Annual monitoring report

JI project

Revamping and Modernization of the Alchevsk Steel Mill, Ukraine

Track 1 JI Registration Reference UA 1000022

Year
2008

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1. Introduction and project description

Open Joint Stock Company "Alchevsk Iron and Steel Mill" (OJSC "AISW") has implemented the JI project by revamping and modernization of the Steel Plant. The project activity aims to replace existing production line with Open Hearth Furnaces, Ingot Casting and Blooming Mills by new LD Converters, Ladle Furnace, Vacuumator and Slab Casting Machines (Slab Casters).

OJSC "AISW" has used a traditional steel making technology – Open Hearth Furnaces, Ingot Casting and Blooming Mill to produce semi-finished products. The produced ingots are conglomeration of cavities. Therefore around 20-21% of ingots have to be cut off at the exit of the Blooming Mills and put back to the Open Heath Furnaces.

Alternatively with introduction of new Slab Casters and Ladle Furnace only around 3% of slabs have to be cut and put back to Open Hearth Furnaces of LD Converters (when they are installed). So the difference between traditional and existing production line and new Slab Caster line in terms of material losses is around 17-18% leading to reduced GHG emissions.

The project category is energy efficiency that is serving the reduction of end-user energy consumption in industrial applications and processes.

The project was started in 2005 with introduction of the first Slab Caster. According to the investment plan, the following major stages of project implementation have been envisaged:

Phase 1: Installation of Slab Caster #1 along with Ladle-Furnace.
Phase 2: Installation of Slab Caster #2 along with Vacuumator.
Phase 3: Installation of LD Converter #2.
Phase 4: Installation of LD Converter #1.

There is no leakage of GHG emissions associated with the project.

2. Current status of the project

By the end of 2007 only first two stages (Phases) were completed. The Slab Caster #1 was put into operation in August 2005 and Slab Caster # 2 - in March 2007.

Phase 3 was completed in January 2008 when LD Converter #2 was launched. LD Converter #1 started operation in September 2008 (Phase 4 was completed).

The emission reductions were considered from 01.01.2008 till 31.12.2008.

3. Monitoring period

Monitoring period is from 01/01/2008 till 31/12/2008.

4. Statement to what extent the project has been implemented as planned

The project has been completed with some delay. In the Project Design Document (PDD) it was mentioned that Phases 1, 2 and 3 would be completed by the end of 2007. However in practice Phase 3 was completed, as it was stated above, only in January 2008. However now project is fully implemented

The project was operational for the whole monitoring period, and emission reduction was considered for the whole period. However in last quarter of the year 2008 because of impact of global crisis the pace of steel output decreased causing decrease of project emission reductions.

5. Sustainability – economic and social well-being

The project activity is an energy efficient project which saves consumption of natural gas and coke oven gas as well as coal and coke. During the monitoring period, significant amount of fossil fuel and electricity, that would have been required if the project had not been implemented, has been saved.

This project, by reducing GHG emissions, contributes towards a better environment and hence works towards social well-being for all. Project implementation will lead to improvement of ecological climate of the region, increase of payments to the budgets of all levels for social needs, prevention of reduction of working places and better working conditions at Still Mill.

After modernization AISW became the most Integrated Steel Producer based on Converter Steel Making in Ukraine for the production of high quality steel grades. This has large demonstration effect for other Ukrainian Steel Mills.

6. Parameters being monitored according to monitoring plan

Baseline

ID Number	Data variable	Units	2008
	Baseline Emissions (BE)	Tonnes CO2	**6 240 733**
B-1	**Total Steel Output (TSO)**	Tonnes	2 460 922
B-2	**Total CO2 of Pig Iron (TCPI)**	Tonnes CO2	**5 759 498**
B-3	**Total CO2 from Fuel Consumption in Pig Iron production (TCFCPI)**	Tonnes CO2	**404 343**

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	2 432 364
B-6	**Total Pig Iron Produced (TPIP)**	Tonnes	2 432 364
B-7	**Quantity of each fuel (fpi) used in making Pig Iron (Q_{fpi})**	m3, 1000 m3	
	NG	m3,	217 426 939
	COG	1000 m3	4270,792
B-8	**Emission factor of each fuel (fpi) EF_{fpi}**	Tonnes CO2 per m3	
	NG	Tonnes CO2 per m3	0,00184
	COG	Tonnes per 1000 Nm3	0,798
B-9	**Total CO2 from Electricity used in Pig Iron production (TCEPI)**	Tonnes CO2	**276 620**
B-10	**Electricity Consumed in producing Pig Iron (ECPI)**	MWh	308 728
B-11	**Emissions Factor for Electricity Consumption in making Pig Iron (EFECPI)**	Tonnes CO2/MWh	0,896
B-12	**Total CO2 from inputs into Pig Iron (TCIPI)**	Tonnes CO2	**5 078 534**
B-13	**Total Carbon from Fuel Consumption in Sintering (TCFIO)**	Tonnes CO2	**109 158**
B-14	**Quantity of each fuel (fio) used in Sintering (Q_{fio})**	m3	
	NG	m3	33 720 797
	COG	ths. m3	58868,088
B-15	**Emission factor of each fuel in Sintering (fio) EF_{fio}**	m3	
	fuel 1		0,00184
	fuel 2		0,798
B-16	**Total CO2 from Electricity used in Sintering (TCEIO)**	Tonnes CO2	**133 445**
B-17	**Electricity Consumed in Sintering (ECIO)**	MWh	148 934
B-18	**Emissions Factor for Electricity Consumption in Sintering (EFECIO)**	Tonnes CO2/MWh	0,896
B-19	**Total CO2 from Reducing Agents (TCRAPI)**	Tonnes CO2	**4 428 882**
	Total Reducing Agent	Tonnes	1 375 579
	Default Emission Factor	Tonnes CO2/Tonne	3,10
	Total Reducing Agent	Tonnes	65 835
	Default Emission Factor	Tonnes CO2/Tonne	2,50
B-20	**Total CO2 from limestone (TCLPI) in Pig iron production**	Tonnes CO2	**407 049**
	Total Limestone	Tonnes	1 502 025
	Default Emission Factor	Tonnes CO2/Tonne	0,27
	Total dolomite	Tonnes	0
	Default Emission Factor	Tonnes CO2/Tonne	0,298125
B-21	**Total CO2 from steam production in Pig Iron Production (TCSPI)**	Tonnes CO2	**0**
B-22	**Quantity of each fuel (fspi) used in steam production in Pig Iron Production (Q_{fspi})**	m3	
	fuel 1		0
	fuel 2		0
B-23	**Emission factor of each fuel in steam production (fspi) EF_{fspi}**	Tonnes CO2 per m3	
	fuel 1		
	fuel 2		
B-24	**Total CO2 emissions from the furnace process (TCFP)**	Tonnes CO2	**374 048**
B -25	**Total CO2 emissions from fuel consumption in the furnace process (TCFCFP)**	Tonnes CO2	**111 214**

B -26	**Quantity of each fuel (ffp) used in furnace process (Q_{ffp})**	m3	
	NG	m3	60 311 297
	fuel 2		0
B -27	**Emission factor of each fuel in furnace process (ffp) EF_{ffp}**	Tonnes CO2 per m3	
	NG	Tonnes CO2 per m3	**0,0018440**
B -28	**Total CO2 emissions from electricity consumption in the furnace process (TCECFP)**	Tonnes CO2	**232 841**
B -29	**Electricity Consumed in furnace process (ECFP)**	MWh	259 867
B -30	**Emissions Factor for Electricity Consumption in furnace process (EFECFP)**	Tonnes CO2/MWh	0,896
B -31	**Total CO2 emissions from inputs to the furnace process (TCIFP)**	Tonnes CO2	**29 993**
B -32	**Total CO2 from Argon entering the furnace (TCAFP)**	Tonnes CO2	0
B -33	**Total CO2 from steam production in furnace process (TCSFP)**	Tonnes CO2	**0**
B -34	**Quantity of each fuel (fsp) used in steam production in furnace process (Q_{fsp})**	m3	
	fuel 1		0
	fuel 2		0
B -35	**Emission factor of each fuel in furnace process (fsp) EF_{fsp}**	Tonnes CO2 per m3	
	NG		**0**
	COG		**0**
B -36	**Total CO2 from compressed air production in furnace process (TCCAFP)**	Tonnes CO2	**2 446**
B -37	**Quantity of each fuel (fca) used in compressed air production in furnace process (Q_{fca})**	m3	
	NG	m3	0
	fuel 2		0
B -38	**Emission factor of each fuel in furnace process (fca) EF_{fca}**	Tonnes CO2 per m3	
	NG		**0,001844**
	fuel 2		**0**
B -39	**Electricity Consumed in making compressed air for the furnace process in steel making (ECCA)**	MWh	2 730
B -40	**Emissions Factor for Electricity Consumption (EFECCA)**	Tonnes CO2/MWh	0,896
B -41	**Total CO2 from oxygen production (TCOFP)**	Tonnes CO2	0
B -42	**Quantity of each fuel (fop) used in oxygen production (Q_{fop})**	m3	
	fuel 1		0
	fuel 2		0
B -43	**Emission factor of each fuel in oxygen production (fop) EF_{fop}**	Tonnes CO2 per m3	
	fuel 1	**0**	**0**
	fuel 2	**0**	**0**
B -44	**Electricity Consumed in making oxygen (ECOP)**	MWh	0
B-45	**Emissions Factor for Electricity Consumption in making oxygen (EFECOP)**	Tonnes CO2/MWh	0,896
B-46	**Total CO2 from limestone for furnace process (TCLFP)**	Tonnes CO2	**27 547**
	Total Limestone	Tonnes	12 698
	Default Emission Factor	Tonnes CO2/Tonne	0,27
	Total dolomite	Tonnes	81 993

	Default Emission Factor	Tonnes CO2/Tonne	0,294
B-47	**Total CO2 from blooming (TCBM)**	Tonnes CO2	**106 338**
B-48	**Total CO2 from fuel consumption in blooming (TCFCBM)**	Tonnes CO2	**39 780**
B-49	**Quantity of each fuel (fbm) used in blooming (Q_{fbm})**	m3	
	NG	m3	1 394 186
	COG	1000 m3	46 628
B -50	**Emission factor of each fuel in blooming (fbm) EF_{fbm}**	Tonnes CO2 per m3	
	NG	**m3**	**0,00184**
	COG	**1000 m3**	**0,79800**
B-51	**Total CO2 from electricity consumption in blooming (TCECBM)**	Tonnes CO2	**66 558**
B-52	**Electricity Consumed in blooming (ECBM)**	MWh	74 283
B-53	**Emissions Factor for Electricity Consumption in blooming (EFECBM)**	Tonnes CO2/MWh	0,896

Projectline

ID number	Data variable	Units	2008
	Project Emissions (PE)	Tonnes CO2	**5 597 727**
P-1	**Total Steel Output (TSO)**	Tonnes	2 460 922
P-2	**Total CO2 of Pig Iron (TCPI)**	Tonnes CO2	**5 158 067**
P-3	**Total CO2 from Fuel Consumption for Pig Iron (TCFCPI)**	Tonnes CO2	**344 654**
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	2 169 596
P-6	**Total Pig Iron Produced (TPIP)**	Tonnes	2 169 596
P-7	**Quantity of each fuel (fpi) used in making Pig Iron (Q_{fpi})**	m3	
	NG	m3	185 180 222
	COG	1000 m3	3 754
P-8	**Emission factor of each fuel in Pig Iron Production (fpi) EF_{fpi}**		
	NG	Tonnes CO2 per m3	0,00185
	COG	Tonnes per 1000 Nm3	0,79824
P-9	**Total CO2 from Electricity used in Pig Iron production (TCEPI)**	Tonnes CO2	**246 579**
P-10	**Electricity Consumed in producing Pig Iron (ECPI)**	MWh	275 200
P-11	**Emissions Factor for Electricity Consumption in Pig Iron Production (EFECPI)**	Tonnes CO2/MWh	0,896
	Total Electricity Used in Steel Making Process		0
	Grid Emission Factor	Tonnes CO2/MWh	0,896
	CHP Plant Emission Factor	Tonnes CO2/MWh	0,00
	Total Electricity Produced by CHP	MWh	0
	Blast Furnace Gas	1000 m3	0
	NG	m3	0
	Emission factor for BFG	Tonnes CO2 per 1000 m3	0
	Emission factor NG	Tonnes CO2 per m3	0,00185
P-12	**Total CO2 from inputs into Pig Iron (TCIPI)**	Tonnes CO2	**4 566 834**
P-13	**Total CO2 from Fuel Consumption in Sintering (TCFIO)**	Tonnes CO2	**111 123**

P-14	**Quantity of each fuel (fio) used in Sintering (Q_{fio})**	m3	
	NG	m3	37 516 294
	COG	1000 m3	52 498
P-15	**Emission factor of each fuel in Sintering (fio) EF_{fio}**	m3	
	NG	Tonnes CO2 per m3	0,001845
	COG	Tonnes per 1000 Nm3	0,79824
P-16	**Total CO2 from Electricity used in Sintering (TCEIO)**	Tonnes CO2	**119 535**
P-17	**Electricity Consumed in Sintering (ECIO)**	MWh	133 410
P-18	**Emissions Factor for Electricity Consumption (EFECIO)**	Tonnes CO2/MWh	0,896
P-19	**Total CO2 from Reducing Agents (TCRAPI)**	Tonnes CO2	**3 950 036**
	Total Reducing Agent	Tonnes	1 227 043
	Default Emission Factor	Tonnes CO2/Tonne	3,10
	Total Reducing Agent	Tonnes	58 481
	Default Emission Factor	Tonnes CO2/Tonne	2,50
P-20	**Total CO2 from limestone (TCLPI) in Pig iron production**	Tonnes CO2	**386 139**
	Total Limestone	Tonnes	1 424 342
	Default Emission Factor	Tonnes CO2/Tonne	0,2711
	Total dolomite	Tonnes	0
	Default Emission Factor	Tonnes CO2/Tonne	0,2939
P-21	**Total CO2 from steam production in Pig Iron Production (TCSPI)**	Tonnes CO2	0
P-22	**Quantity of each fuel (fspi) used in steam production in Pig Iron Production (Q_{fspi})**	m3	
	fuel 1		0
	fuel 2		0
P-23	**Emission factor of each fuel in Steam Production (fspi) EF_{fspi}**	Tonnes CO2 per m3	
	fuel 1		
	fuel 2		
P-24	**Total CO2 emissions from the furnace process (TCFP)**	Tonnes CO2	**274 135**
P-25	**Total CO2 emissions from fuel consumption in the furnace process (TCFCFP)**	Tonnes CO2	**46 503**
P-26	**Quantity of each fuel (ffp) used in furnace process (Q_{ffp})**		
	NG	m3	25 204 876
P-27	**Emission factor of each fuel in the furnace process (ffp) EF_{ffp}**	Tonnes CO2 per m3	
	NG	Tonnes CO2 per m3	0,00185
P-28	**Total CO2 emissions from electricity consumption in the furnace process (TCECFP)**	Tonnes CO2	**214 695**
P-29	**Electricity Consumed in the furnace process (ECFP)**	MWh	239 615
P-30	**Emissions Factor for Electricity Consumption in the furnace process (EFECFP)**	Tonnes CO2/MWh	0,896
P-31	**Total CO2 emissions from inputs to the furnace process (TCIFP)**	Tonnes CO2	**12 937**
P-32	**Total CO2 from Argon entering the furnace (TCAFP)**	Tonnes CO2	0
P-33	**Total CO2 from steam production in the furnace process (TCSFP)**	Tonnes CO2	**260**
P-34	**Quantity of each fuel (fsp) used in steam**	m3	

	production in the furnace process (Q_{fsp})		
	NG	m3	8
	COG	1000 m3	259
P-35	**Emission factor of each fuel in the furnace process (fsp) EF_{fsp}**	Tonnes CO2 per m3	
	NG	m3	0,001845
	COG	1000 m3	0,79824
P-36	**Total CO2 from compressed air production for the furnace process (TCCAFP)**	Tonnes CO2	**0**
P-37	**Quantity of each fuel (fca) used in compressed air production (Q_{fca})**	m3	
	NG	m3	0
	fuel 2		0
P-38	**Emission factor of each fuel in compressed air production (fca) EF_{fca}**	Tonnes CO2 per m3	
	NG	m3	0,00185
	fuel 2		0
P-39	**Electricity Consumed in making compressed air for the furnace process (ECCA)**	MWh	0
P-40	**Emissions Factor for Electricity Consumption in compressed air production (EFECCA)**	Tonnes CO2/MWh	0,896
P-41	**Total CO2 from oxygen production (TCOFP)**	Tonnes CO2	0
P-42	**Quantity of each fuel (fop) used in oxygen production (Q_{fop})**	m3	
	fuel 1		0
	fuel 2		0
P-43	**Emission factor of each fuel in oxygen production (fop) EF_{fop}**	Tonnes CO2 per m3	
	fuel 1		0
	fuel 2		0
P-44	**Electricity Consumed in making oxygen (ECOP)**	MWh	0
P-45	**Emissions Factor for Electricity Consumption in making oxygen (EFECOP)**	Tonnes CO2/MWh	0,896
P-46	**Total CO2 from limestone for furnace process (TCLFP)**	Tonnes CO2	**12 677**
	Total Limestone	Tonnes	7 086
	Default Emission Factor	Tonnes CO2/Tonne	0,2711
	Total dolomite	Tonnes	36 596
	Default Emission Factor	Tonnes CO2/Tonne	0,2939
P-47	**Total CO2 from casting (TCBM)**	Tonnes CO2	**165 258**
P-48	**Total CO2 from fuel consumption in casting (TCFCBM)**	Tonnes CO2	**8 013**
P-49	**Quantity of each fuel (fbm) used in casting (Q_{fbm})**	m3	
	NG	m3	3 125 695
	coal electrodes		624
P-50	**Emission factor of each fuel used in casting (fbm) EF_{fbm}**	Tonnes CO2 per m3	
	NG	m3	0,00185
	coal electrodes		3,6
P-51	**Total CO2 from electricity consumption in casting (TCECBM)**	Tonnes CO2	**157 244**
P-52	**Electricity Consumed in casting (ECBM)**	MWh	175 496
P-53	**Emissions Factor for Electricity Consumption in casting (EFECBM)**	Tonnes CO2/MWh	0,896

7. Emission reduction

Following table shows emission reduction through the project:

	2008
Baseline Emissions, t CO_2e	6 240 733
Project Emissions, t CO_2e	5 597 727
Emission Reductions, t CO_2e	**643 006**

8. Measures to ensure the results/uncertainty analysis

The monitoring procedures for the most part are straightforward in term of what AISW already does to collect energy consumption data and measure inputs and outputs. Three set of instructions at the AISW regulate the monitoring procedures and responsibilities. They are called Guiding Metrological Instructions:

1) "Metrological product quality assurance" (RMI-I-19.0.1-07)
2) "Metrological expertise of documentation" (RMI-I-19.0.2-07)
3) "Management of measurement technique" (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.

The above mentioned instructions also secure the traceability of monitoring/metering devices.

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

Best available techniques are used in order to minimize uncertainties. Uncertainties are generally low, typically below 2% with as all parameters are or will be monitored. All the equipment used for monitoring purposes is in line with national legislative requirements and standards and also in line with ISO 9001 standards.

Details are given in Guiding Metrological Instructions.

9. Roles and responsibilities

The Chief Metrological Specialist of the AISW is in charge for maintenance of the monitoring equipment and installations as well as for their accuracy required Regulation PP 229-Э-056-863/02-2005 "On metrological services of the iron works" and on Guiding Metrological Instructions. In case of defect is discovered in

the monitoring equipment the actions are determined in Guiding Metrological Instructions. The measurements are conducted on continuous basis and automatically.

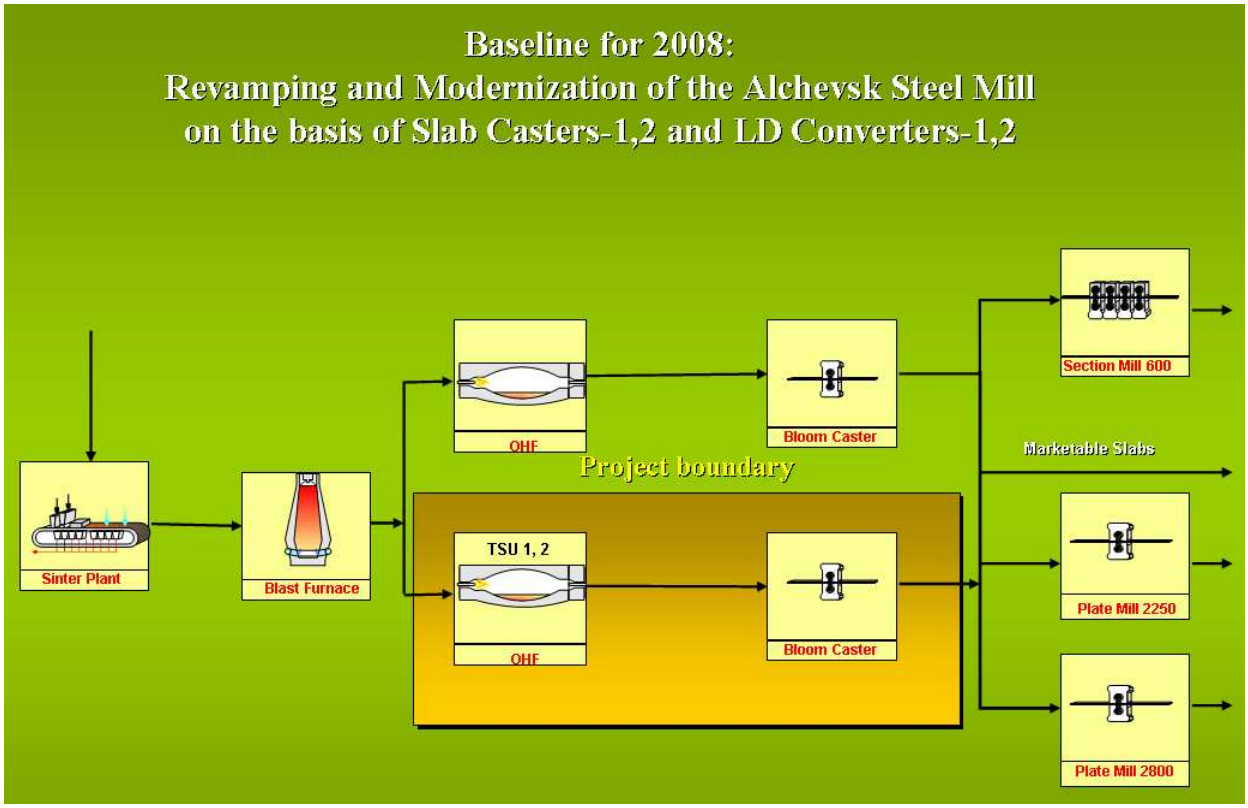
Data is collected into electronic database of AISW as well as in paper format. Data is further compiled in day-to-day records and annual records. All records are finally stored in Planning Department.

The results of the measurements are being used by relevant services and technical personnel of the iron works. They will be reflected in the technological instructions for the regimes of conducting the technological processes and in the revision of Guiding Metrological Instructions.

The data will be cross checked as well as internal audits and corrective actions are taken as defined in Instructions. For the project case, similar procedures will followed based on forthcoming Order of Director General of the Plant defining the exact JI monitoring procedures. Responsibilities for JI monitoring are indicated in table 6 of the PDD.

10. Sample schemes for estimate of emission reductions

Project boundary for the baseline is given at Picture below. In fact baseline is continuation of the historical practice of the AISW to produce steel.



Project boundary for the project line is depicted at picture below.