

O 31. HAZARDOUS WASTE MANAGEMENT: CASE STUDY OF NORTH MACEDONIA

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ABSTRACT: Hazardous waste is the most complex type of waste and in the same time its management is very difficult and complicate. This waste produces a great risk to the environment and human health. It may be in different physical states, such as gaseous, liquids, or solids. Considering a very large types and sources of hazardous waste its management is very complex and needs different measures and activities during all life cycles, from its origin to final recovery or disposal. There are very different types of hazardous waste such as: electrical and electronic, battery, chemical, medical, radioactive etc. The biggest portion of this waste is generated by different industrial process, but also from other business, public and health services, households, transport, education and science, and many other sources. Hazardous waste management has to be based on the principles of precautionary, prevention, high quality, sustainability, polluter has to pay, recycling and recovery and high level of environmental protection. However, a key point for environmentally friendly hazardous waste management is its minimization. North Macedonia as a country, which has just start negotiation with the European Union for becoming a full member state, is just on beginning of the establishment efficient and effective hazardous waste management. On this way, it faces with a number of difficulties. There is significant progress in the sectors of electrical and electronical waste and waste from batteries where there are transposed a part of EU regulation and it is establishing collective operator's schemes, but in other sectors such as chemical, radioactive and medical waste, additional measures and activities has to be done in the near future. Additional problems arising from such as named historical "hot spots" from the industry and especially mining sector. Improving hazardous waste management in the country needs significant financial funds. Also it has to be considered that small countries such N. Macedonia is not able to establish completely autonomy treatment of hazardous waste. It has to be done on a wider base with cooperation with international community. The main goal of this paper is to analyze the conditions with hazardous waste management in N. Macedonia and to give some proposals.

Keywords: *Hazardous waste, management, environment, protection, regulation.*

1. INTRODUCTION

Hazardous waste is the most complex waste type for management (Mereki et al., 2020). This waste type seriously threats environment and human health (Misra & Pandey, 2005). North Macedonia as a state with candidate state for full membership of the European Union, since 2004 has been making efforts to harmonize its legislation and standards with the EU legislation and standards in the sphere of environment and waste as an important part of the environment (URL-1). The problem appears with its practical implementation (ECE/CEP/186, 2019). In 2004 was adopted Law on waste management and in 2005 was adopted Law on environment. In the period of 2010 – 2016 were adopted some laws that regulate specific waste sort such as: Law on packaging waste, Law on batteries, Law on electronic and electrical waste and many other laws. These laws were detailed in 85 sub law acts (URL-2).

EU legislation in the sphere on the environment consist of more than 400 legal acts and in waste sector about 120 legal problems (EU, 2019). In this occasion, we will mention some of them. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, known as Waste framework directive, that is the most important directive in waste sector in the EU, because it covers all waste activities (URL-3). Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste. Directive 2010/75/EU of the European Parliament and of the council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Directive 2000/76 on the Incineration of Waste. Commission Regulation (EU) No 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives Regulation (EC)

No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste (Dri et al., 2018).

The small countries like Macedonia have a number of problems in the sector of hazardous waste. It is not easy to establish a system of waste recovery and waste treatment of hazardous waste. Following the Basel convention of transboundary movement of hazardous waste, the country has to seek waste treatment for some types of waste in the development countries (Hogg & Vergunst, 2017).

For waste treatment of hazardous waste there is a need of significant financial recourses and an important part of them are from foreign donors at the first place EU (URL-4). That a significant portion of hazardous waste has to be export in the countries that have a high level of technologies fort treatment of this waste type. In N. Macedonia, according the regulation municipal waste is responsibility of local government and hazardous waste is competence of central government.

2. METHOD

There is a testament of some types of hazardous waste in Macedonia such as: medical waste, which mostly incarnation on very old fashion technology incinerator, asbestos waste which land field, low-level radioactive waste. All waste treatment is performed on an unsatisfactory manner. The only solution for satisfactory waste management of hazardous waste is its minimization as much as possible. There were used and analyzed statistical data both from North Macedonia and from European Union.

3. RESULTS

Table 1 and table 2 present amount of incinerated medical waste and generation of hazardous waste in N. Macedonia. Other tables present the data of generated and processed hazardous waste in European Union.

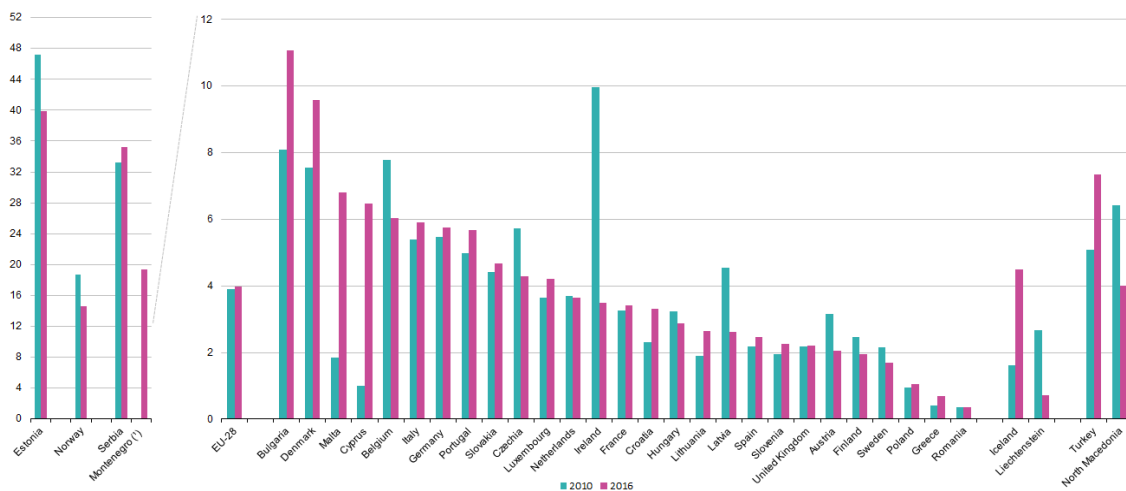
Table 1. Collected and incarnated medical waste in Drisla, year, 2000 – 2014, in tons

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
114	231	248	255	322	375	327.	327	358	416	458	469	501	748	725

Table 2. Amount of hazardous waste generated in N. Macedonia in tons from 2014-2018

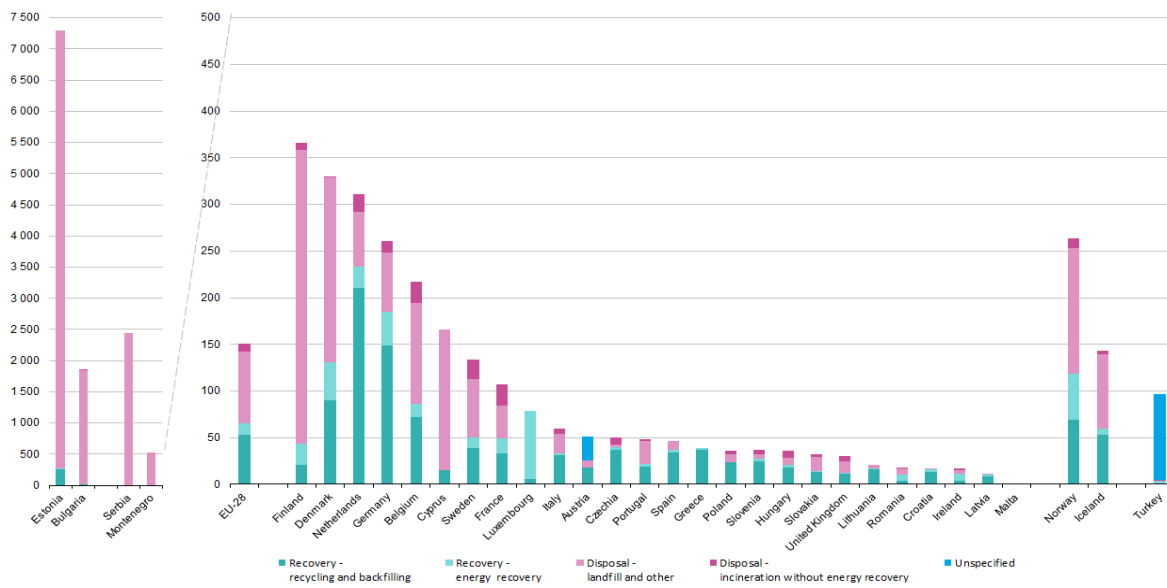
2012	2013	2014	2015	2016	2017
72.000	74.000	72.000	79.000	75.000	77.200

Hazardous waste generated, 2010 and 2016
(% share of total waste weight)



Note: The two parts of the figure have different scales for the y-axis.
(*) 2010: not available.
Source: Eurostat (online data code: env_wasgen)

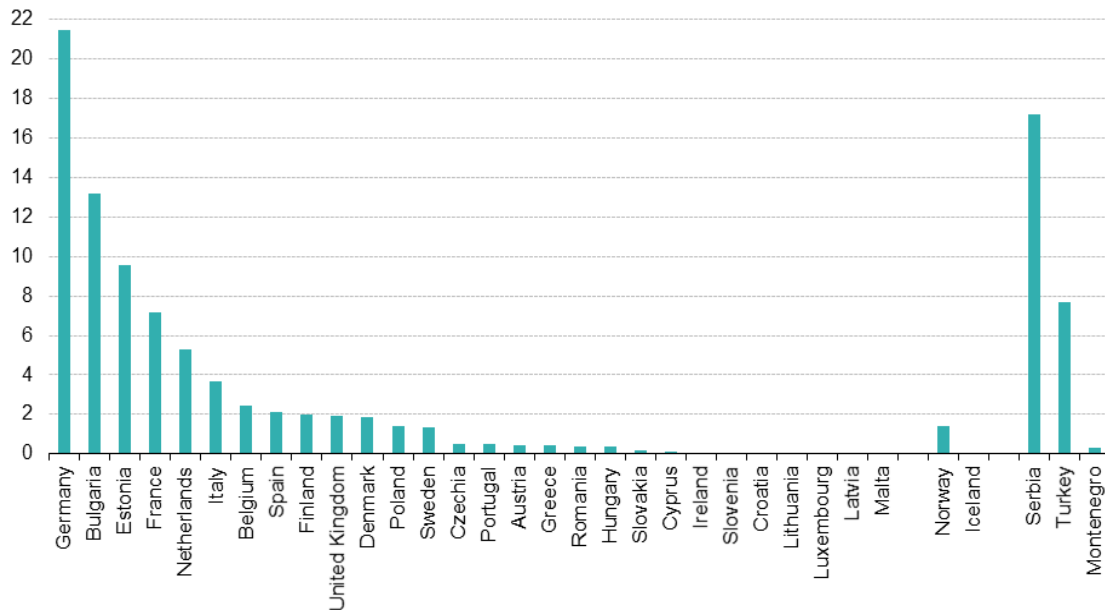
Hazardous waste treatment, 2016
(kg per inhabitant)



Note: the two parts of the figure have different scales for the y-axis.
Source: Eurostat (online data code: env_wastr)

eurostat

Hazardous waste treatment, 2016
(thousand tonnes)



Source: Eurostat (online data code: env_wastr)

eurostat

4. DISCUSSION

Waste classification in hazardous or not hazardous waste depend on the classification and labelling of dangerous substances and preparation that ensures application and implementation of equal or at least very similar principles over the whole life cycle of materials. Hazardous waste is a waste that contents substances with one or more characteristics such as toxicity, flammability. Infectivity, carcinogenicity, mutagenicity, properties for release of toxic gases in contact with water, air and soil and other characteristic. In N, Macedonia, for management of hazardous waste is responsibility of central government while for management of non hazardous waste is responsibility of local government units.

Waste and in the frame of this hazardous waste is one the biggest environmental problems in N. Macedonia/ (Sapuric et al., 2015).

The above mention tables show some figures about waste generation and treatment in N. Macedonia and European Union. It is visible that there are big differences between some EU countries. Also it obvious that N. Macedonia faces with a number of problems and in the future has to make much bigger efforts to improve hazardous waste management. Even the country has signed and ratified Basel Convention for trans boundary movement of hazardous waste and its disposal (URL -5) and has transposed a significant part of EU regulation. N. Macedonia faces with a number of problems in the sphere of hazardous waste management. The above mention tables present the trend of increasing of hazardous waste generation, which is not, followed with adequate waste treatment in the EU especially in some new EU countries. However, it is obvious that the EU as a community with high level of standards has been acting in the direction to mitigate the differences between the countries. Opposite the situation in N. Macedonia is very dramatic because hazardous waste generation it is not followed with increasing of treatment of this waste type. A very big problem is that this waste very often is mixed waste, with different types of hazardous waste or other non hazardous waste types. This disables selection and separation as a pre - condition for properly hazardous waste treatment.

Additional problem appears from the historical “hot spots” where a significant quantity is dumped from abandoned mines and heavy industry plants from the transition period that are not in functions more than 25 years. A small part of this hazardous waste is transported and processed in some developed country such as Germany, Switzerland and Holland. EU and other international donors provided the costs for transport and waste treatment. However, in the future there is a need of at least 500 million Euros that has to be provided from the international donors, at the first place from the EU, but also for state budget in the next 5-6 years. This is a big challenge for the country.

The waste classification in hazardous or not hazardous waste depend on the classification and labelling of dangerous substances and preparation that ensures application and implementation of equal or at least very similar principles over the whole life cycle of materials.

The biggest portion of hazardous waste management in N. Macedonia is based on land filling which is the last favourable waste treatment and incineration. Also land filing is not completely environmentally friendly and incineration is performing in the plant with old fashion technology.

In the future, hazardous waste management in N. Macedonia has to be significantly improved and based at the first place on waste minimisation and reduction and after that on preparing for reuse, recycling and other recovery eg. energy recovery and on the last on disposal only for the part of waste which cannot be treated.

The situation with hazardous waste management in the country can be estimated as still very poor and has to be improved in the next 5 years.

5. CONCLUSION

Hazardous waste causes serious threats for the environment and human health. This produces a need for its management, which is based on high-level environmental standards. The standards have to be stipulated in a very precise and detailed regulation. Hazardous waste management in N. Macedonia is still not developed. N. Macedonia as a country with candidate status for the membership of the EU faces with a number of problems in the area of hazardous waste. The most part of this waste type is land filled in an inappropriate way and a very big portion is dumped on a “temporarily sites” waiting for export in the countries where it can be treated in the installations with high level of standards. A part of hazardous waste is incinerated in a plant with old technology. The recycling and other forms of waste recovery are very poor. For the improvement of hazardous waste management has to be provided financial resources from the EU funds and other international donors, but also the central government has to provided financial resources. All mention above means that there is a need of undertaking of intensive measures and activities in the next period.

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