

Croatian Experience in Waste Oil Management

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Abstract. This paper describes the course of introducing and implementing regulations ensuring efficient waste oil (lubricant and edible oil) management, as well as results obtained based on long-term experience in monitoring and reporting on the management of this special waste category. According to the results from 2007 to 2012, between 6 000 and 7 000 t of waste lubricant oil was collected in the Republic of Croatia. Quantities of collected waste edible oil in the same period indicate low recovered amounts compared to the estimated annual quantities of fresh edible oil placed on the market (50 000 t), i.e. supposed quantities of waste edible oil recovered vary, from 3.6 % to 8.6%.

Key words: Waste edible oil; Waste management; Waste oils; Waste oil management

Introduction

According to the European Commission Eurostat office of statistics (EUROPEAN COMMISSION, 2013), in 2010 the total quantity of waste produced from all economic activities and households at the EU-27 amounted to 2 502 million tonnes. In the same time the quantity of processed waste (including the waste imported into the EU) was 2 336 million tonnes. Almost half of the mentioned amount (45.4 %) of waste, processed within the EU, was treated by the means of disposal, primarily at the disposal sites, part was disposed of in proximity or within the mines, and remaining was released into the water. 49 % of the total waste quantity processed in the EU in 2010 was recycled using procedures of extracting valuable components, while remaining 5.6 % was processed by means of

incineration with or without using thermal energy.

Mentioned waste quantities, as well as activities related to its processing and/or treatment, indicate the significance of waste management, which has an emphasized position in environment protection strategies in all European countries. Developed countries focus on minimizing and recycling waste, thus contributing to closing of the circle of raw material use by creating materials from waste as an input for new production. Consideration of life cycle has lately been increasingly introduced as the leading principle of resource management. The environmental impacts are being studied throughout a product's life span in order to wherever possible avoid or minimize transfer of environmental problems from one stage of life span to

another or transfer from one country to another via market instruments.

An established and efficient waste management system is an important component of the contemporary society. In order to ensure its further development and better efficiency economic incentives are required to ensure reduction of waste quantities at the place of occurrence, separate collection, processing and recycling.

Croatia's legislative system regulates waste management in large part, although there are areas that are not harmonized with EU requirements and standards. However, evasion of implementation presents the biggest challenge. Even though activities and measures in the field of waste management contributing to fulfilling set strategic goals have been implemented in Croatia, some segment still do not demonstrate the expected dynamics or experience difficulties in implementation. Thus, further strengthening of the capacities in the terms of authorities for waste management is essential, as well as the improvement in private sector participating in the waste management process as well as development of new and enhancement of existing economic instruments, such as already introduced fees for recycling and collection of special categories of waste and fees for pollution by waste disposal. Further efforts are also needed in the education of experts for pollution by waste disposal, who will work on this problem.

Within the Croatian legislative framework, a special place belongs to the management of special categories of waste, that is regulated by a series of individual ordinances (Ordinance on packaging and packaging waste, Official Gazette of the Republic Croatia, OG 97/05, 115/05, 81/08, 31/09, 156/09, 38/10, 10/11, 81/11, 126/11, 38/13, 86/13; Ordinance on waste tyre management, OG 40/06, 31/09, 156/09, 111/11, 86/13; Ordinance on waste oil management, OG 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13; Ordinance on waste batteries and accumulators management, OG 133/06, 31/09, 156/09, 45/12, 86/13; Ordinance on the

management of end-of-life vehicles, OG 136/06, 31/09, 156/09, 53/12, 91/13; Ordinance on the method and procedures for managing waste containing asbestos, OG 42/07; Ordinance on medical waste management OG 72/07; Ordinance on the management of waste electrical and electronic appliances and equipment, OG 74/07, 133/08, 31/09, 156/09, 143/12, 86/13; Ordinance on construction waste management, OG 38/08; Ordinance on management of wastewater treatment sludge when used in agriculture, OG 38/08; Ordinance on management of waste from the titanium dioxide industry, OG 70/08; Ordinance on the management of polychlorinated biphenyl and polychlorinated terphenyls, OG No. 105/08). Among other matters these ordinances prescribe development of systems of separate collection and recycling of individual special categories of waste (OG 94/13), including: bio waste, waste textile and footwear, waste packaging, waste tyres, waste oils, waste batteries, waste vehicles, waste consisting asbestos, medicinal waste, waste electric and electronic devices and equipment, waste naval vehicles, sea waste, construction waste, waste sludge from the waste water purification plants, waste from the production of titan oxides, waste poly chloride biphenyl and poly chloride terphenyl.

Of the relatively high number of special categories of waste, Croatia as well as some other European countries started to organized management of categories of waste oils. Hence, this paper will demonstrate some of our experiences in that field.

How it all started

Mid 1970s are considered as the beginning of the introduction of waste oil management practice into the European legislation, with the publication the Council Directive on the disposal of waste oils (COUNCIL DIRECTIVE 75/439/EEC), even though document at that time related only to the lubricant oils waste. Since then this Directive has been amended on three occasions by the Directives on Amending

the Directive on the disposal of waste oils 1987/101/EEC, 1991/692/EEC and 2000/76/EC, and revoked by the Directive of the European Parliament and of the Council on waste and repealing certain Directives (DIRECTIVE 2008/98/EC). Current EC Directive on waste oil management covers all relevant provisions on waste oil management all of which have since been transposed into the legislation of the EU member states.

In terms of the environmental awareness, Croatia has never lagged far behind the advanced European counterparts. Thus, in 1982 it devoted great attention to waste oils in its Act on the disposal of waste materials (OG 42/82). Article 3 of the said Act classifies waste materials into four categories, namely: production and traffic waste, waste mineral and other oils, communal waste and unused energy. The same Act established the tributaries of the proscribed manner of managing the listed groups of waste, as well as the obligation to register economic subjects for the business activity of collecting waste oils.

Although the 1995 Waste Act (OG 34/95), which revokes the Act on the disposal of waste materials, does not mention waste oils expressly, opposed to packaging waste, it still is present in the implementation part of the regulation, which is the Ordinance on the kinds of waste (OG 27/96), placing great importance on waste oils.

This Ordinance, among other, determines the types of waste depending on their properties and place of generation, means of treatment individual waste types, manner of delivering information on waste management, testing physical and chemical properties of hazardous waste, sampling waste, etc., as well as proscribes in detail the manner of managing waste oils exclusively, while it lists general provisions for other waste types and categories. Furthermore, this document defines the term of waste oils, prescribes the classification according to the degree of pollution, defines the obligations of fresh oil producers and distributors, as well as waste oil producers,

especially concerning collection (separate collection, specially marked tanks...), managing the register on generated quantities of waste oils, etc.

The 2004 Waste Act (OG 178/04) proscribed the obligation of drafting an ordinance which was to establish the treatment of all special waste categories.

The first in the series of respective ordinances was introduced in 2005 entitled Ordinance on packaging and packaging waste (OG 97/05, 115/05, 81/08, 31/09, 156/09, 38/10, 10/11, 81/11, 126/11, 38/13, 86/13), followed by Ordinance on waste tyre management (OG 40/06, 31/09, 156/09, 111/11, 86/13), Ordinance on waste oil management (OG 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13), Ordinance on waste batteries and accumulators management (OG 133/06, 31/09, 156/09, 45/12, 86/13) and Ordinance on the management of end-of-life vehicles (OG 136/06, 31/09, 156/09, 53/12, 91/13) in 2006. 2007 saw Ordinance on the method and procedures for managing waste containing asbestos (OG 42/07), Ordinance on medical waste management (OG 72/07), Ordinance on the management of electrical waste and electronic appliances and equipment (OG 74/07, 133/08, 31/09, 156/09, 143/12, 86/13). Ordinances for other special categories of waste were adopted in 2008, namely: Ordinance on the construction waste management (OG 38/08), Ordinance on the management of wastewater treatment sludge when used in agriculture (OG 38/08), Ordinance on the management of waste from the titanium dioxide industry (OG 70/08) and the Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG 105/08).

Most of these ordinances have in the meantime seen a number of amendments, mostly relating to their harmonization with relevant EU legislations.

The objective of the Ordinance on waste oil management (OG 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13) was to establish the system of waste oil collection for the purpose of disposal and/or recycling, environment protection in

general, as well as human health preservation.

This Ordinance proscribes the manner of managing waste oils, determines the tributaries of fees, types and amounts of those fees, payment manner and deadlines, amounts of fees payable to entities authorised for collection of waste oils, and many other issues relating to waste oil management.

Further, it also regulates the managing of register on quantities of products placed on the Croatian market (produced or imported), becoming a special waste category upon expiration. The provisions of this Ordinance do not refer to the managing of waste oil comprising biphenyls (PCB) and polychlorinated terphenyls (PCT) over 30 mg kg⁻¹, emulsions and oiled liquid waste having in its composition, apart from emulsion oils and other waste oils, other pollutants and water, as these issues are regulated by the Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG 105/08).

Since its first introduction, the Ordinance on waste oil management has seen numerous amendments, and it is to be replaced by a new Ordinance upon the adoption of a coming new Act on Sustainable Waste Management (OG 94/13).

Data on quantities of collected and disposed waste oils 1996-2004

The obligation of the Croatian waste producers on the manner of managing a register on types and quantities of generated waste in the form of Waste cadastre was regulated as far back as 1995 in the Waste Act (OG 34/95) and Ordinance on the kinds of waste (OG 27/96), while the system itself was implemented in 1997. Based on the 1994 Environmental Protection Act (OG 82/94), Regulations on Emission Inventory (OG 36/96) was adopted with the purpose of establishing a wholesome base of data on the environmental pollution via air, water and sea emissions from respective sources, as well as types and quantities of hazardous waste. Emission Inventory collected data on the environmental pollution from 1997 to 2008, when it was replaced by the

environmental pollution register (OG 35/08) as a data base on the sources, types, quantities, manner and location of emissions, transfer and disposal of pollutants and waste into the environment.

Even though completed forms with data such as sources, types, quantities, manner and location of emissions, transfer and disposal of pollutants and waste into the environment were delivered to the county offices authorised for environmental protection, the available literature holds no systematized data on collected waste quantities 1996-2004. Until 2005 keeping the Waste cadastre was under the scope of (then) Ministry of Environment Protection, Urban Planning and Building. Since 2005 it is responsibility of the Croatian Environment Agency (OG 75/02), as regulated by the 2004 Waste Act (OG 82/94). This in turn means that the Croatian Environment Agency started receiving waste data for 2004 only in 2005. Since then Agency introduced the practice of reporting on Waste cadastre (WASTE CADASTRE, 2006; 2007; 2008.), and those reports, among others, presented the total number of the quantity of collected waste oil.

The first waste reports (WASTE CADASTRE, 2006; 2007; 2008.) usually presented total data for the whole Croatia in the first part, continuing with reported quantities of generated, collected and recycled production waste by categories with summaries of managing generated, collected and recycled waste in respective counties. The data delivered to the Waste cadastre were often incomplete and inaccurate, as reflected in wrong key numbers of reported waste, lack of information on waste flow, inadequate measuring units of the quantities of reported waste, etc. This is why the results of processing county and county level in those first reports should be regarded cautiously (Table 1).

The first detailed report with gathered data on waste lubricant oil for Croatia was in the 2005 Report (CROATIAN ENVIRONMENT AGENCY, 2007), listing that hazardous waste 13 00 00 (oil wastes and wastes of liquid fuels – except edible oils,

and those in chapters 05, 12 and 19), reported in the Waste cadastre in the amount of 9 461 tonnes represents as much as 26.6% of the total reported quantity of generated hazardous waste. Within the 13 00 00 group, the report listed the following: 2 853 t of sludge from the oil/water separator process by the solidification procedure, 2 457 t of non-chloride lubricant oils from motors and gears based on mineral oils mostly remaining at the place of collection, with only a minor part being sent for incineration, 1 094 t of other oiled waste temporarily stored at the place of collection, etc.

Table 1. Overview of quantities of generated waste oils as reported to the waste cadastre 2003-2006.

Waste oil, t	Year			
	2003	2004	2005	2006
Generated	13 303	11 258	9 461	10 083
Collected	NA	NA	10 409	15 292
Recycled	NA	NA	8 997	13 563

NA - not available

In the following year the share of waste oils in the total quantity of generated production waste was somewhat lower (CROATIAN ENVIRONMENT AGENCY, 2006; 2007; 2008) 25.3%. Of the totally reported 10 083 tonnes of 13 00 00 waste group, 2 530 t of non-chloride lubricant oils from motors and gears based on mineral oils mostly submitted to processing was reported, 2 003 t of sludge from the oil/water separator submitted for processing, 1 102 t of other oiled waste, etc.

Data on quantities of collected and disposed waste oils 2007-2012

Even though waste oil management, fee tributaries and fees themselves, etc. were proscribed in 2006 by the Ordinance on waste oil management (OG 124/06, 121/08, 31/09, 156/09, 91/11, 45/12, 86/13), the data on implementation and efficiency of its provisions could be analyzed only after the adoption of the 2007 Environmental

Protection Act, under which the Croatian Environment Agency was obliged to draft annual Reports on the state of the environment in the Republic of Croatia.

The Ordinance on waste oil management set up the goal of establishing the system of collecting waste oils for the purpose of disposal and/or recycling, environment protection and people's health. Legislation also defined role of authorised collectors and recyclers, who were to engage in afore mentioned activities as legal entities and as such are obliged to obtain licences for the activities of collection, disposal and/or recycling waste oils. Pursuant to that, 50 Croatian business are in possession of licences for waste lubricant oil management (groups 12 01 and 13), and 88 businesses for waste edible oil management under the key number 20 01 25 (November 2013).

Until 2008 data on waste oil management were gathered based on the Regulations on Emission Inventory (EI) until the adoption of the Ordinance on the Environmental Pollution Register (OG 35/08), when Regulations on Emission Inventory stopped being legally valid.

The Ordinance on the environmental pollution register proscribes the obligatory contents and manner of keeping the environment pollution registry, the tributaries of delivering data to the registry, manner, methodology and deadlines for gathering and delivering data on emissions, transmissions and disposal of pollutants in the environment, as well as waste, data on polluting entities, company, plant, polluting entity's organizational unit, deadlines and ways of providing public information, information review and quality assurance, timeframe for archiving data and conducting expert activities regarding registry management.

This Ordinance fully ensures the implementation of the Regulation 166/2006 EZ on establishing the European Pollutant Release and Transfer Register, E-PRTR (REGULATION EC166/2006), and upon joining the EU, the Croatian Environment Agency is obliged to deliver data to E-PRTR. The first Waste Oils Report (ANNUAL CEA, 2008) for 2007 was drafted by the Croatian

Environment Agency pursuant to 2007 Environmental Protection Act and Ordinance on waste oil management. According to the mentioned report, during 2007, 31 478 t of fresh lubricant oil was produced and imported, i.e. placed on the market. In the same year 6 115 t of waste lubricant oil was collected, comprising 39% of the total of waste lubricant oil or only 19.4% of the fresh lubricant oil placed on the market.

In the first Waste Oils Report (ANNUAL CEA, 2008) further discusses the quantity of 1 132 t collected waste edible oil, even though data on the quantity of fresh edible oil placed on the Croatian market are not known, because the producers/importers of waste edible oil in Croatia are not tributaries of fees for waste oil management and are not under the obligation of delivering information on the quantities of fresh edible oil placed on the market to the Croatian Environmental Protection and Energy Efficiency Fund. Of the 1 132 t of collected waste edible oil, 691 t or 61% was delivered for processing. Amount of collected waste edible oil is much lower than the estimated quantity of produced waste edible oil from the Waste Management Plan of the Republic of Croatia (WASTE MANAGEMENT PLAN OF THE REPUBLIC OF CROATIA, 2007-2015; OG 85/07,126/10, 31/11) for 2007-2015, estimated at 50 000 t year⁻¹.

These first reports on waste oil management, based on the data submitted by the authorised collectors and recyclers to the Croatian Environmental Protection and Energy Efficiency Fund and Croatian Environment Agency saw certain data discrepancies. This was a direct result from poor defining of key numbers of some of the waste from 13 00 00 group, levelling litre and kilogram units, etc. For instance, in the 2007 report five of total twenty authorised collectors reported the same data to the Croatian Environmental Protection and Energy Efficiency Fund and Croatian Environment Agency, thus the said discrepancies come as no surprise at all.

Regulation on categories, types and classification of waste with a waste catalogue and list of hazardous waste (OG 50/05, 39/09), includes and summarizes

waste oils covered by the Ordinance on waste oil management in chapters 12, 13 and 20. Same classification is used for the regular annual reports on waste oils drafted by the Croatian Environment Agency, alongside with waste oils from chapter 13 00 00, namely oil wastes and wastes of liquid fuels - except edible oils, and those in chapters 05, 12 and 19. Report also contains data on managing other waste like:

- 12 01 06* - mineral-based machining oils containing halogens (except emulsions and solutions);
- 12 01 07* - mineral-based machining oils free of halogens (except emulsions and solutions);
- 12 01 10* - synthetic machining oils;
- 12 01 12* - spent waxes and fats and
- 12 01 19* - readily biodegradable machining oil.

During the last six years of implementing the Ordinance on waste oil management, no significant change in waste oil management has been reported. The quantities of fresh lubricant oil placed on the market of Croatia went from 21 219 t (2012) to 35 576 (2008), and the result are the development of produced, imported and exported quantities, as presented in Table 2.

From the data (ANNUAL CEA, 2008 - 2012; DATA ON WASTE OIL, 2012) shown in Table 2, it is evident that in the period 2007-2012 the annual amount of collected waste was almost equal, and that the quantities of waste lubricant oil went from 6 115 t (2007) to 7 068 t (2008), while a drop in the quantity of collected waste lubricant oil was reported in 2009. In the same period almost the entire collected quantity was recycled, and Table 2 demonstrated that in the first years of implementing the Ordinance on waste oil management and monitoring waste oil management, the shown quantities of recycled waste oil were sometimes bigger than the shown quantities of collected lubricant oil (2007-2009), resulting from the manner of delivering incomplete data by the licensed companies. According to data shown in Table 2, in the 2007-2012 period, between 20 488 t (2010) and 35 576 t (2008) of fresh lubricant oil was placed on the Croatian market, while between 5 835 t

(2012) and 7 068 t (2008) of fresh lubricant oil was collected, i.e. between 39% (2007) and 65% (2010) of estimated produced quantities of waste lubricant oil, usually comprising around one half of the annual quantity placed on the market (WASTE OILS, 2013), as shown in Fig. 1.

As the Ordinance on waste oil management implies both lubricant waste oils and edible waste oils under the term waste oils, in the annual reports (ANNUAL CEA, 2008 - 2012; DATA ON WASTE OIL, 2012) due attention was also paid to waste edible oils.

Waste edible/cooking oil (20 01 25 - edible oil and fat) is, pursuant to this

Ordinance, any oil produced within catering and tourist-related activities, industry, craft, health-related activities, public management and similar businesses preparing over 20 meals per day, meaning that most provisions from the Ordinance apply to these waste oils as well.

According to the data on collected waste edible oil in the 2007-2012 period in Croatia, it is evident that the collected quantities are very small relative to estimated annual amounts of fresh edible oil placed on the market of 50 000 t or supposed quantities of waste oil, estimated at 50% of the total fresh oil quality (Table 3).

Table 2. Overview of the development of lubricant oil in Croatia 2007-2012.

Lubricant oil, t	Year					
	2007	2008	2009	2010	2011	2012
Produced fresh oil	12 501	12 413	10 417	7 031	9 205	6 723
Imported fresh oil	23 794	28 518	24 212	22 939	25 095	22 253
Exported fresh oil	4 816	5 355	10 567	9 482	9 633	7 757
Placed on the market fresh oil	31 478	35 576	24 062	20 488	24 667	21 219
Collected waste oil	6 115	7 068	6 785	6 640	6 391	5 835
Recycled waste oil	6 364	7 131	6 843	6 535	5 906	5 125

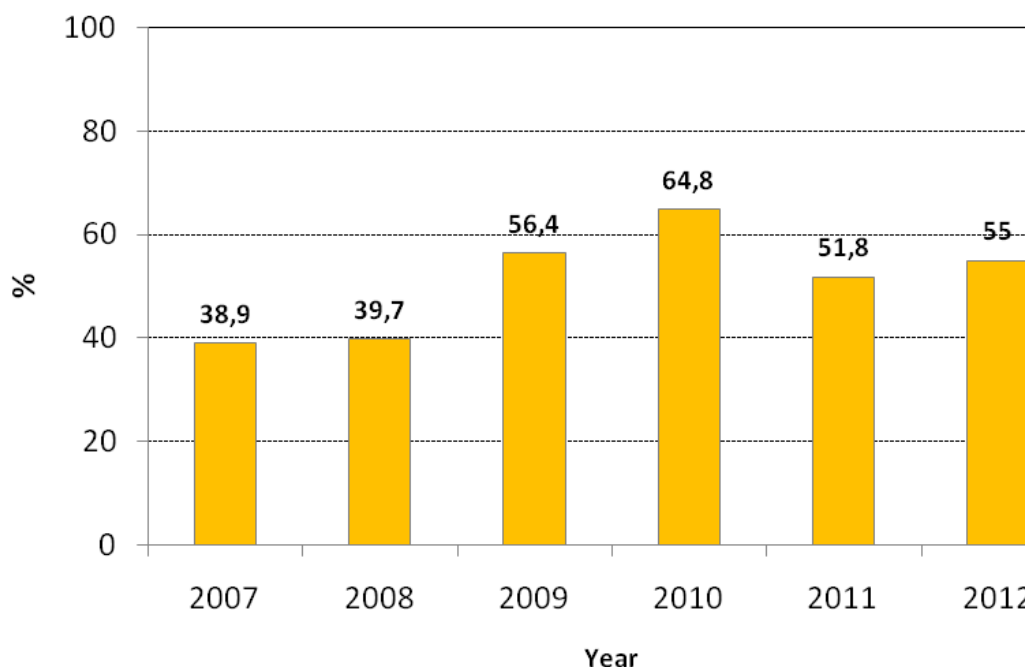


Fig. 1. The share of collected waste lubricant oil in the estimated produced quantity of waste lubricant oil in the 2007-2012 period.

Table 3. Overview of the development of waste edible oil in Croatia 2007-2012.

Edible oil, t	Year					
	2007	2008	2009	2010	2011	2012
Placed on the market fresh oil	50 000*	50 000*	50 000*	50 000*	50 000*	50 000*
Collected	1 132	1 606	2 145	1 260	1 196	911
Recycled	691	1 033	1 507	683	744	678

*Estimation (WASTE MANAGEMENT PLAN OF THE REPUBLIC OF CROATIA, 2007-2015; OG 85/07,126/10, 31/11)

According to data presented in Table 3, and based on the comparison of data on collected quantities of waste edible oil and estimated annual quantities of fresh edible oil placed on the market of 50 000 t, it ensues that in the 2007-2012 period, very little, i.e. between 3.6% (2012) and 8.6% (2009) was collected relative to the estimated quantity of the total collected waste edible oil (Fig. 2). Having in mind that, according to the data of the Croatian Bureau of Statistics for the 2005-2011 period, the annual per capita consumption of edible oil (CROATIAN MAIN CHARACTERISTICS HOUSEHOLD CONSUMPTION AND HOUSEHOLD, 2007 - 2011) was between 13.1 and 14.6 litres, implying that the annual quantity of fresh edible oil placed on the market may be higher than the estimated 50 000 t, in that case the real results on annually collected waste edible oil are even poorer than reported.

To be precise, the European and global statistics report that 40-50% of edible oil

used for food preparation is consumed by restaurants and in the food industry, whereas the rest is consumed by household, of which 50% in food and the rest presents waste edible oil (CVENGROŠ *et al.*, 2004; KLEINOVA *et al.*, 2009; ADEME, 2010). According to that, in the EU countries, the total quantity of produced waste edible oil is 5kg per capita annually. In the same period between 678t (2012) and 1507t (2009) was recycled, i.e. between 54.2% (2010) and 74.4% (2012) of the total quantity of collected waste edible oil, as presented in Fig. 3.

Comparing the results of quantities of collected and recycled waste edible oil in 2008 with data available from the literature (CVENGROŠ *et al.*, 2004; KLEINOVA *et al.*, 2009; ADEME, 2010) for the same year in some EU member states, it is evident that the results of collection and recycling of waste edible oil in Croatia are significantly below the results achieved during the same year in the observed EU member states, as presented in Table 4.

Table 4. Waste edible oil management in some EU countries and Croatia in 2008.

Country	Edible oil, t			Recycled, %
	Fresh oil placed on the market	Generated waste oil	Collected waste oil	
Belgium (BE)	110 742	46 710	44 711	94
Denmark (DK)	61 182	28 000	20 000	100
Croatia (HR)	50 000*	25 000*	1 606	64
Italy (IT)	529 870	227 371	212 497	71
Germany (DE)	1 079 576	493 000	493 000	100
Portugal (PT)	93 576	41 169	31 695	89
Spain (ES)	485 200	190 000	180 000	100

*Estimation (WASTE MANAGEMENT PLAN OF THE REPUBLIC OF CROATIA, 2007-2015; OG 85/07,126/10, 31/11)

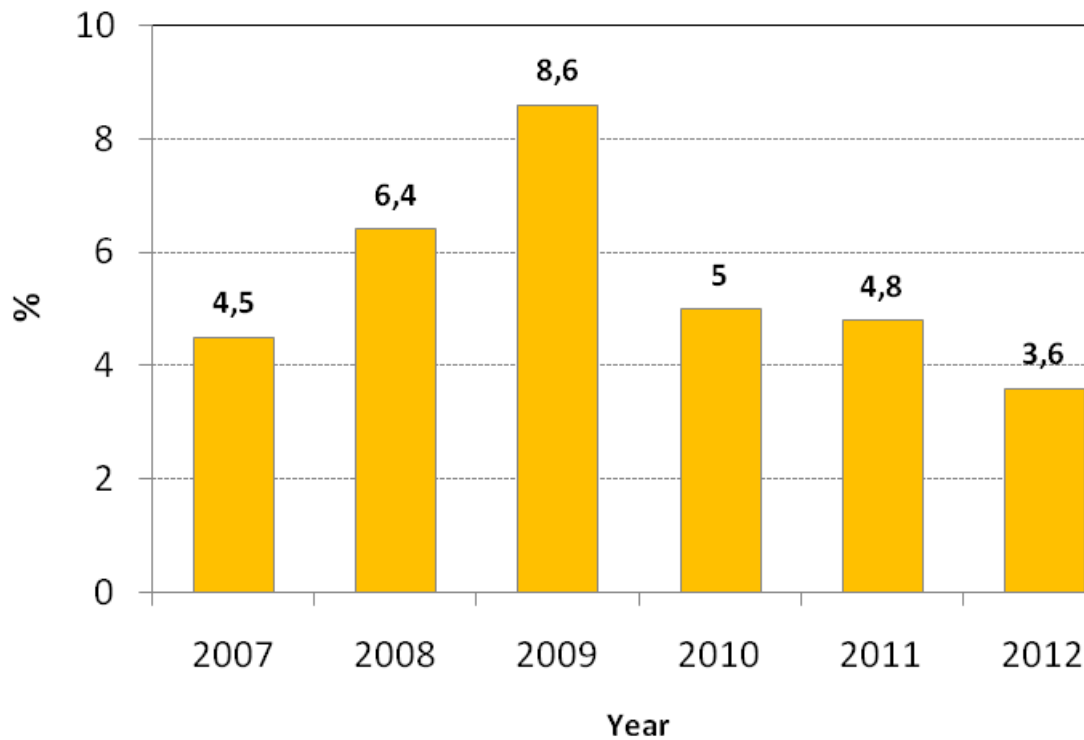


Fig. 2. The share of collected waste edible oil in the estimated produced quantity of waste edible oil in the 2007-2012 period.

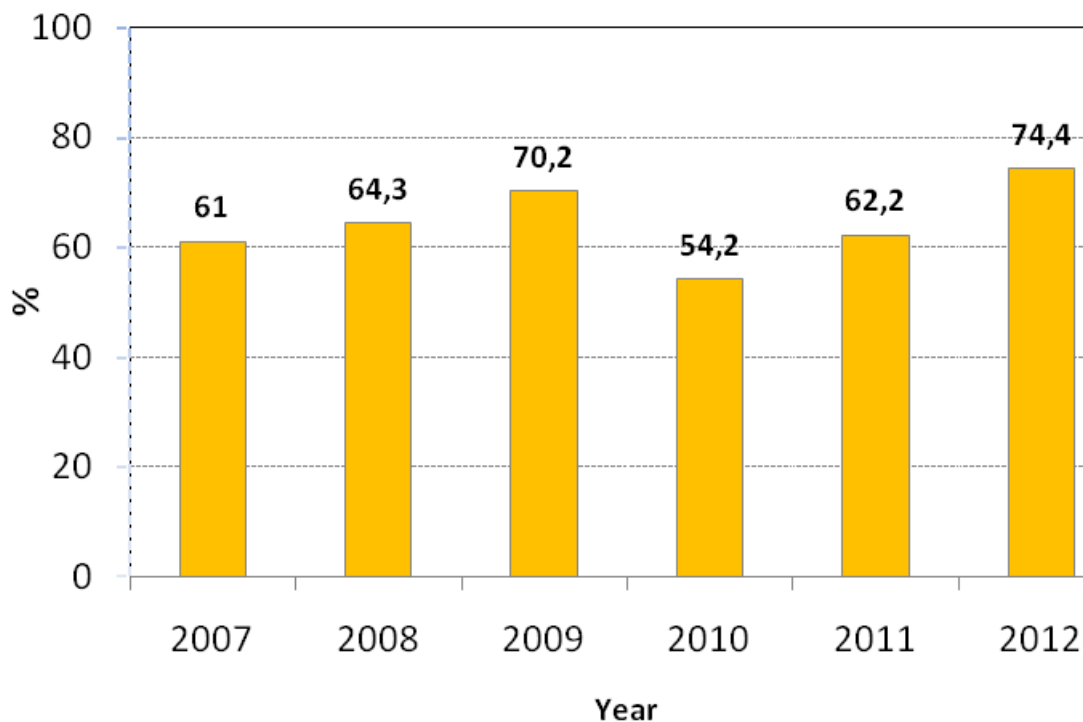


Fig. 3. The share of recycled waste edible oil in the estimated produced quantity of waste edible oil in the 2007-2012 period.

Conclusion

This paper has described the course of introducing and implementing the regulations ensuring simultaneous learning, establishing and implementing waste oil management system. At the same time, it shows Croatia's commitment for a general consideration of this segment of environment protection and human health, resulting in existing legislature and long experience in reporting on waste oil management results.

According to the results demonstrated for 2007-2012 between 5 835 t (2012) and 7 068 t (2008) of waste lubricant oil was collected in Croatia, i.e. between 39% (2007) and 65% (2010) estimated generated quantities of waste lubricant oils.

According to the data on quantities of collected waste edible oils from 2007 to 2012 in Croatia, one may conclude that those quantities are very small relative to the estimated annual amounts of fresh edible oil placed on the market (50 000 t), i.e. supposed quantities of waste edible oil, from 3.6 % (2012) to 8.6% (2009).

From 2007 to 2012 almost entire quantity of collected waste lubricant oil was recycled, and the share of recycled waste edible oil was between 54.2% (2010) and 74.4% (2012) of the total quantity of collected waste edible oil. Thus it is important to note that the quantities of collected waste edible oil in Croatia are very small and it is essential to make steps towards improving significantly the system of waste oil management relating to edible oil.

In general, the share of recycled waste oil is very difficult to comment in relation to the objective determined by the Waste Management Strategy of the Republic of Croatia (OG 130/05), which was to be met as far back as 2010. To be more precise, the 90% waste oil recycled goal determined by the Strategy has not been clearly defined, i.e. it is not clear whether it refers only to recycling lubricant oils or edible as well, and whether 90% of collected or generated waste oil is to be recycled. On the EU level, recycled quantities of waste oil are

expressed in the relation to collected quantities.

Regardless of the inconsistencies in terms of the Strategy's objectives, the results of waste oil management, both lubricant and edible, are not significant, which leads to the conclusion that, based on the comparison of demonstrated results relating to the collection and the recycling of waste lubricant oil and waste edible oil in Croatia and some EU member states, Croatia needs to continue with the ongoing education of all participants, especially small consumers like households with the purpose of improving the system of waste oil management.

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