

Improving the Efficacy and Efficiency of the Environmental Management System in the Romanian Powerplants on Coal – the Condition of the Environmental Performance

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<http://doi.org/10.29227/IM-2019-01-11>

Submission date: 11-07-2018 | Review date: 02-04-2019

Abstract

After a decade-long evolution, the use of coal for energy production is growing again. Carbon is still an important source of energy in Europe, covering about one-fourth of electricity production. There are plans to open around 50 new coal-fired power plants. But the continued use of coal has a price, we pay all, mainly with our health can be affected by excessive environmental pollution. Today more and more emphasis on the concept of „green economy” that should be reflected in improving people’s lives through effective management of environmental issues and reducing environmental risks. Thus, through the present paper we aim to highlight those aspects that would allow the improvement of the environmental performance of coal-fired power plants in Romania by improving the efficiency and effectiveness of the Environmental Management System (EMS) as a component of the Integrated Management System along with the Quality, Health and Safety Management System. We start from the premise that the development and implementation of an effective and efficient environmental management system (EMS) becomes a priority for all companies in the field, especially since their activities based on coal burning, are considered among the most polluting.

Keywords: environmental management system, environmental performance, integrated management systems, sustainable development

Introduction

Every industrial activity has an effect on the environment. More and more companies, especially industrial ones, have become and become aware that they need to pay more attention to the management of their environmental impact. To that end, the development and implementation of an effective and efficient EMS system becomes a priority. Industrial producers have to meet the demands and challenges of the European Union. We mention here the initiative of the European Commission that launched a scheme (EMAS - eco-management and audit scheme) to which they can voluntarily join organizations, in accordance with European Regulation 1836/93, which was subsequently replaced by Council Regulation 761/2001, 1221/2009 last amendment being 1505/2017. So EMAS targets a set of environmental policy tools that allow companies to pursue both environmental objectives and competition objectives in a synergistic way. Implementation of a system environmental management can be based on one of EMAS standards and / or ISO 14001 that allow organizations of any size or type to control the impact of their activities, products and services on the environment. The accession of industrial organizations to an environmental management and audit system such as EMAS is voluntary but once a what an enterprise decides to do join EMAS, then it have to fully comply with the provisions of the aforementioned regulation. Improving environmental performance is a goal set by EMAS. If the ISO 14001 : 2004 standard not established anything about the environmental performance, only an absolute dedication and involvement in the field of environmental protection, compliance with the law and the principle of continuous improvement, the new ISO 14001:

2015 standard (which replaces the old standard at the end of 2018) requires performance assessment and we recommend increasing focus on managing environmental performance improvements.

The environmental management system (EMS) has two areas of focus: environmental compliance and environmental sustainability.

The place of coal-fired power stations is in Romania’s energy system

Coal remains a major energy pawn while being an important source of energy security even if the share of coal in the energy mix is to be diminished. Reality but emphasizes the importance of coal-based electricity. It turns out so that coal-fired power stations remain to play an important role in the production and delivery of energy and electricity in the National Energy System (NES), regardless of atmospheric conditions - frost, increased drought, when the wind does not blow to produce wind energy or the sun is not enough for normal photovoltaic power production. During 2017, thermo capacities produced 41% of the national electricity, accounting for 48.6% of the total installed power. By comparison, analyzing the weights of the components of the net production mix for 2017, we can see that the largest share (41%) is represented by the thermo component followed by the hydro component (25%) and the energy produced from renewable and nuclear sources have a weight of approximately 18% and 16%, respectively.

In Romania the production of electricity in the thermo-electric power plants is realized in:

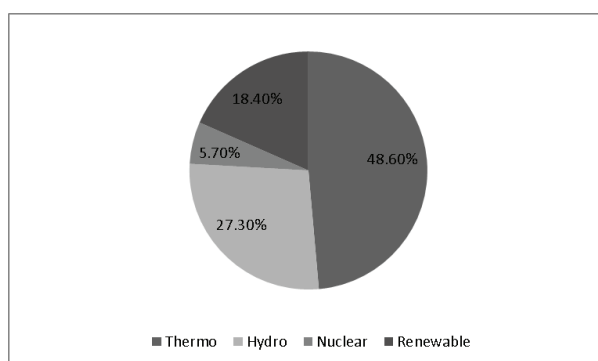


Fig. 1. Power installed on 9 months 2017 (24,738 MW, gross)

Rys. 1. Moc zainstalowana w ciągu 9 miesięcy 2017 r. (24 738 MW, brutto)

Tab. 1. The National Transition Plan for substantially reducing the amount of sulfur dioxide, nitrogen oxides and dusts emitted into the atmosphere (eg from 9 496 tonnes of sulfur dioxide in 2016 to 1980 tonnes in 2020)

Tab. 1. Krajowy plan zmniejszenia ilości dwutlenku siarki, tlenków azotu i pyłów emitowanych do atmosfery (np. z 9 496 ton dwutlenku siarki w 2016 r. do 1980 ton w 2020 r.)

	2016	2017	2018	2019	Sem 1.2020
SO ₂	9.496	7.650	5.805	3.960	1.980
NO ₂	26.096	23.605	21.115	18.624	9.312
Dusts	916	724	532	341	170

- 12 production capacities with an installed capacity of 6015 MW using coal as fuel; these plants belong to 7 companies.
- 13 production capacities with an installed capacity of 4445.6 MW, using hydrocarbons as fuel, these plants being owned by 8 companies.

The most important producers of coal-based energy are the Hunedoara Energy Complex and the Oltenia Power Complex. The Hunedoara Energetic Complex (CEH) owns the Lonea, Livezeni, Lupeni and Vulcan mines and Mintia thermal power plant (on Mures), with a 1,075 MW installed power, and the Paroseni electro-thermal power plant (Jiu), with an installed power of 150 MW. Their production covers 2% of national electricity production (data for year 2016). The Oltenia Energetic Complex operates 4 thermoelectric power plants: Işalnita (2 groups x 315 MW), Rovinari (4 groups x 330 MW), Turceni (6 groups x 330MW) and Craiova (2 groups x 150MW).

The problem that arises is related to the impact of the activities of these coal-fired power plants on the environment. It is not to be neglected that industrial organizations we refer face serious problems for alignment with European emission standards for reducing air pollution. It is important to emphasize that the reduction of pollutant emissions to the air at the legal level does not mean that coal-fired power plants no longer have an impact on health and the environment. Romania's coal-fired power plants are big polluters with dust, sulfur dioxide, nitrogen oxides, and carbon dioxide. In addition to coal-fired power plants harmful emissions, is the impact of coal extraction, in particular for lignite, which includes grazing large areas of forests, the destruction of some agricultural landfills and the production of large quantities of dust, as well as the pollution of groundwater. Compliance with emission standards can not be an object of negotiation, so it is necessary to treat these problems with most seriousness, hence mandatory implementation of management systems such as

the environment, quality and occupational health within these enterprises .

By approving the National Transition Plan by the European Commission by decision of 03.03.2016 (according to the provisions of Article 32 of Law 278/2013), a number of installations have been granted derogation for different emissions until 30 June 2020 (Order No 1430/1063/2017 / 220/2018 on the approval of the Transitional National Transition Plan for Combustion Plants under the provisions of Chapter III of the Law No 278/2013 on industrial emissions).

But besides investment necessary measures that have to be taken to ensure compliance by all combustion installations of coal plants of the applicable emission limit values such as desulphurisation of the flue gases rehabilitation low NOx burners, rehabilitation electrostatic and the case Electrocentrale Deva in the Energy Complex Hunedoara, or installation and commissioning of a system to reduce noncatalytic selective nitrogen oxides from the flue gases (SNCR) in plants in the structure of the Oltenia Energy Complex, the focus should be on improving the efficiency and effectiveness of the Environmental Management System (EMS) implemented within these organizations.

Environmental performance – a criterion for the efficiency and effectiveness of the environmental management system

In recent years, the literature has been abundant in studies describing the elaboration, development, implementation and continuous improvement of the integrated systems of SIM quality management, environment, occupational health and safety management, social responsibility, etc., as well as their individual study. In the case of environmental management, the studies focused on the conditions of enterprises that decided to implement the environmental management system based on the ISO 14001 standard, its certification and, last but not least, its economic impact (Matuszak-Flejszman, 2009;

Marimon, et al., 2011; Narasimhan and Schoenherr, 2012; Bernal Conesa et al., 2016).

The relationship between the implementation of the environmental management system and the environmental performance has in turn prompted interest in recent years. Several international studies have shown that there is a positive relationship between ISO 14001 certification and improving environmental performance in countries such as Canada, France, Germany, Hungary, Japan, Norway, USA (Barla, 2007, Schulze, W. and Trommer, R., Arimura et al., 2012, 2016) or Malaysia (Goh, EA et al., 2006; Goh YN, 2011). However, other studies on the operation of industrial activities in Mexico (Blackman and Guerrero, 2012), Great Britain (Dahlstrom et al., 2003) or USA (King et al., 2005) do not bring any change in environmental performance or in pollution reducing behavior (Ziegler and Rennings, 2004), while other studies offer inconclusive results. Furthermore, a research study by Hertin et al., 2003, even in the field of electricity, concluded that environmental performance is not the main reason for the EMS implementation, which is why the poor relationship between EMS and performance becomes a plausible consequence, because there is no evidence to suggest that EMS implementation has a consistent and significant positive impact on environmental performance. But more recent studies, such as the (Arab, et al., 2017) highlighted the main success factors for the implementation of environmental management systems, with direct effect in improving environmental performance, including commitment and support of the manager, coordination and integration, education, effective participation and management of human resources, financial and non-financial resources and cost analysis -benefits, environmental objectives and policies and documentation control.

It is clear that starting from the literature on this topic, a set of specific indicators is set and monitored in practice. Crucially, however, is the selection of the most representative of them, so that the correlations between the groups of factors or the composite variables determine the efficiency and effectiveness of the EMS.

Results and discussion

With regard to the above-mentioned organizations, both representative industrial companies in the field of the coal-based electricity production have implemented and maintain an Integrated Management System in accordance with the requirements of the ISO 9001: 2008, ISO 14001: 2004, OHSAS 18001: 2007 through which it promotes a policy oriented towards the permanent satisfaction of the requirements of the clients and stakeholders towards the offered products and services, of reducing the negative impacts of its activities on the environment and of reducing the risks to the safety and health of the employees, visitors, subcontractors by conducting safe activities.

However, the immediate concern is to recertify the management systems according to the new standards (ISO 9001: 2015, ISO 14001: 2015, the old ones lose their validity at the end of 2018, and ISO 45001: 2018, replaces OHSAS 18001 health and safety standard).

The implementation of the EMS aims at demonstrating the organization's environmental performance, taking measures to control the impact of its activities / processes on the environment.

Identifying and analyzing best practice in the process of developing and implementing the EMS, based on the application of ISO 14001, it is necessary to analyze the factors that may determine the effectiveness and efficiency of EMS in thermal power plants using coal, the enhancement of the peculiarities of these firms in the energy field.

Improving environmental management and increasing the efficiency and effectiveness of EMS, based on ISO 14001, should take into account:

- A strengthening of the specific values of the organizational culture that to stimulate compliance with environmental requirements, respectively environmental legislation and regulations;
- Ensuring a strong and informed leadership in environmental management;
- Promoting integrated prevention strategies for environmentally competitive, economically and financially-friendly (profitability) ecological production where environmental pollution control systems (which are expensive) are replaced by focused measures to prevent pollution
- Obtaining information on the potential for enhancing environmental performance in order to apply organizational strategies to facilitate the assessment and valorisation of their potential to adopt and apply eco-friendly technologies and techniques, and to capitalize on the opportunities for eco-growth-efficacy.

Conclusion

An Environmental Management System or EMS can be a powerful tool to help businesses improve their environmental performance.

Many organizations implement an EMS that meets the requirements of ISO14001 certification, not necessarily to become a better environmental corporate citizen. However, they soon discover that implementing a robust EMS is beneficial and adds value to their business.

In the case of energy organizations studied, it is necessary that the investment measures necessary to maintain the safety of the national energy system to be correlated with the environmental compliance measures. We recommend developing a model of analysis that highlights the relationship between the efficiency and effectiveness of EMS and environmental management, motivational factors, market and regulatory and benefits in its implementation and development in power plant coal as electricity generation units from Romania, as well as the degree of integration of SME along with the leased systems (quality, health and occupational security, social responsibility). There are several reasons for integrating management, quality, occupational health and safety (OH & S) together with environmental management (Sanz-Calcedo, JG et al., 2015), such as: Reducing duplication of activities and therefore costs Balance conflicting objectives, eg between occupational health and the environment, Eliminate conflicting responsibilities and relationships, Harmonize and optimize practices, Create consistency, Improve communication, Facilitate training and development, Integrating management systems facilitates focus on the most important aspects of a company, Separate systems tend to put focus on every area instead of the common area.

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Poprawa skuteczności i efektywności systemu zarządzania środowiskowego w rumuńskich elektrowniach na węgiel – stan efektywności środowiskowej

Po trwającej lata ewolucji wykorzystanie węgla do produkcji energii ponownie rośnie. Węgiel jest nadal ważnym źródłem energii w Europie, pokrywając około jednej czwartej produkcji energii elektrycznej. Istnieją plany otwarcia około 50 nowych elektrowni węglowych. Ale energetyczne wykorzystanie węgla ma swoją cenę, płacimy głównie naszym zdrowiem wskutek nadmiernego zanieczyszczenia środowiska. Obecnie coraz większy nacisk kładzie się na koncepcję „zielonej gospodarki”, która powinna znaleźć odzwierciedlenie w poprawie życia ludzi poprzez skuteczne zarządzanie środowiskowe i zmniejszanie zagrożeń środowiskowych. W artykule przedstawiono aspekty, które mogą pozwolić na poprawę efektywności środowiskowej elektrowni węglowych w Rumunii poprzez poprawę wydajności i skuteczności Systemu Zarządzania Środowiskowego (EMS) jako elementu Zintegrowanego Systemu Zarządzania wraz z Systemem Zarządzania Jakością i Bezpieczeństwem. Przyjęto założenie, że opracowanie i wdrożenie skutecznego i wydajnego systemu zarządzania środowiskiem (EMS) staje się priorytetem dla wszystkich firm w tej dziedzinie, zwłaszcza że ich działalność oparta na spalaniu węgla jest uważana za najbardziej zanieczyszczającą środowisko.

Słowa kluczowe: system zarządzania środowiskowego, efektywność środowiskowa, zintegrowane systemy zarządzania, zrównoważony rozwój