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Environmental performance indicators used in the EMAS system on the example of Czestochowa Municipal Company

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ABSTRACT

The subject of consideration of the following study are environmental performance indicators used in the Eco-Management and Audit Scheme (EMAS) as a tool for assessing the organization's environmental performance. EMAS is an element of environmental management in organizations, is based on European Union guidelines and regulations, about on the voluntary participation of the organisation in the Eco-Management and Audit System. The following considerations concern the comparative analysis of environmental performance indicators in 2012-2015 at the Czestochowa Municipal Company in order to assess the development of environmental performance of the organization.

***Keywords*:** Eco-Management and Audit Scheme, EMAS, Czestochowa Municipal Company, environmental management, environmental management system, environmental performance indicators

1. INTRODUCTION

Nowadays, when environmental protection is an important element of the economy, it is necessary to apply the principles of environmental management and the concept of sustainable development, which concerns the use of resources needed to meet society's needs,

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taking into account their future generations and effective development in social, economic and social aspects ecological. A modern approach to business management should strive to increase economic benefits with the assumption of improving the quality of life of the society and maintaining ecological balance. [1] The concept of sustainable development assumes achieving an optimal and sustainable level of social well-being, through organizational, technical and technological, economic, ecological and social transformations. The principles of sustainable development can be used to improve the life of society and shape development processes in various spheres of economic and social life. [2] The development of entrepreneurship can not proceed without taking into account the protection of the natural environment, which is why entrepreneurs, when taking ecological actions, also have effects at the economic and social level. [3] Therefore, the implementation and dissemination of eco-management in companies is important [4].

The environmental awareness of enterprises is systematically growing, and therefore additional environmental management systems, such as EMAS, are also gaining in importance. EMAS was introduced by the European Parliament and the Council (EC), it is addressed to various organizations, financial institutions, public institutions, service providers, manufacturing companies that want to limit the negative impact of their activities on the environment. Participation in the system is voluntary and available to all public and non-public organizations [5]

2. ECO-MANAGEMENT AND AUDIT SCHEME (EMAS)

An environmental management system is a worldwide tool for potential use by any organization to improve environmental management and achieve continuous improvement of environmental performance. There are two main standards that define the requirements for EMS: the international standard ISO 14001 designed by the International Organization for Standardization (ISO) and the Eco-Management and Audit Scheme (EMAS) regulated by European Regulation EC 1221/2009. [6] Both standards are based on very flexible requirements that allow each organization to create an environmental management system in accordance with its internal features and to choose the most effective solutions to improve their performance.[7] The implementation of the EMS improves some of the environmental management practices, such as registering and using information, knowledge and implementation of licensing requirements, maintenance of installations, management and training, and process support. [8] Benefits resulting from the implementation of the EMS environmental management system cause that it is the main tool within the set of environmental tools used by the creators of an integrated environmental policy, combining sustainable consumption and production with environmental protection. The importance of EMS standards in European environmental policy has led the European Commission to design an EMAS policy instrument based on the Deming cycle concept (PDCA, Plan-Do-Check-Act). Member States and local authorities support the implementation of EMAS ISO 14001 through a number of legal reliefs and incentives, such as prolonging the duration of the environmental permit, reducing controls, tax benefits. [9]

EcoManagement and Audit Scheme (EMAS) is an EU environmental certification system that operates based on Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in

a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC. The first version of EMAS (EMAS I) was issued in 1993 when key principles such as pollution prevention and a voluntary approach to improving environmental performance were included in the European Union's environmental policy. [10]

The EMAS system is addressed to all types of organizations interested in the implementation of comprehensive solutions in the field of environmental protection, both representatives of companies and non-profit institutions. It is a tool for implementing sustainable development principles in organizations and effective management of available resources and energy. The requirements set out in EMAS are guidelines, guidelines thanks to which organizations organize environmental protection obligations, optimize costs incurred and effectively manage energy and resources.

The goal of EcoManagement and Audit Scheme is to support the continuous improvement of environmental performance of the organization by creating and implementing an environmental management system, assessing the functioning of such a system, providing information on environmental performance, conducting an open dialogue with the public and other interested parties and actively engaging employees. Registering an organization in the EMAS system means meeting certain environmental protection requirements [11, 12].

The requirement of the EMAS Regulation that distinguishes it from other EMS systems is the publication of an environmental statement. Organizations registered in the system are required to post information on the effects of their environmental activities, including, among others, a summary of available data on the organization's environmental performance compared to its environmental goals and tasks, in relation to the organization's significant environmental impact. The declaration also covers the main environmental performance indicators specified in the Regulation. EMAS declarations are publicly available, therefore, it is possible, through the analysis of data contained in them, regarding environmental performance indicators to obtain information on the organization's environmental impact and the progress of its environmental performance. Pursuant to the EMAS Regulation, the task of environmental performance indicators is, among others, to present an accurate assessment of the environmental performance of an organization and to enable comparisons of individual years to assess the development of environmental performance of an organization. [13]

3. EMAS ENVIROMENTAL PERFORMANCE INDICATORS

Guidance on the selection and use of an environmental performance indicator is set out in the Annex I of Commission Recommendation 2003/532/EC, on guidance for the implementation of Regulation (EC) No 761/2001 of the European Parlament and of the Council allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) and provides guidance on the selection and use of environmental performance indicators to produce an environmental statement from EMAS. [14]

According to the EMAS Regulation, the environmental effects are measurable results of the organization managing its environmental aspects. They are measured by means of environmental indicators, i.e. specific indicators allowing to determine the environmental performance of the organization. In an environmental statement, organizations provide key indicators to the extent they relate to direct environmental aspects and other relevant existing

environmental performance indicators. Reporting provides data on the actual contribution, impact. [15]

Environmental performance indicators according to the EMAS Regulation shall: [15]

- give an accurate appraisal of the organisation's environmental performance;
- be understandable and unambiguous;
- allow for a year on year comparison to assess the development of the environmental performance of the organisation;
- allow for comparison with sector, national or regional benchmarks as appropriate;
- allow for comparison with regulatory requirements as appropriate

The main indicators included in the EMAS environmental declarations concern the main environmental areas such as: energy efficiency, material use efficiency, water, waste, biodiversity and emissions. Each core indicator is composed of: [15]

- a figure A indicating the total annual input/impact in the given field;
- a figure B indicating the overall annual output of the organisation;
- a figure R indicating the ratio A/B

Each organization gives all 3 elements for each indicator. The indication of the total annual input/impact in the given field, figure A, shall be reported as follows: [15]

a) on Energy efficiency:
- concerning the 'total direct energy use', the total annual energy consumption, expressed in MWh or GJ,
- concerning the 'total renewable energy use', the percentage of total annual consumption of energy (electricity and heat) produced by the organisation from renewable energy sources

b) on Material efficiency
- concerning the 'annual mass-flow of different materials used' (excluding energy carriers and water), expressed in tonnes,

c) on Water
- concerning the 'total annual water consumption', expressed in m^3

d) on Waste
- concerning the 'total annual generation of waste', broken down by type, expressed in tonnes,
- concerning the 'total annual generation of hazardous waste' expressed in kilograms or tonnes,

e) on Biodiversity
- concerning the 'use of land', expressed in m^2 of built-up area,

f) on Emissions
- concerning the 'total annual emission of greenhouse gases', including at least emissions of CO_2, CH_4,N_2O, HFCs, PFCs and SF_6, expressed in tonnes of CO_2 equivalent,

– concerning the 'total annual air emission', including at least emissions of SO_2, NO_x and PM, expressed in kilograms or tonnes,

The indication of the overall annual output of the organisation, figure B, is the same for all fields, but is adapted to the different types of organisations, depending on their type of activity, and shall be reported as follows: [15]

a) for organisations working in the production sector (industry), it shall indicate the total annual gross valueadded expressed in million euro (EUR Mio) or total annual physical output expressed in tonnes or, in the case of small organisations the total annual turnover or number of employees;
b) for organisations in the non-production sectors (administration/services), it shall relate to the size of the
c) organisation expressed in number of employees.

Organizations also have the option of presenting additional indicators in declarations if they are relevant to the significant environmental aspects identified by the organization. The organization may also disregard all of the mentioned indicators if one of them is not related to significant environmental aspects of the organization, i.e. it will not be a measurable indicator of the organization's activities. The decision should be taken by the organization in relation to the environmental review carried out. [16]

4. THE ENVIRONMENTAL PERFORMANCE INDICATORS USED IN EMAS REPORTING OF A WASTE MANAGEMENT COMPANY ARE PRESENTED BELOW

1) Energy efficiency (electricity, diesel oil, gasoline, hard coal) expressed in gigajoules [GJ], calculated on the total amount of waste accepted in a given year

$$R_{Energy} = \frac{A}{B}$$

where:
R_{Energy} - energy efficiency indicator
A - annual consumption of electricity and fuels expressed in GJ
B - total amount of waste accepted in a given year

2) Efficient use of materials (aggregate, sulfuric acid) expressed in Mg, calculated on the total amount of waste accepted in a given year

$$R_{Materials} = \frac{A}{B}$$

where:
$R_{Materials}$ - indicator of efficient use materials

A - annual use of materials (aggregate, sulfuric acid) expressed in Mg
B - total amount of waste accepted in a given year

3) Water consumption, ie the total annual water consumption expressed in m3, based on the total amount of waste accepted in a given year

$$R_{Water} = \frac{A}{B}$$

where:
R_{Water} - indicator of water consumption efficiency
A - annual water consumption expressed in m3
B - total amount of waste accepted in a given year

4) Own waste produced

a) Own inert waste produced (dimensions, toners, metals, ashes, green) expressed in Mg, calculated on the total amount of waste accepted in a given year

$$R_{inert\ waste} = \frac{A}{B}$$

where:
$R_{inert\ waste}$ - indicator of the total annual amount of inert waste produced
A - annual production of own inert waste expressed in Mg
B - total amount of waste accepted in a given year

b) Own hazardous wastes (engine oils) expressed in kg calculated on the total amount of waste accepted in a given year

$$R_{hazardous\ waste} = \frac{A}{B}$$

where:
$R_{hazardous\ wastes}$ - indicator of the total annual amount of hazardous own waste generated
A - annual production of hazardous own waste expressed in kg
B - total amount of waste accepted in a given year

5) Waste accepted for disposal by landfilling and landfill expressed in Mg calculated on the total amount of waste accepted in a given year

$$R_{waste\ landfilling} = \frac{A}{B}$$

where:
$R_{waste\ landfilling}$ - an indicator of the total annual amount of waste accepted for disposal by landfilling and landfill expressed in Mg

A - the annual amount of waste accepted for disposal by landfilling and use expressed in Mg
B - total amount of waste accepted in a given year

6) Biodiversity expressed in ha, calculated on the total amount of waste accepted in a given year

$$R_{biodiversity} = \frac{A}{B}$$

where:
$R_{biodiversity}$ - indicator of biodiversity
A - total usable area expressed in ha
B - total amount of waste accepted in a given year

7) Emissions to air

a) **Emission PM** (Particulate matter) expressed in Mg calculated on the total amount of waste accepted in a given year

$$R_{PM} = \frac{A}{B}$$

where:
R_{PM} - indicator of emission PM to air
A - total annual PM emission into air expressed in Mg
B - total amount of waste accepted in a given year

a) **Emision CO_2** expressed in Mg calculated on the total amount of waste accepted in a given year

$$R_{CO2} = \frac{A}{B}$$

where:
R_{CO2} - indicator emission of CO_2 to air
A - total annual CO_2 emission to air expressed in Mg
B - total amount of waste accepted in a given year

8) Recyclable materials sold expressed in Mg calculated on the total amount of waste accepted in a given year

$$R_{recyclable\ materials} = \frac{A}{B}$$

where:
$R_{recyclable\ materials}$ - indicator of recyclable materials sold
A - total annual quantity of recyclable materials sold expressed in Mg

B - total amount of waste accepted in a given year

9) Compost produced expressed in Mg calculated on the total amount of waste accepted in a given year

$$R_{compost} = \frac{A}{B}$$

where:
R $_{compost}$ - compost production indicator
A - total annual amount of produced compost expressed in Mg
B - total amount of waste accepted in a given year

5. ANALYSIS OF MAIN INDICATORS OF ENVIRONMENTAL PERFORMANCE IN CZESTOCHOWA MUNICIPAL COMPANY LTD.

Activity of Czestochowa Municipal Company (CzPK) Ltd. affects various environmental elements. The environmental statement prepared by the company under the EMAS Regulation describes the basic impacts and measures the size of environmental aspects. The indicators are also used to assess environmental performance in enterprises. The main environmental performance indicators in 2012-2015 are presented in Table 1.

Table 1. Main indicators of environmental performance in CzPK ltd. in 2012-2015
[Source: Own elaboration based on the EMAS Environmental Declaration of the Czestochowa Municipal Company Ltd. based in Sobuczyna edition VII, VIII, IX]

Lata	2012		2013		2014		2015	
B - total amount of waste accepted in a given year	B = 73386,00 Mg		B = 120 790,14 Mg		B = 137087,48 Mg		B = 124680,76 Mg	
Indicators:	A - total annual impact in a given area							
	A	R=A/B	A	R=A/B	A	R=A/B	A	R=A/B
Energy efficiency (electricity, diesel oil, gasoline, hard coal) [GJ]	7549,47	0,1029 GJ/Mg	9357,61	0,0775 GJ/Mg	10519,42	0,0767 GJ/Mg	12512,6	0,100357/ Mg
Efficient use of materials (aggregate, sulfuric acid) [Mg]	2509,78	0,0342 Mg/Mg	1181,88	0,0098 Mg/Mg	3183,98	0,0232 Mg/Mg	1100,5	0,0088 Mg/Mg

Water [m^3]	998	0,0136 m^3/Mg	1386	0,011 m^3/Mg	1635	0,012 m^3/Mg	4848,7	0,0389 m^3/Mg
Own waste produced in CzPK:								
Own inert waste produced (dimensions, toners, metals, ashes, green) [Mg]	12,5	0,00017 Mg/Mg	44,3	0,0003 Mg/Mg	11,38	0,00008 Mg/Mg	11,8	0,000095 Mg/Mg
Own hazardous wastes (engine oils) [kg]	800	0,0109 kg/Mg	900	0,007 kg/Mg	900	0,006 kg/Mg	2500	0,02005 kg/Mg
Waste accepted for disposal by landfilling and landfill [Mg]	60526,74	0,8248 Mg/Mg	103961,33	0,86 Mg/Mg	106126,64	0,77 Mg/Mg	79172,44	0,64 Mg/Mg
Biodiversity [ha]	35,5225	0,00048 ha/Mg	35,5225	0,00029 ha/Mg	35,5225	0,00026 ha/Mg	35,5225	0,00028 ha/Mg
Emission:								
PM [Mg]	1,77	0,00002 Mg/Mg	7,9	0,00006 Mg/Mg	3,3	0,00002 Mg/Mg	2,38	0,000019 Mg/Mg
CO_2 [Mg]	25,9	0,0003 Mg/Mg	28,2	0,0002 Mg/Mg	23,12	0,00016 Mg/Mg	27,75	0,00022 Mg/Mg
Recyclable materials sold [Mg]	1665,39	0,023 Mg/Mg	1665,08	0,012 Mg/Mg	1956,32	0,014 Mg/Mg	2090,74	0,017 Mg/Mg
Compost produced [Mg]	7198,17	0,098 Mg/Mg	11671,96	0,09 Mg/Mg	17322,88	0,12 Mg/Mg	25244,5	0,20 Mg/Mg

Table 1 presents the total annual impact in 9 highlighted areas, and environmental indicators in these areas calculated in relation to the total amount of waste accepted to CzPK Sp. z o.o. that year.

The comparison of the consecutive research periods follows from the list of the above-mentioned indicators presented by the Czestochowa Municipal Company in the environmental statement. Analyzing the environmental performance indicators in 2013, it can be concluded that the majority of indicators showed a decrease compared to 2012. In cases such as the sale of secondary raw materials or the amount of compost produced, this increase means improvement of environmental results.

The decrease in the energy efficiency index in 2013, in relation to the previous year, despite the improvement of equipment efficiency and operation of facilities, was influenced by the increase in energy media consumption resulting from the increased use of fuels for sorting plant service due to the increase in the amount of accepted waste. The indicator of the effective use of materials has deteriorated as a result of increased purchases of aggregate used in the storage quarters, and less use of aggregate produced in the waste management plant. In the case of water consumption, there has been an increase in its use due to cleaning work and

cleaning of the waste treatment system elements, as well as the need to irrigate compost prisms during the summer. In 2013, compared to 2012, the waste stream significantly increased, which went through the Waste Management Plant, and due to the fact that in accordance with the law they are included in the waste generated, this indicator has also increased. In the case of biodiversity, the annual impact in 2013 is at the same level as in 2012, but due to the increase in the amount of accepted waste, this indicator has decreased. As a result of increasing the consumption of energy utilities needed to service the sorting plant and increased waste, CO_2 emissions increased. On the other hand, the increase in dust emissions results from the significant increase in waste used for recultivation of the landfill site in 2013.

The compilation of indicators in 2014 and 2013 shows a reduction in the index of energy consumption and energy media in relation to the total amount of waste adopted in a given year. Despite the increase in the consumption of energy utilities resulting from the increase in the amount of accepted waste, the continuous improvement of the efficiency and operation of the facilities has contributed to the improvement of energy efficiency in the enterprise. In the case of effective use of materials in 2014, as in 2013, the purchase of aggregates, required for the foundation of the road in the storage quarters, was increased, due to the difficulty of obtaining less aggregate obtained in the waste management plant. The indicator of water consumption increased in comparison to 2013, due to the increased use of water for irrigation of compost prisms in the summer. In 2014, the waste stream through waste management plant increased, and due to the increase in the total amount of waste accepted by the company, this indicator decreased.

CO_2 emissions have also increased as a result of increased use of energy utilities for sorting facilities and increased waste. In the case of PM emission, it decreased due to the decrease in the amount of material used for the reclamation of landfill sites. The biodiversity index in 2014 again decreased due to the increase in the quantity of accepted waste at the absolute value of the total usable area expressed in ha. When juxtaposing the last two research periods of 2014-2015 for the above indicators, the following relationship follows. The systematic increase in the consumption of energy utilities, resulting from the intensive operation of the sorting plant and the composting plant, contributes to the increase of the energy efficiency index. In 2015, the purchase of aggregate for the road foundation on the storage yard was reduced, and thus the index of material efficiency was at a much lower level. Due to the need to operate a composting plant and waste irrigation, the water consumption index increased. In the case of the waste index, the waste stream has gone down, which passed through the waste management plant, which was reflected in the segregated waste indicators, and the company increased the sold materials.

In the case of CO_2 and PM emissions, as in 2014, CO_2 emissions resulting from higher consumption of energy utilities increased and dust emissions decreased due to the decrease in the amount of material used for the reclamation of landfill sites. Analyzing the data presented in Table 2, it can be noticed that over the analyzed years energy efficiency is constantly increasing, comparing the year 2015 with 2012, the amount of resources used has increased by 66%.

In 2014, we can observe a slight decrease in energy and media consumption in relation to 2013, which results from the improvement of equipment efficiency and operation of facilities. The highest level of their consumption occurred in 2015, which is the result of intensive operation of the sorting plant and the composting plant, including bioreactors. Table

2 presents the dynamics of changes in the annual impact in 9 main areas of environmental efficiency in the Częstochowa Municipal Company in the years 2012-2015.

Table 2. Dynamics of changes in annual impact in a given area of environmental efficiency in CzPK ltd. in 2012-2015

[Source: Own elaboration based on the EMAS Environmental Declaration of the Częstochowa Municipal Company Ltd. based in Sobuczyna edition VII, VIII, IX]

		The dynamics of the total annual impact in a given area					
		indeksy jednopodstawowe			Indeksy łańcuchowe		
The area of environmental performance		2013/2012	2014/2012	2015/2012	2013/2012	2014/2013	2015/2014
1	Energy efficiency (electricity, diesel oil, gasoline, hard coal) [GJ]	123,95%	139,34%	165,74%	123,95%	112,42%	118,95%
2	Efficient use of materials (aggregate, sulfuric acid) [Mg]	47,09%	126,86%	43,85%	47,09%	269,40%	34,56%
3	Water [m^3]	138,88%	163,83%	485,84%	138,88%	117,97%	296,56%
4	Own waste produced in CzPK:						
	Own inert waste produced (dimensions, toners, metals, ashes, green) [Mg]	354,40%	91,04%	94,40%	354,40%	25,69%	103,69%
	Own hazardous wastes (engine oils) [kg]	112,50%	112,50%	312,50%	112,50%	100,00%	277,78%
5	Waste accepted for disposal by landfilling and landfill [Mg]	171,76%	175,34%	130,81%	171,76%	102,08%	74,60%
6	Biodiversity [ha]	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
7	Emission:						
	PM [Mg]	446,33%	186,44%	134,46%	446,33%	41,77%	72,12%
	CO_2 [Mg]	108,88%	89,27%	107,14%	108,88%	81,99%	120,03%
8	Recyclable materials sold [Mg]	99,98%	117,47%	125,54%	99,98%	117,49%	106,87%
9	Compost produced [Mg]	162,15%	240,66%	350,71%	162,15%	148,41%	145,73%

In the case of effective use of materials, in 2014 there was a significant increase (by 170%) of their consumption, as a result of increased purchases of aggregates for repair purposes (road foundation on the storage yard). In 2015, the amount of aggregate used decreased significantly, due to the renovation activities conducted a year earlier, there was no need for increased use of materials. Over the analyzed years, a significant decrease in the use of materials by around 56% can also be observed.

The company's water consumption is increasing every year, and the ratio of water use to the increase in the amount of waste accepted to the CzPK can also be observed. The greatest dynamics of changes was recorded in 2015, in which the amount of water consumed grew by 197%, or 3214 m3 compared to the previous year, which is the result of the operation of the composting plant and the need to irrigate the waste. Over the analyzed years, the value of water consumption increased by 385%.

In the case of waste generated by the company during the years 2012-2015, regression of produced inert waste occurred, their number decreased by 6%. However, in 2015, the amount of hazardous waste generated increased, the amount of waste generated amounted to 2,500 kg, or 1600 kg more than in previous years (2013-2014), this is due to the increased use of this raw material by the machines used in the enterprise for waste treatment. These wastes are stored selectively in sealed, closed containers protected against the possibility of environmental pollution

The amount of waste accepted for disposal and use in the landfill in 2013 increased by 72%, however, already in 2014, the increase compared to 2013 was 2%, in 2015 there was a regression of 25% of the amount of waste accepted for storage compared to the previous year, while the index comparing waste accepted for storage and use in the landfill up to the total amount of waste accepted to the CzPK, from year to year is systematically decreasing. This phenomenon is very beneficial, showing improvement of the company's operations in the area of waste efficiency. The decrease in the amount of waste neutralized by landfilling is one of the main objectives of the enterprise, resulting from the requirements imposed by the Act in this respect.

The absolute size of biodiversity in all analyzed years is at the same level.

In the analyzed years, the dust emission (PM) decreased significantly, by 28% comparing the years 2015 and 2014, this is due to the significant reduction in the amount of material used for landfill reclamation in 2014 and 2015. In the case of CO_2 emissions despite a decrease in carbon dioxide emissions in 2014 by 18% in 2015, there was a further increase of 4.63 Mg, and returned to the level comparable to 2013. This is due to the increase in consumption of energy utilities, due to the greater consumption of media for sorting and increased waste.

In addition to neutralizing waste through sorting and storage, the company manages waste through composting and separating waste for recycling. In 2015, the volume of waste flowing into the enterprise decreased, while the level of segregated raw materials and composted waste increased. In 2014, despite the increase in the total amount of waste accepted to CzPK, the volume of sales of secondary raw materials and composted waste is also at a satisfactory level, higher than in 2013. Over the analyzed years, the amount of secondary raw materials sold has been systematically increasing by over 25% when comparing 2015 with base. However, the amount of compost produced by the company in the analyzed period increased by as much as 250%, this is due to the introduction of a modern

system of biodegradable waste management through their composting in closed bioreactor technology.

According to the data presented, in the company, despite the increase in energy and media consumption indicators, water or raw materials needed to maintain operations, waste management indicators are at a satisfactory level, and are constantly improving. This is a positive phenomenon, resulting from the main objective of the company, which is to reduce the amount of waste neutralized by storage, and to increase the recovery and recycling of waste.

5. CONCLUSIONS

The implementation of the EMAS system is intensively promoted in the European Union, many models have been developed and tested for its effective implementation. The main principles of the organization and operation of the system are set out in the European Parliament Regulation of 25 November 2009 the voluntary participation of the organisation in the Eco-Management and Audit System (EMAS). EMAS is an instrument for the implementation of the European Union's environmental policy, whose task is to inform the public on issues related to environmental protection, through environmental reports (so-called EMAS declarations). The system is an effective tool for minimizing the environmental impacts of various types of organizations and strengthening their pro-ecological development.

The EMAS Regulation requires the environmental statement to provide key indicators for key environmental areas, such as: electricity consumption, efficient use of materials, water consumption, amount of waste generated, land area (biodiversity), and greenhouse gas emissions and dust emissions into the air. Organizations may also include additional environmental performance indicators in environmental declarations if they consider them relevant to their significant environmental aspects.

In the case of Czestochowa Municipal Company ltd., relevant indicators are also used to assess environmental performance in enterprises. On the basis of the analysis of the indicators, it can be stated that the company properly implements the environmental policy by constantly reducing the amount of waste deposited for their recovery and recycling. Despite the increase in energy consumption and media in the enterprise, their growth is economically and ecologically justified, as they are used to implement modern technologies that dispose of waste.

References

[1] Stead, Jean Garner, and Edward Stead. Eco-enterprise strategy: standing for sustainability. *Journal of Business Ethics* 24.4 (2000) 313-329

[2] Giddings, Bob, Bill Hopwood, and Geoff O'brien. Environment, economy and society: fitting them together into sustainable development. *Sustainable Development* 10.4 (2002) 187-196

[3] Balan, George, and Larisa Dragolea. Implementation of environmental management systems-ISO 14001 or EMAS. *Academic Research International* 4.3 (2013) 287

[4] Robèrt, Karl-Henrik. Tools and concepts for sustainable development, how do they relate to a general framework for sustainable development, and to each other? *Journal of Cleaner Production* 8.3 (2000) 243-254

[5] Pachura, Piotr, and Agnieszka Ociepa-Kubicka. Eco-Management and Audit Scheme (EMAS) functioning on the example of the Water Supply and Sewerage Joint Stock Company of the Czestochowa District. *Polish Journal of Management Studies* 10 (2014)

[6] Iraldo, Fabio, Francesco Testa, and Marco Frey. Is an environmental management system able to influence environmental and competitive performance? The case of the eco-management and audit scheme (EMAS) in the European Union. *Journal of Cleaner Production* 17.16 (2009) 1444-1452

[7] De Oliveira, Otavio Jose, José Roberto Serra, and Manoel Henrique Salgado. Does ISO 14001 work in Brazil? *Journal of Cleaner Production* 18.18 (2010) 1797-1806

[8] Franchetti, Matthew. ISO 14001 and solid waste generation rates in US manufacturing organizations: an analysis of relationship. *Journal of Cleaner Production* 19.9-10 (2011) 1104-1109

[9] Wätzold, Frank, et al. EMAS and regulatory relief in Europe: lessons from national experience. *European Environment* 11.1 (2001) 37-48

[10] Morrow, David, and Dennis Rondinelli. Adopting corporate environmental management systems: Motivations and results of ISO 14001 and EMAS certification. *European Management Journal* 0.2 (2002): 159-171.

[11] Commission Decision of 4 March 2013 establishing the user's guide setting out the steps needed to participate in EMAS, under Regulation (EC) No 1221/2009 of the European Parliament and of the Council on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS)

[12] Testa, Francesco, et al. EMAS and ISO 14001: the differences in effectively improving environmental performance. *Journal of Cleaner Production* 68 (2014) 165-173

[13] Olsthoorn, Xander, et al. Environmental indicators for business: a review of the literature and standardisation methods. *Journal of Cleaner Production* 9.5 (2001) 453-463

[14] Hřebíček, Jiří, Petra Misařová, and Jaroslava Hyršlová. Environmental key performance indicators and corporate reporting. *International Conference EA-SDI* (2007) 147-155

[15] European Parliament and Council Resolution (EC) No. 1221/2009 of 25 November 2009 on the voluntary participation of the organisation in the Eco-Management and Audit System (EMAS), invalidating the resolution (EC) No. 761/2001 and Committee's decisions 2001/681/WE and 2006/193/EC

[16] Peris-Mora, E., et al. Development of a system of indicators for sustainable port management. *Marine Pollution Bulletin* 50.12 (2005) 1649-1660