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## WASTE MANAGEMENT POLICIES IN FINLAND AND POLAND – TOWARDS A RECYCLING SOCIETY

### 18.1 INTRODUCTION

Finland and Poland represent EU-countries situated in the Baltic Sea catchment area. Although these two countries differ in size, population and economical situation, it seems to be interesting to compare waste management policies in order to use positive experiences.

Finland with the surface of 338145 km<sup>2</sup> is only a little bit larger country than Poland (312679 km<sup>2</sup>), but there is the main difference relates to population – 5,48 mln in Finland (16 persons/km<sup>2</sup>) and 38,4 mln in Poland (123 persons/km<sup>2</sup>) (2015). So this means there is a difference of about 8 rates. As far as Gross Domestic Product per capita is concerned, in Finland it counts 49497 USD and in Poland 14411 USD, so more than three times higher in Finland than in Poland [8, 9].

The waste management market in Poland has undergone a significant change over the past few years, largely as a result of the country trying to catch up with Western Europe. Transposition of EU directives has accelerated the pace of modernization of existing plants as well as forced the companies to engage in further investments, especially in the reduction of landfilled waste [7].

The comparison of waste policy and legal regulations makes sense because of possibility of using positive experiences in both countries, particularly on the level of national and local law deeds. In the paper there are presented statistical data, which will show how to approach to so called `recycling society`.

### 18.2 WASTE MANAGEMENT POLICY IN FINLAND

Finland's waste policies are based on the following key principles in accordance with the EU waste strategy (1996) on the prevention and recycling of waste (2005): prevention, pollutant pays, producer responsibility, precautionary and self-sufficient principle [6].

Finland's waste legislation defines waste management activities in the following order of precedence:

- preventing wastes reducing their harmful impacts,
- recovering wastes including primarily their material content and secondarily their energy content,
- the safe treatment of wastes and the rehabilitation of any related damages.

A number of reports were commissioned in connection with the preparation of the new plan:

- National Waste Plan for 2016 – Background document, Finnish Environment Institute 16/2007;
- The role and critical limits of waste co-incineration in Finland's waste disposal strategy, Background document, Part I, Reports of the Finnish Environment Institute 15/2006;
- Assessing the impacts of the promotion of material efficiency, Background document, Part II, Reports of the Finnish Environment Institute 9/2006;
- Environmental aspects of energy and material recovery of wastes, Background document, Part III, Reports of the Finnish Environment Institute 12/2006;
- Identification and assessment of the environmental impacts of landfilled industrial waste, Background document, Part IV, Reports of the Finnish Environment Institute 2/2007;
- Role of municipalities in future waste management, Background document, Part V, Reports of the Finnish Environment Institute 8/2007;
- Assessing the impacts of the proposed steering methods, Background document, Part VI, Reports of the Finnish Environment Institute 9/2007;
- Assessing the cost impacts of the National Waste Plan, Pöyry, Report 29 May 2007.

### 18.2.1 Main goals in waste management policy

The aim is to achieve a decline in the amount of municipal waste by the year 2016. Furthermore, the main goal is to achieve a situation when 80% of municipal waste is recycled or used as energy and a maximum of 20% ends up at landfills. These and other aims proposed in the National Waste Plan (16.2007) can only be achieved if all players in the waste management sector commit themselves to its goals and take action to reach them and if there are substantial changes to current waste-management and recovery practices [6].

Directions of fulfilling mentioned above requirements comprise e.g.:

- increasing the waste prevention by promoting material efficiency,
- increasing recycling,
- promoting the management of hazardous substances from the waste point of view,
- reducing the harmful climatic impacts of waste management,
- reducing negative health and environmental impacts of waste management,
- improving and clarifying the organization of waste management,

- developing expertise in the waste sector.

### 18.2.2 Recovery of wastes

If the above-mentioned recovery objectives are to be achieved, the targeted waste amounts (less than 2.3-2.5 million Mg/year) will require a composting or digestion capacity of between 320000 and 350000 Mg by 2016. Other materials would require a recovery capacity of between 700000 and 750000 Mg. At the same time, incineration capacity required for energy use would be between 700000 and 750000 Mg. This total includes waste incineration in incineration and co-incineration plants [6].

The aim of the National Waste Plan is that a maximum of between 460000 and 500000 Mg of municipal waste would end up at landfills by 2016 and that, landfills would number between 30 and 40 in 2016 (Table 18.1).

**Table 18.1 Recovery and treating of municipal waste in Finland (2006-2016)**

Plants recovering or treating municipal waste	Treated amounts in 2006 (1000 Mg)	Percentage of the municipal waste generated in 2006 (%)	Required capacity in 2016 for targeted amounts of waste (1000 Mg)	Percentage of the municipal waste generated in 2016 (equal to targets for recovery and treatment, %)
<b>Composting or biogas plant (digestion)</b>	137	5	320-350	14
<b>Composting at source</b>	54	2	140-150	6
<b>Material recycling</b>	648	25	700-750	30
<b>Waste incineration plant or co-incineration plant</b>	222	9	700-750	30
<b>Landfill</b>	1504	59	460-500	20
<b>Total</b>	2565	100	< 2300-2500	100

Source: [4]

Almost 66 million Mg of wastes was generated in Finland in 2005. The figure does not include the manure used in agriculture and the cutting waste left in the forests. Of the waste generated, some 29% was recovered as material and 14% used as energy. The remaining 57% ended up at landfills or was treated using other methods. The largest amounts of waste were generated in connection with mineral extraction (21 million Mg) and construction (22 million Mg). Of the mining waste, some 47% was waste rock, 47% tailings and 6% waste soil. The largest changes in the amount of waste in the sector have resulted from the changeover from opencast mining to underground mining. Waste soil accounts for almost 95% of the construction waste. In 2005, about 38% of all construction waste was recovered. Of the waste generated during housing construction (about 1.7 million Mg; excluding waste soil) about 33% was used as materials. At the same time, about 27% was used as energy, while the remaining 40% ended up at landfills [5].

Industrial waste in total in 2005 counted almost 17 million Mg. The largest

industrial waste categories were wood and bark, slag generated in connection with metal processing and manufacturing of metal products, and chemical-industry waste, particularly gypsum. The recovery rate of industrial waste varies greatly between sectors. Pulp and paper industry, food industry and the manufacturing of wood products exceeded the 70% recovery target laid down in the National Waste Plan for 2005. However, oil and chemical industry and the manufacturing of basic metals fell substantially short of the target.

Almost 2.4 million Mg of hazardous waste was generated in 2005. Most of that amount originated from the extraction of minerals, metal processing, manufacturing of metal products and construction. Households and the service sector are the largest source of municipal waste. In the period 2000-2006, the amounts of municipal waste have varied between 24 and 2.6 million Mg [11].

### **18.3 WASTE MANAGEMENT POLICY IN POLAND**

Poland's waste policies are based on similar key principles in accordance with the EU strategies as in Finland. The differences appear on the national level. Main Polish legal regulations regarding waste management are set forth primarily by the provisions of three acts of parliament:

- Act on waste (Journal of Laws 2012, item 21);
- Act on packaging and packaging of waste (Journal of Laws 2013, item 888);
- Act on maintaining cleanliness and order in municipalities (Journal of Laws 2013, item 1399).

In the context of waste-to-energy laws, Poland has adopted a strategic document regarding the energy sector, known as Polish energy policy until 2030. The basic premise of the document is to develop the use of renewable energy sources (RES), including bio fuels. The key goals include the following:

- to increase the share of RES in total energy consumption up to 15% by 2020 and more in the forthcoming years,
- to achieve a 10% share of bio fuels in the transport fuel market by 2020; this would embrace an increased use of second generation bio fuels, further diversification of energy supply, creation of optimal conditions for development of distributed energy based on locally available raw materials.

In accordance with the European Union Directive 2008/98/EC, the hierarchy of waste management was modified, with the aim to put special pressure on the rule of prevention and the conception of 'recycling society', and within their frames on the activities implementing those values: the prevention of waste production, preparing for re-use and recycling [7]. In the case of 'pollutant pays principle' within waste management it seems that more detailed presentation of this rule would be necessary in the range of the existing EU courts judicature within this scope, especially in the case of the regulations concerning entities bearing costs in the chain of waste distribution [4, 5, 10].

Taking into account the risk related to the transformation of waste within

waste recycling processes, the Polish legal regulations introduce the requirement to employ experts on the position of a manager, respectively of a waste landfill, incinerator or co-incinerator.

Poland, as a member of the EU, is obliged to harmonize its waste management laws with EU requirements. The issues of waste management that have been reflected in directives at the EU level lay the framework for the National Waste Management Plan (2014) as well as various regional plans. The basic premise of municipal waste management in Poland is a system of regional solutions. Specifically, each region of Poland (or Voivodship) will be provided with a Regional Waste Management Plan, which encompasses the assumptions contained both in the National Waste Management Plan and in strategic documents of a region.

The mentioned Plan assumes that Poland's modern waste management system should embrace the following range of services:

- mechanical-biological conversion of mixed municipal waste, storage of mixed and recycled waste and composting of green waste in regions > 150,000 residents,
- thermal conversion of mixed municipal waste in regions > 300,000 residents.

Local governments were obliged to arrange min. 5 and max. 15 waste management plants per region by 2014. As for landfill sites, their absorptive capacity should be sufficient for a period of min. 15 years of utilization.

#### **18.4 QUESTIONS OF RECYCLING**

Waste management in Poland varies from the models observed in Western European countries and Scandinavia. It is one of the countries where modern methods of waste disposal are used only to a limited extent. Below there is presented a chart, presenting waste management in 28 European countries, with regard to landfilling, thermal treatment, recycling and composting (Fig. 18.1).

In Poland landfilling reaches 70% of total municipal waste management, whereas in Finland this value oscillates at ca. 45%. Thermal treatment in Finland counts over 20%, while in Poland it covers very small percentage. However, the number of incineration plants is still being increasing in Polish waste management system. The level of recycling of communal wastes in Poland is two times smaller than in Finland (ca. 11% versus ca. 20%). But, the share of recycling has risen significantly for last years (e.g. 5.8% in 2007 and 11.4% in 2011). The level of composting in Poland is a little bit higher (few percent) than in Finland.

The positive information is that in the group of central and eastern European countries, Poland is on the 4th place, behind Slovenia, Estonia and Hungary. The distance to Finland, which is considered as well developed country with modern waste management system is 8 positions.

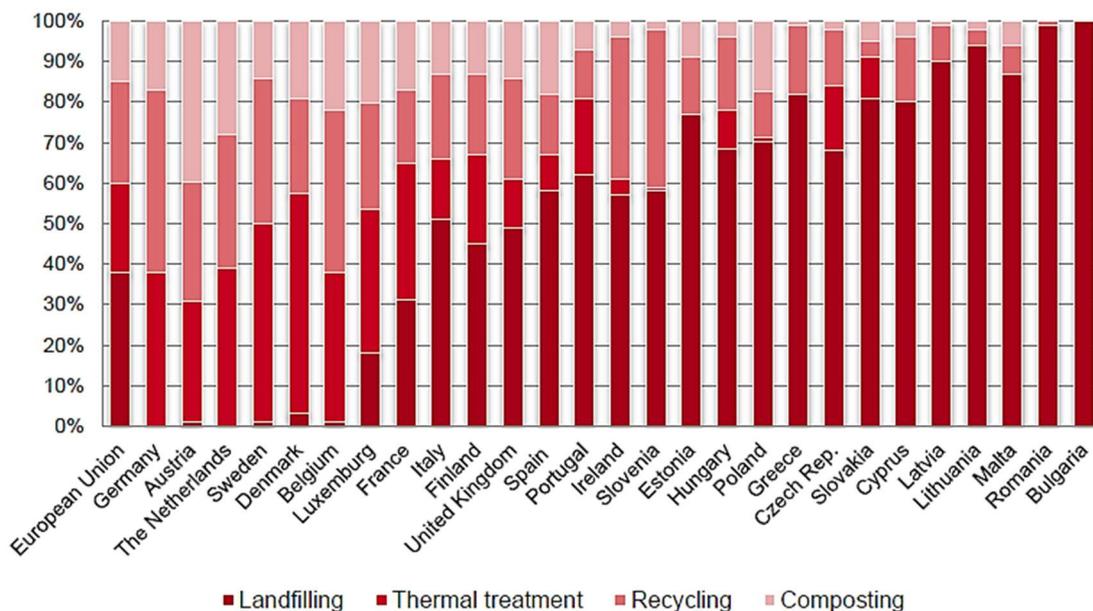


Fig. 18.1 Municipal waste management in the European countries in 2010

Source: [8]

Another important question is industrial waste management, which is connected with bottom ash treatment issue. At the moment the bottom ash from Polish incineration plants is not being recycled, although there are technological solutions which are additionally economically justified (e.g. BATNEEC methods used in many western countries – Finland, Germany, Belgium etc.) [1, 2].

## 18.5 CONCLUSIONS

Mentioned above problems are strictly connected with the community. Both communal wastes and industrial wastes require particular behaviors from the members of society. Legal regulations have no meaning without their respecting. Reaching towards recycling society begins with education on the earliest stage, meaning learning of the segregation of communal wastes. This depends also on the way of ecological education on the all levels of Polish education system. The problem of efficient segregation in Poland is still to be solved, although more and more communes introduces successful selected collecting of wastes. However, there are still large problems with illegal storage of wastes e.g. in forests. Another question is development of incineration and recycling plants. These plants on the level of planning require also participation of the society, what is described in suitable legal regulations. One of serious problems represent incinerating of communal wastes in individual households what is directly linked with very poor quality of the atmospheric air in towns, particularly in southern Poland.

Due to the longer process of development of implementing such installations and higher technical level of environmental infrastructure in Finland it may be profitable to use these good experiences in Polish waste management system.

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## **POLITYKI GOSPODARKI ODPADAMI W FINLANDII I POLSCE – W KIERUNKU SPOŁECZEŃSTWA RECYKLINGU**

**Streszczenie:** W artykule przedstawiono porównanie polityki gospodarki odpadami w dwóch krajach Unii Europejskiej: Finlandii i Polski. Opisano przepisy prawne dotyczące gospodarki odpadami komunalnymi i przemysłowymi. Przedstawiono najważniejsze dane dotyczące ilości powstających odpadów oraz działalność w zakresie unieszkodliwiania i przeróbki oraz odzysku surowców wtórnych, w dążeniu do utworzenia tzw. społeczeństwa recyklingu.

**Słowa kluczowe:** gospodarka odpadami, przepisy prawne, recykling

## **WASTE MANAGEMENT POLICIES IN FINLAND AND POLAND – TOWARDS A RECYCLING SOCIETY**

**Abstract:** In the paper there is presented a comparison of waste management policies in two EU-countries: Finland and Poland. There are described legal regulations considering communal and industrial wastes management. There are presented the most important facts and figures about total amount of wastes which is being produced and there are presented activities of waste treatment and recovery of secondary materials towards a recycling society.

**Key words:** waste management, legal regulations, recycling

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