



<sup>1</sup>. Bożena GAJZIK

## SUSTAINABLE STEELWORKS AFTER RESTRUCTURING PROCESS IN POLAND – SOME EXAMPLED EFFECTS

<sup>1</sup>. THE SILESIA UNIVERSITY OF TECHNOLOGY, FACULTY OF MATERIALS SCIENCE AND METALLURGY, DEPARTMENT OF MANAGEMENT AND COMPUTER SCIENCE, KATOWICE, POLAND

**ABSTRACT:** The aim of this article is to present the key elements of changes in steelworks plants in Polish metallurgical sector after restructuring process. Market situation of domestic steel industry was presented in the period 1990-2010. In the period new methods of raising the effectiveness of enterprises functioning started to be favoured. Some of them were presented in the article. Moreover statistic data about Polish steel industry were presented too. The statistic information show changes in Polish steel industry. All the changes lead to sustainable business in the sector of the economy.

**KEYWORDS:** restructuring process, restructuring changes, sustainable business, sustainable development

### INTRODUCTION

The transformation of the Polish economic system in the early 1990s forced enterprises to adjust to totally new conditions of the market economy. New methods of raising the effectiveness of enterprises functioning started to be favoured, not only in the sphere of basic business, but also in additional activities preparing for sustainable development. One of the industry sectors in Poland, which underwent restructuring, was metallurgy of iron and steel. The year 1992 is considered the beginning of changes. In 2007 the Government of the Republic of Poland and the European Commission acknowledged that the restructuring programme, based on the document “Restructuring and Development of the Iron and Steel Metallurgy in Poland up till 2006” had been realized. Recent years saw Poland vigorously development steel industry. In 2009 steel market turned to worse – adverse global crisis spill over hit Poland badly. 2010 saw Poland’s economy picking up again. Enterprises in steel sectors still change to develop and build competitiveness. In global economy their development must be sustainable. The concept of sustainable development lets develop both business and other social activities. Enterprises, which using the concept are called sustainable. How changed Polish steelworks after 1992 years to be more sustainable, the article shows. This publication is a result of analytic and scientific research of the author and a result of many years of observations of changes occurring in metallurgy sector in Poland.

### RESTRUCTURING PROCESS AND SUSTAINABLE BUSINESS

The aim of restructuring is the achievement of the highest effectiveness of enterprise functioning in new conditions in the market. Scientists, both national and foreign, agree that the introduction of restructuring results from the difference in the speed of changes in the surrounding and the speed of introduction of changes in the enterprises. In order to function properly the enterprises need to adjust their basic functions and additional functions to the dynamics of the surrounding. The restructuring process cannot be a duplicated action, because each enterprise has specific conditions of functioning and wide range of options of how to create the right relations between it and the surrounding. Conditions for enterprises in Polish steel market differ from others markets. Each economy has its characterized macroeconomic indicators for example GDP, consumption indicators, exports and imports, inflation and unemployment rate. According to macro and microenvironment the enterprises realize changes in their activities. During crisis the aim here is to eliminate the unprofitable and unnecessary areas of activity in order to bring back the financial liquidity and to avoid the winding-up of the enterprise. Such changes are characteristic for repair restricting process. When there is prosperity in the market the enterprises invest in new business activities to have more competitive position in the market. They use modern and energy-saving technologies (technologies and facilities applied today by domestic steel marker meet BAT requirements – Best Available Techniques), modern methods of

management and work organization (methods connected with: Total Quality Management, better productivity for example Total Productive Maintenance, Time Based Management re engineering, Lean Management, Just in Time and others). Such changes in enterprises are called development restructuring and they lead to sustainable business.

### CHANGES IN POLISH STEEL INDUSTRY AND SOME EXAMPLED EFFECTS

The most important event in restructuring of Polish steel industry was closing the privatisation transaction of Polish Steelworks, which were the former Katowice Steelworks, T. Sendzimira Steelworks, Florian and Cedler which were consolidated into one holding in 2002. Polish Steelworks, in the end of 2003, were taken over by foreign capital, now ArcelorMittal. On the global steel market, the group ArcelorMittal is considered the leader in steel production because it is number one in the international ranking. In 2009 the group produced 77.5 million tonnes of crude steel [1]. ArcelorMittal Poland owns 70 % share in the Polish steel market. The company realises the full production cycle, owns big furnaces to melt foundry pig, converters and continuous casting of steel production lines. After privatisation of Polish Steelworks others were chosen to be sold: Zawiercie, Ostrowiec and Częstochowa. Steelworks Zawiercie (now CMC Zawiercie) was bought by American capital group. Ostrowiec Steelworks was sold in July 2003 to a Spanish company Celsie. In case of Częstochowa Steelworks the chosen strategic investor was Industrial Union of Donbasa (corporation from Ukraine). In 2005, the steelworks was taken over by Industrialnyj Sojuz Donbasa and IDS Huta Częstochowa Sp. z o. o. Four metallurgical enterprises: ArcelorMittal Poland, CMC Zawiercie, Huta Ostrowiec and Huta Częstochowa manufacture together over 90 % of Polish steel.

Until 2005 the ownership changes took place in most Polish steelworks which caused the creation of new metallurgical enterprises, often with new names. Most steelworks changed their legal status and on the basis of the possessions of the steelworks new production and service companies were created. It is assumed that until 2001 more than 100 companies were isolated and created out of Polish steelworks [2]. The basic legal forms among them were trading companies which were limited liability companies and joined stock companies (figure 1).

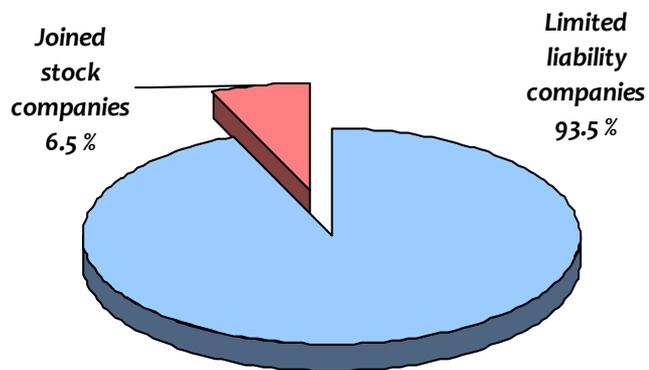


Figure 1. Structure of trading companies in metallurgy in Poland in year 2001 [2]

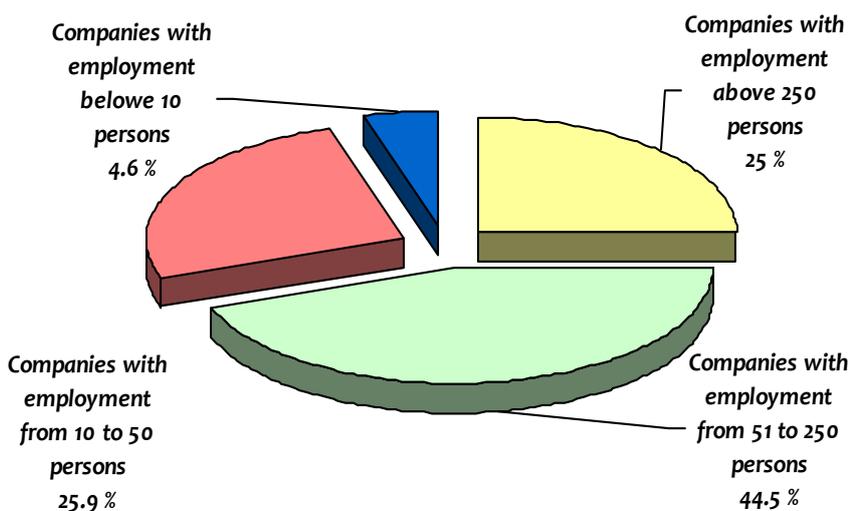


Figure 2. Structure of employment in metallurgical companies during outsourcing process in Poland in 1990-2000 [2]

New enterprises realize such activities: transport service, traffic maintenance, renovation-construction service, electro-energetic service, purchase and processing of scrap metal, production of metal products and steel constructions, production of metallurgical products, social services, municipal

services, medical services, trade and distribution of metallurgical products, information technology, management, production of special products etc.

During restructuring process the employment in Polish steelworks was reduced from 147000 people in 1990 to 25000 in 2010. The basic forms of employment reduction were: paid out benefits and pre-retirement pension for the employees of steelworks, unconditional severance pay, courses and training and connected with that costs of retraining workers and paid retirements in the due time as well as disability payments (figure 3).

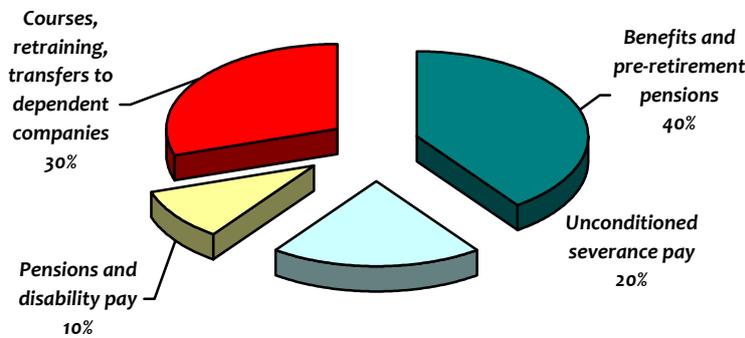


Figure 4. Forms of employment reductions in metallurgical sector in Poland [3, 4]

Table 1. The steel production in Poland and number of employees [3]

Year	Steel production [in million tons]	Number of employees [in thousand persons]	Productivity per head [tons]
1990	13.5	147.0	88
1991	10.3	123.0	81
1992	9.8	106.0	92
1993	8.9	99.0	90
1994	11.0	93.0	118
1995	11.7	91.0	128
1996	10.4	90.0	115
1997	11.6	86.5	134
1998	9.9	78.2	126
1999	8.8	55.2	159
2000	10.5	38.7	271
2001	8.8	31.6	278
2002	8.4	26.4	318
2004	10.5	28.0	375
2005	8.3	29.0	286
2006	10.0	30.4	329
2007	10.7	28.9	370
2008	9.1	29.3	310
2009	7.1	26.3	270
2010	8.0	25.4	314

As a result of the restructuring, the productivity of the metallurgical sector increased. In 1990 it equalled 88 tons per head, in 2010 about 314 tons per head. It is still not enough in comparison to the EU standards of productivity, which are ca. 500/600 tons per head. Table 1 presents the steel production in Poland and the number of employees [3].

Reduction of the production from 13.5 million tons to 8 million tons (crude steel) was caused by market demand, particularly in building sector (residential and infrastructural) as well as automotive, machinery builder, home appliances and metals industries. Production of steel was conducted in converters and electrical furnaces. 2010 saw 4 million tonnes steel made via electrical furnaces (EAFs), or 50.02%, and 3.99 million tonnes of converters (BOFs) made steel, or 49.98%. Poland's contribution to EU steel was 5%. [5]. Manufacture of crude steel by particular processes from 1992 to 2010 was presented in the figure 4.

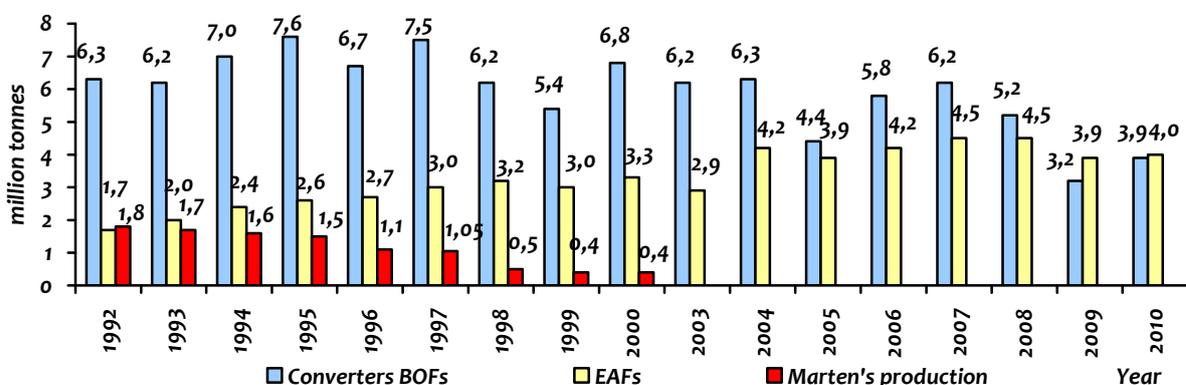


Figure 4. Steel production in Poland according to processes in 1992-2010 [3,5]

HR finished goods has such structure: 34.1% - flat products, 65.9% long products. These products are produced in hot-rolled process. In cold products Polish steel sector produce sheets and strips. The

production of steel pipes and tubes along with hollow sections were 839 000 in 2010. The structure of production was presented in the table 2 [5].

Table 2. The structure of production in Polish metallurgical sector in 2000-2010 [5]

PRODUCT/YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Breakdown of hot rolled long products in %											
Wire rod	22.6	23,5	22,7	22,5	21.1	20.7	20.0	18.0	22.0	25.0	25.0
Bars	35.1	30.9	30.2	32.2	34.0	36.6	38.0	40.0	40.0	45.0	42.0
Heavy sections	33.7	35.7	36.3	37.7	37.1	35.0	34.0	35.0	32.0	24.0	24.0
Light sections	4.1	3.9	5.8	4.3	3.9	3.0	3.0	2,0	3.0	2.0	3.0
Rails	4.5	5.8	4.7	2.9	3.8	4.3	5.0	5,0	3.0	4.0	6.0
Breakdown of hot rolled flat products in %											
Wide strip	70	78	79	78	73	67	66	62	61	70	76
Plates	29	22	21	22	27	33	34	38	39	30	24

Poland's steel market visibly improved after restructuring process. The enterprises have good economic standing. In the 80s and 90s of 20<sup>th</sup> century the metallurgical enterprises in Polish market were in debt. In 1995, the value of financial liabilities of the metallurgical sector was 7.1 million zloty. The steelworks in debt were supported by the national budget. Financial restructuring influenced the liabilities concerning steelworks towards the national budget, Work Fund, Guaranteed Employee Benefits Fund, National Fund of Environmental Protection and Water Management, local governments and Fund of Social Insurance. It is estimated that the value of 2.4million zloty was the amount of public help up to year 2003 for the steelworks. After 2003 the help from the country could be regulated by the provisions of the European Union (Poland's accession to the EU in 2004). Financial help for the steelworks could have been granted within so-called beneficiaries list and it was granted only once. After 2004 the subsidy for metallurgy was limited.

The biggest favourable result was noted down in 2004 (data for 9 months) and equalled 1857.4 million zloty. In 2004 the economic situation for steel and metallurgical products in Poland and all over the world was favourable. Enterprises benefited from that situation by producing and selling more. A growing tendency for production of raw steel started up to the amount of 10 million tonnes a year. A significant drop in metallurgical production was noted down in 2009. That year only 7.1 million tonnes of raw steel was produced due to global crisis.

Good financial situation of the steelworks resulted in the increase of the expenses for investments. In 2006 the Polish metallurgy spent 1 billion euro on investments [3]. Apart from the investments concerning the expansion of the real estates, the companies completed also some organisational and management innovations. Information technology systems of enterprise management (SAP) appeared, the systems of quality management according to ISO 9001 norm were applied, the stage of clean production and environment management started (ISO 14001), the marketing and distribution activities were developed. The work organisation was led according to process approach (instead of event-based approach), the systems of improvement of device operation effectiveness were implemented (TPM - Total Productivity Maintenance), the rule concerning workplace organisation methodology was introduced (5S), the systems of work safety management were applied (PN-N 18001). An important aspect of changes was also the introduction of the ideas of Kaizen philosophy, allowing for constant improvement of the functioning in an enterprise. Until 2008 the steelworks quite easily realised the planned investments and broadly understood innovations (product, process, technological innovations etc.). The investment-innovation actions were supposed to increase the productive potential and competitive position of the enterprises on the market. In 2009 the metallurgical enterprises limited the expenses on the investments due to the world crisis and the decrease of the demand for the metallurgical products on the foreign markets. Steel-consuming sectors' downturn made its painful Mark on steel output and steel revenues. Poland's ASU was merely 8.19M tones in 2009, down 32% as compared to 2007. 2010 saw Poland's economy picking up again. Steel-consuming sectors grown, and in effects Poland's ASU spiked 20% vis-à-vis 2009 [5].

In order to achieve the standard of sustainable enterprises the steelworks invest in environment friendly technologies. In recent years the pollution emission and the amount of waste produced got reduced. The amount of dust pollution which is filtered and kept in by the cleaning devices is gradually getting bigger. In 2010 dust emissions captured by dedusting facilities were 324 000. In 2010 the average dust emissions factor was 0.59 kgs/tonne crude steel (average for EAF and BF/BOF router).

The basic problem is emission of CO<sub>2</sub>. Polish steel sector produce about 0,9mt per metric tone of crude steel. But the share of the national metallurgical sector in the amount of created carbon dioxide is decreasing. In 2006, it was about 6% of the whole CO<sub>2</sub> emission created by the Polish industry. Now it is only 4% (figure 5). Further abatement is only possible when breakthrough technologies have been widely implemented and access to low-carbon electricity has been ensured in Poland.

Also in water management in steelworks there has been a lot of changes. Steelworks introduced closed water circulation system and rational management of water resources. Water consumption in Polish steel industry estimates from 15 000 th.cubic m to 20 000. cubic m [3].

Metallurgical sector is also responsible for creating waste Solid waste arising within the steel industry are divided into: generated In the applied production process (i.e. steelmaking slag, rolling scale) and generated in environmental protection process (i.e. sludge/slurry, filter dust, flue desulfurization residue etc.). About 94% waste is reused for economic purposes, some recycled to the steel process for recovery of ferrous and ferruginous substances. The structure of waste was presented in the figure 7 [5 p. 35]. The structure of waste management was presented in figure 8 [3; 5 p. 36]. Another environmental aspect is sewage. After restructuring process all steel effluent has been subject to treatment.

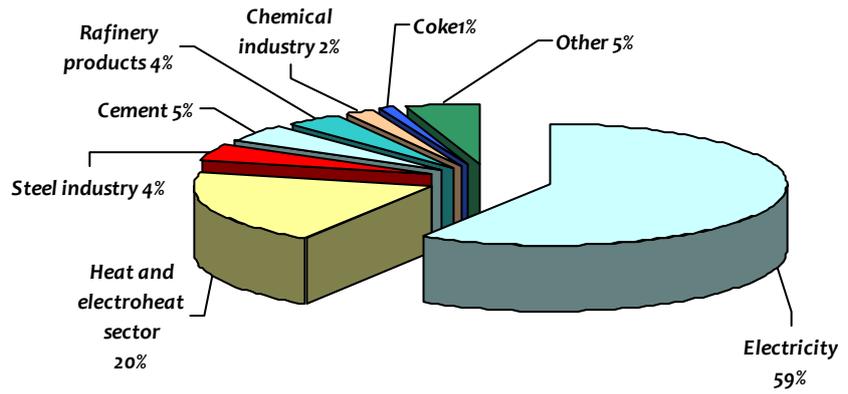


Figure 5. Share of steel industry emission in total country's CO<sub>2</sub> emission [5, p. 29]

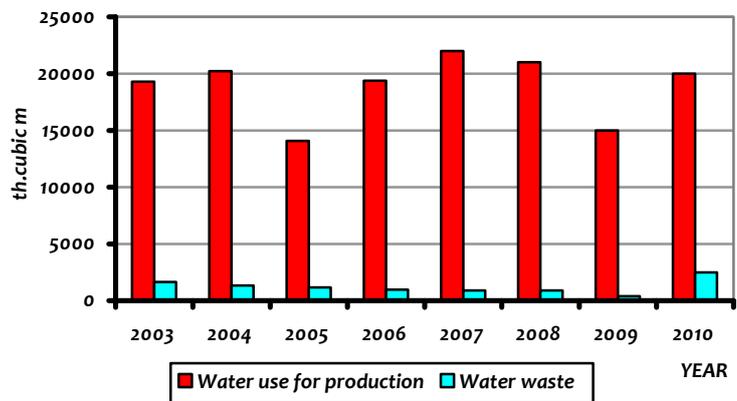


Figure 6. Water consumption in the Polish metallurgical production in the period 2003-2010 [3, 5]

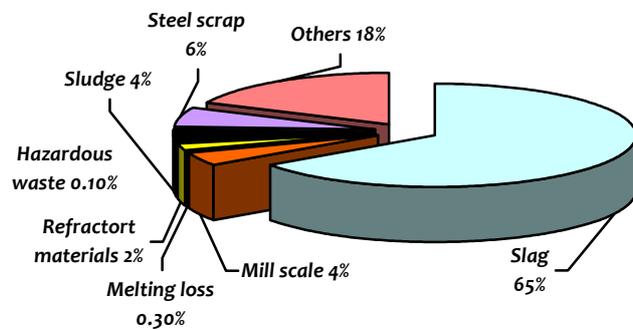


Figure 7. Waste products in the Polish iron and steel industry in 2010 [5, p. 35]

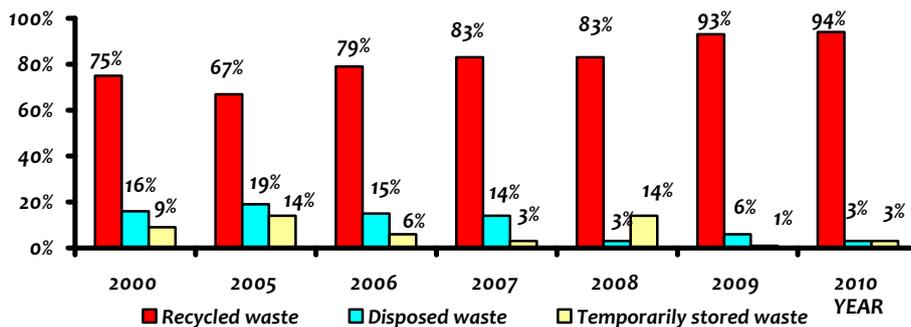


Figure 8. Waste management In Polish steel industry in 2000-2010 [3; 5, p.36]

**CONCLUSIONS**

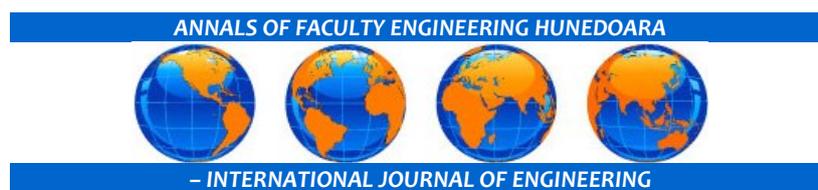
The observed changes in metallurgical sector make the enterprises realise that they should search for new solutions which improve their functioning. Applied novelties in different areas of functioning of metallurgical enterprises will continue to be used. New models of enterprises functioning are being created and one of those models is the sustainable business model. Restructuring of Polish steel sector was constantly monitored by European Commission.

In 2007, Polish Government and European Commission stated that the program “Restructuring and development of metallurgy of iron and steel in Poland till 2006” was successfully completed. It should not be forgotten, however, that the enterprise management in times of market economy is very complex and restructuring processes are constantly being realised. Changes in the process caused that Polish steel industry is more sustainable. Some of steelworks realized the strategy Cleaner Production for example metallurgical company ArcelorMittal Poland, steelworks Ferrum SA [6] and others.

Cleaner Production creates the ecological values category for metallurgical enterprises. According to this concept, the companies are motivated by the reduction of the negative influence on the environment (lower levels of pollution emissions) and through the rational resource management (saving energy – electricity, thermal energy, water, gas etc.) – so they are more sustainable than others.

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