

# Identifying crucial factors affecting Waste Oils collection from shipping sector in Greece

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## Abstract

The shipping sector is one of the major lubricant oil users in Greece, along with the industrial and vehicles sectors. Nevertheless, waste lubricant oil collection remains proportionally extremely poor compared to that of other sectors, considering the intense shipping activity and the number of ports in Greece. This is why the new National Planning for the Hazardous Waste Management points out the non-separation of WLO and other hazardous liquid waste, as the main problem in waste management at the Ports. Waste collection and management status in main Greek ports and the obligations arising from Extended Producer Responsibility legislation for the shipping sector are explained in order to better analyze the present situation and determine the characteristics of the problem. A connection to the national obligation concerning the collection and regeneration targets in waste oil management is also attempted. Multiple ministries, port authorities, shipping companies, waste collection companies and the ship personnel seem to hold a key player role. Which parameters feed the existing situation? What is the existing legal status adequacy? Crucial factors affecting the shipping lubricant waste oils management are investigated in order to come up with short term and long term suggestions. Focusing in specific target groups and actions is likely to have significant positive effects in waste oils collection.

**Keywords:** Waste Oils, Ships, Ports, Recycling, national targets

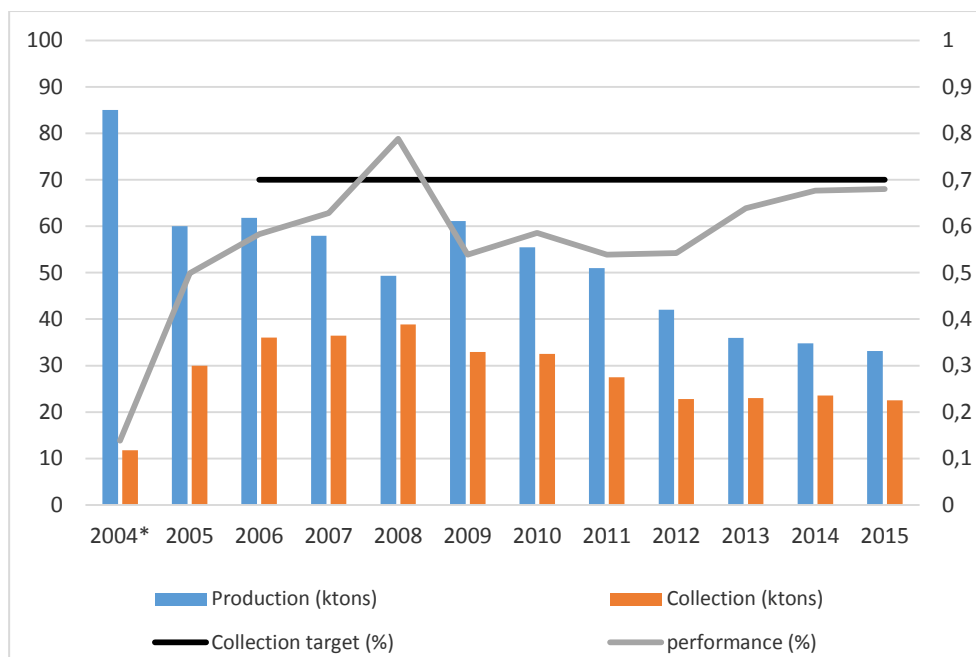
## 1. Introduction

Alternative waste management is a set of activities that include inter alia the collection and transport, temporary storage, reuse, recycling and recovery of specific waste streams, so that they are recovered and diverted from the waste stream that led to final disposal sites. There are many kinds of materials which can be reused, recycled or otherwise recovered rather than ending up in landfills. The benefits of recycling are numerous, including not only the protection of the environment and the conservation of natural resources but also the promotion of sustainable development and the creation of new jobs. In Greece, despite the initial alignment delay, recycling is currently

satisfactory. In most products, the EU objectives are met, practically demonstrating the concern of Greek citizens for recycling and the environment. The Hellenic Recycling Agency (HRA) is the competent authority of the Ministry of Environment and Energy for the design and implementation of recycling policy in Greece. It is responsible for approving national alternative management systems (EPR schemes) for each product and for controlling the progress of recycling within the Hellenic territory. Lubrication Oils (lubrication and industrial) are an essential element of everyday life necessary for the operation of machines and mechanisms. In 2006, the EU consumed approximately 5.7 million tons of lubrication oils (Okopol, 2008). So every year the EU should manage about 3 million tons of waste lubricating oil (WLO). Waste oils are hazardous to public health and the environment because they contain high concentrations of toxic and carcinogenic substances, such as heavy metals, polychlorinated hydrocarbons, poly-aromatic compounds, etc. The overhead disposal causes pollution to both the groundwater stream and the soil. Specifically, 1L of WLO can contaminate up to one million liters of drinking water. WLO regeneration (in other words the recycling) is the best reclaiming solution instead of burning or even worse burying.

## 2. WLO management in Greece

In Greece it is estimated that 60% of oils available in the market becomes waste. In 2014, 32.3 t of WLO have been produced in Greece (ENDIALE, 2015). Greece regenerates 100% of the collected WLO in local facilities. ENDIALE SA is the unique Extended Producer Responsibility (EPR) scheme for the WLO alternative management, in Greece. It operates since 2004, and contracts 9 waste oil regeneration units, about 40 collectors all over Greece, while it has registered more than 35000 WLO collection points (ENDIALE, 2016). WLOs have an economic value that leads to illegal management, uncontrolled incineration and fuel blending. The national collection target is set to 70% of WLO produced per year whilst the regeneration target is set to 80% of WLO collected per year. These ambitious obligations are pioneering since European Commission is not expected to set obligations for member states before 2025 the earliest (EU non paper on the preparation of circular economy directive, 2017).



**Fig. 1.** Quantities and percentages of WLO collected in Greece for the period 2004-2015 (HRA, 2015)

WLO management in Greece is settled and well described by the waste legislation, the hazardous waste legislation and alternative management of waste legislation. Figure 1 presents collection status over the years. All WLO collected was led to regeneration facilities within Greece, which satisfies the national target and is important from environmental as well as economic point. This performance is recognized as European leading by institutes (Okopol, 2008), Organizations (GEIR, 2009) and European Commission partners (bio Deloitte, 2014).

### 3. WLO in the shipping sector

#### 3.1. Ship waste

Operational discharges of waste from ships form a significant threat to the marine environment. To reverse this trend, the EU adopted Directive 2000/59/EC1 on port reception facilities for ship-generated waste and cargo residues ("the PRF Directive"). The PRF Directive aims "to reduce the discharges of ship-generated waste and cargo residues into the sea, especially illegal discharges from ships using ports in the EU, by improving the availability and use of port reception facilities" (Article 1). The PRF Directive supports the objectives and targets as defined in the Circular Economy Package (COM, 2015) and in the 7th Environment Action Programme. The PRF Directive is generally coherent with the objectives set by

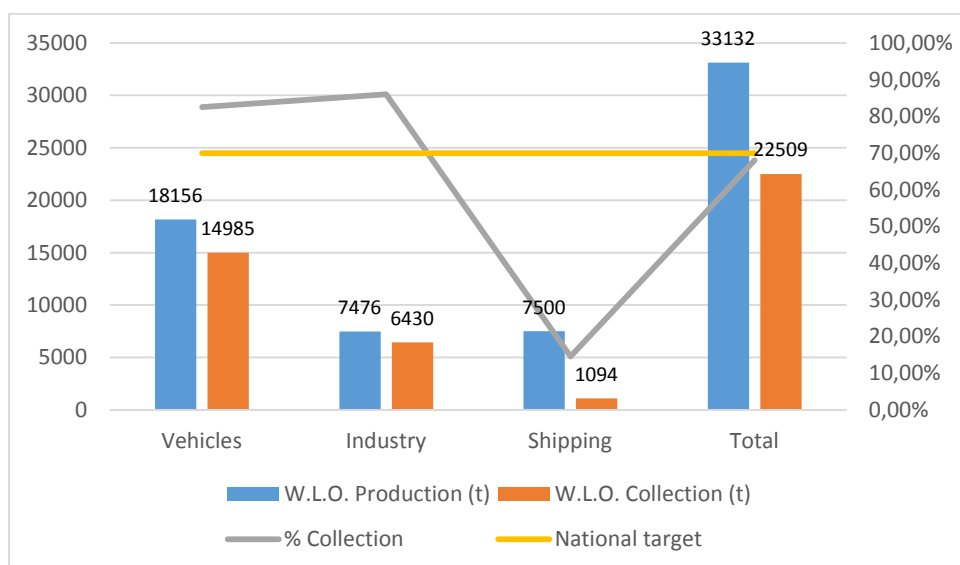
EU environmental legislation, in particular the Directive 2008/56/EC of the European Parliament and of the Council establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) and the Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives (the Waste Framework Directive). In practice, however, Member States have interpreted key elements of the PRF Directive in different ways, in particular the principle of mandatory delivery, the requirements on cost recovery systems and the provisions on inspections (COM, 2016). Due to these divergent practices in implementation and enforcement, the PRF Directive does not realise its full potential added value at EU level

#### 3.2. Description of the problem

Lubricant oils related to the shipping sector in Greece are estimated to 26.000 tn per year (ICAP, 2015). The Elina project (Elina, 2015b) was the first source to come out with measurements of WLO in the shipping sector. Based on its findings, 16.000 tn per year of produced WLO consist a moderate estimation. Elina concluded that the vast majority of WLO are lost because of mixing with Petroleum Waste and Residues (PWR).

**Table 1.** WLO collection in Greece, derived from the shipping sector the last three years (ENDIALE, 2017)

Year	WLO Collection
2014	836 t
2015	1094 t
2016	1464 t



**Fig. 2.** Waste Lubricant Oils Production & Collection for 2015

If we could share the national collection target between the three main sectors (vehicles, industry and shipping) 11.000 tn would be the limit to satisfy it for shipping. Recorded collection of WLO from shipping (table 1) has reached a ton in 2015 for the first time and followed an increasing trend in 2016 (our actions started in 2014). Nevertheless, there is still a lot to be done in order to approach the target and increase shipping sectors' performance and contribution to overall national target fulfillment. Figure 2 presents an attempt to share national WLO collection target between the three sectors for 2015. Collection exceeds 82% for terrestrial sources while at the same time marine sources account for less than 15%. For many years a perception has been cultivated that Marine Oils are excluded from the scheme of extended producer responsibility. Likewise, WLO produced in ships were considered impossible to gather or/and collect. This black box in management was fed by various factors:

- No separation of waste, mixing with PWR.
- Lack of information of stakeholders.
- Lack of reception port infrastructure.
- No separation facilities on board.
- Discouraging economic policy for ship waste management.
- Overlapping of responsibilities.
- Interpretation of law at will.
- Ability of a ship to use facilities in any port even abroad.

### 3.3. Legislative issues

There are differences in definitions used in the PRF Directive and those contained in the MARPOL Convention (COM, 2016). The current misalignment between the Directive and MARPOL creates confusion among the different actors in implementing the Directive, while at the same time complicates compliance with the MARPOL norms and requirements.

The MARPOL is a quite old convention where separation of WLO is not foreseen nor forbidden. Liquid

waste management on ship according to European marine law dir 59/2000/EU and 71/2007/EU, as transported in national law "Ministerial Decree 8111.1/41/2009, Gov. Gazette 412B/06-03 2009", foresees management of WLO according to Presidential Decree 82/2004 which is the main law concerning WLO management.

Moreover, mixing of hazardous waste is forbidden (dir 2008/98/EU, Ministerial Decree 13588/725/2006, Law 4042/2012).

Concluding, there already exist numerous legal tools that justify interventions to separately collect marine WLOs.

### 4. Crucial factors affecting management

Adequate port reception facilities are a sine qua non condition for increasing the delivery of waste onshore and reducing discharges at sea (Puig *et al*, 2015). The delivery of all ship-generated waste to port reception facilities is one of the cornerstones of the PRF Directive and can be ensured through strict monitoring and enforcement of the mandatory delivery of ship-generated waste, as well as through the use of effective incentives. The establishment of an information and monitoring system should in the first place contribute to the identification of ships, which have not delivered their ship-generated waste and cargo residues. In that perspective ships could be included in the recently developed "Waste e-Register" of the Ministry of Environment. Furthermore, the non-transparent nature of the fees, and the basis of their calculation, is an issue of concern, since this leads to the fees not being perceived as "fair, non-discriminatory and reflecting actual costs". Especially the economic policy for PWRs is directly related to WLOs management. Incentives to promote separation of WLO on ship seem to be an important tool to increase collection. Lack of facilities on board for separated collection, lack of information of ship owners and ship mechanics, are estimated to play an important role in poor performance of shipping sector in WLO collection. Cooperation of stakeholders remains critical for successful

results in any intervention. Stakeholders include the HRA, the Ministry of Environment, the Ministry of Shipping, port authorities, shipping companies, ENDIALE SA and waste collection contractors.

## 5. Propositions

Actions to optimize WLO management seem to have three main possibilities:

a. Change of MARPOL through suggestions and interventions to the International Maritime Organization and the European Union. Leading position of Greek shipping could signify possible changes at least for EU countries.

b. Interventions on port through suggestions to improve management plans and determination of standards for plans efficiency. These would also include predictions to administrative procedures and suggestions for the adoption of an adjusted pricing policy.

c. Interventions on ship in order to separate WLO in the engine rooms and promote measures and technical specifications towards a complete Code of Good Practice to ships and managers (Elina, 2015a).

The most promising route towards direct as well as secure results and low resources input is to focus on ship intervention and limit the task to ships of Hellenic Coasting, through installations of specific pumps and channels in order to separately deliver WLOs.

## 6. Conclusions

Greece not only implements extended producer responsibility principle for Lubricant Oils, although this remains optional at the European level, but leads an honorable 100% regeneration of all WLO collected. National targets on WLO management are also quite ambitious. All WLO collected is processed at local facilities which has numerous positive effects for the environment and the economy as well. Nevertheless, in addition to being a hazardous waste, many threats remain to the environment from illegal management or inadequate implementation of the existing scheme. Waste lubricant oil collection from shipping remains proportionally poor compared to that of other sectors, considering the intense shipping activity and the number of ports in Greece. This is due to lack of awareness, poor port facilities, marine policy failures, custom practices that led to inertia, no provision in port plans. Even in cases with existing port facilities and provision for separate collection of waste, collection of WLO is undermined leading in mixing of WLO with Petroleum waste and loss of their regeneration possibility. The three main limiting factors seem to be bad interpretation of outdated international marine laws (MARPOL), discouraging waste management fees on ports for related waste streams and lack of adequate infrastructure (dedicated tank) and education (of the mechanics) on the ship. Actions to improve the existing situation include proposals to the IMO and the EU, readjustment of port authorities' environmental management plans and corresponding economic policy through fair fees and incentives, and last but not least interventions on board to encourage separate collection of WLO. Prioritizing possible measures and selecting a target

group is believed to have positive in short time effects in improving WLO performance of the marine sector and save resources. Focusing on the port of Piraeus and the Hellenic Coasting ships is expected to have direct results and boost WLO ship management creating a pioneering trend as extra pride for Greek shipping.

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