	И670М	643487	Once in 2 years	08.2010
	Electricity meter #118	И670	793273	Once in 2 years	08.2010
	Electricity meter #119	И670	350061	Once in 2 years	08.2010
	Electricity meter #120	И43	237322	Once in 2 years	08.2011
	Electricity meter #121	И43	155427	Once in 2 years	10.2011
	Electricity meter #122	И670М	130498	Once in 2 years	07.2010
	Electricity meter #123	И670	649492	Once in 2 years	02.2012

	Electricity meter #124	И670	193831	Once in 2 years	01.2011
	Electricity meter #125	И670М	011918	Once in 2 years	08.2011
	Electricity meter #126	И670	303419	Once in 2 years	06.2010
	Electricity meter #127	ИТ	690221	Once in 2 years	11.2011
	Electricity meter #128	И670	233827	Once in 2 years	04.2010
	Electricity meter #129	И670М	096018	Once in 2 years	04.2010
	Electricity meter #130	И670	305171	Once in 2 years	02.2012
	Electricity meter #131	И670	377759	Once in 2 years	11.2010
	Electricity meter #132	И670	188830	Once in 2 years	06.2011
	Electricity meter #133	И670	192034	Once in 2 years	06.2011
	Electricity meter #136	И670	605102	Once in 2 years	02.2012
	Electricity meter #137	И670	082160	Once in 2 years	05.2010
	Electricity meter #138	И670М	095620	Once in 2 years	10.2011
	Electricity meter #139	И670М	506019	Once in 2 years	08.2010
P-28 B-28	Electric substation of Oxygen shop				
	Electricity meter #142	И670	754749	Once in 2 years	12.2010
	Electricity meter #143	И43	201587	Once in 2 years	10.2011
	Electricity meter #145	И670	143541	Once in 2 years	02.2012
	Electricity meter #146	И670М	157116	Once in 2 years	08.2010
	Electricity meter #147	И670	233755	Once in 2 years	01.2012
	Electricity meter #148	И670М	036772	Once in 2 years	01.2012
	Electricity meter #149	И670	062944	Once in 2 years	01.2012

	Electricity meter #150	И670	619944	Once in 2 years	04.2010
	Electricity meter #151	И670	919610	Once in 2 years	03.2012
	Electricity meter #152	ET	8876	Once in 6 years	09.2006
	Electricity meter #153	ET	8875	Once in 6 years	09.2006
P-28 B-28	Electric substation of Gas shop				
	Electricity meter #166	И670	690556	Once in 2 years	08.2011
	Electricity meter #167	И670	168047	Once in 2 years	08.2011
	Electricity meter #168	И670	232756	Once in 2 years	03.2011
	Electricity meter #169	И670	134849	Once in 2 years	09.2010
	Electricity meter #170	И670	672417	Once in 2 years	02.2012
	Electricity meter #171	И670	712689	Once in 2 years	03.2011
	Electricity meter #172	И670M	021916	Once in 2 years	12.2011
	Electric substation of CHP				
	Electricity meter #154	И670	069187	Once in 2 years	09.2011
	Electricity meter #155	И670	374202	Once in 2 years	03.2012
	Electricity meter #156	ИТ	313176	Once in 2 years	11.2010
	Electricity meter #157	И670	115317	Once in 2 years	10.2011
	Electricity meter #158	И670	754589	Once in 2 years	10.2011
	Electricity meter #159	И670	233380	Once in 2 years	12.2009
	Electricity meter #160	И670	306278	Once in 2 years	12.2010
	Electricity meter #161	И670	793115	Once in 2 years	07.2010

	Electricity meter #162	И670	681225	Once in 2 years	11.2010
	Electricity meter #163	И670	603211	Once in 2 years	11.2010
	Electricity meter #164	И670	350258	Once in 2 years	03.2012