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FINAL REPORT

EMSA STUDY ON THE DELIVERY OF SHIP-GENERATED WASTE AND CARGO RESIDUES TO PORT RECEPTION FACILITIES IN EU PORTS

RAMBØLL

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CONTENTS

ABBREVIATIONS

CBM	Cubic Metres (m^3)
CR	Cargo Residues
EC	European Commission
EEA	European Economic Area
EMSA	European Maritime Safety Agency
ESPO	European Sea Ports Organisation
EU	European Union
GT	Gross Tonnage
HELCOM	Helsinki Commission
IMO	International Maritime Organisation
MARPOL 73/78	The International Convention for the Prevention of Pollution From Ships
NT	Net Tonnage
PRF	Port Reception Facilities
PSC	Port State Control
SGW	Ship-generated Waste
SOLAS	The International Convention for the Safety of Life at Sea
STCW	The International Convention on Standards of Training, Certification and Watch-keeping for Seafarers
UK	United Kingdom
VTS	Vessel Traffic System

DEFINITIONS

The following definitions are used throughout this report. They are taken from EU Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues (*); the International Maritime Organisation (IMO), incl. MARPOL (**); Directive 2008/98/EC of the European Parliament and of the Council on waste (***); and other definitions established by the Consultant himself (****).

"**Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues**" pursues the same aim as the 73/78 MARPOL Convention on the prevention of pollution by ships, which all the Member States have signed. However, in contrast to the Convention, which regulates discharges by ships at sea, the Directive focuses on ship operations in European Union (EU) ports. It addresses in detail the legal, financial and practical responsibilities of the different operators involved in delivery of ship-generated waste and cargo residues. See Appendix 1 for a Summary of this Directive; *

"**Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives**" establishes a legal framework for the treatment of waste within the European Community. It aims at protecting the environment and human health through the prevention of the harmful effects of waste generation and waste management. See Appendix 1 for a Summary of this Directive; ***

"**MARPOL 73/78**" is the main international Convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes. See Appendix 2 for a Summary of this Convention; **

"**ship**" shall mean a seagoing vessel of any type whatsoever operating in the marine environment and shall include hydrofoil boats, air-cushion vehicles, submersibles and floating craft;*

"**ship-generated waste** (SGW)" shall mean all waste, including sewage, and residues other than cargo residues, which are generated during the service of a ship and fall under the scope of Annexes I, IV and V to MARPOL 73/78 and cargo-associated waste as defined in the Guidelines for the implementation of Annex V to MARPOL 73/78;*

"**cargo residues** (CR)" shall mean the remnants of any cargo material on board in cargo holds or tanks which remain after unloading procedures and cleaning operations are completed and shall include loading/unloading excesses and spillage;*

"**port reception facilities** (PRF)" shall mean any facility, which is fixed, floating or mobile and capable of receiving ship-generated waste or cargo residues;*

"**fishing vessel**" shall mean any ship equipped or used commercially for catching fish or other living resources of the sea;*

"**recreational craft**" shall mean a ship of any type, regardless of the means of propulsion, intended for sports or leisure purposes;*

"**port**" shall mean a place or a geographical area made up of such improvement works and equipment as to permit, principally, the reception of ships, including fishing vessels and recreational craft;*

"**oil**" means petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products;**

"**oily waste from machinery space**" is defined according to the revised MARPOL Annex I, i.e. the slop from machinery space and is divided into two types, i.e. engine bilges and engine sludge (shot out from centrifuges), and is often located in separate engine slop tanks. For bigger and more modern ships bilges and sludge are separated in separate tanks;**

"**noxious liquid substance**" is defined according to the new categorisation of MARPOL Annex II substances;**

"**sewage**" " is defined according to the revised MARPOL Annex IV and covers black (toilet) and grey (household) water;**

"**garbage**" is defined according to the revised MARPOL Annex V definition, which includes all kinds of food, domestic and operational waste, excluding fresh fish, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically;**

"**port state control (PSC)"** refers to the inspection of foreign ships in other national ports by PSC officers (inspectors) for the purpose of verifying that the competency of the master and officers on board, and the condition of the ship and its equipment, comply with the requirements of international conventions (e.g. SOLAS, MARPOL, STCW, etc.) and that the vessel is manned and operated in compliance with applicable international and EU law; **

"**hazardous waste**" means any harmful substance and waste which displays one or more of the hazardous properties due to the fact that its intrinsic properties are persistent, toxic or liable to bio-accumulate; ***

"**waste operator**" means a company, which performs waste collection and other sanitary services in the port area according to an agreement with the Port Authority or any other competent authority; ****

"**direct/indirect fee**". As a principle, the direct fee means payment for waste collection services only if provided. Indirect fee means a fee which is paid regardless of services provided. The indirect fee (sometimes incorporated into the port dues or as a separate waste fee) is for some ports called the "No Special Fee" (Scandinavia), "Mandatory Fee" (some UK ports) or "Sanitary Fee" (Poland). The definitions are not precise or well-defined and the terminology used shall be seen more as principles rather than precise descriptions. With regard to the indirect fee then there are several interpretations of this, e.g. limitations in the types of waste accepted under the indirect fee and /or the volume. More detailed descriptions are provided under Section 3.5, Table 6 of this Report. ****

1. EXECUTIVE SUMMARY

1.1 Overall Objective and Methodology

The main objective of this contract is to provide the European Maritime Safety Agency (EMSA) with a study on the delivery of Ship-generated Waste (SGW) and Cargo Residues (CR) to Port Reception Facilities (PRF) in EU ports. Following agreement on the study's approach and methodology a detailed questionnaire was developed by the Consultant and approved by EMSA in order to obtain the most relevant information from the ports. The questionnaire - focusing on the volume of SGW and CR and on the waste fee and handling system - has been sent to 50 selected European ports. The 40 ports that responded to the questionnaire have subsequently been contacted to follow-up on the information submitted by means of personal interviews and detailed discussions. In order to fully complete the questionnaires received, the ports' websites and, in some cases, individual port waste management plans, have been consulted. In some cases national port associations, such as Assoporti in Italy, and regional waste management organisations, such as OVAM in Flanders, have been contacted for further support and information. The European Sea Ports Organisation (ESPO) has also been contacted for a more general discussion on ship-waste delivery behaviour. However, no written material has been provided by ESPO.

ESPO and the majority of the ports approached for this study have been very cooperative and provided valuable information. It has, however, been very difficult to receive information from a few select ports. In these cases, the ports did not reply at all - to the e-mails and reminders sent or to the subsequent telephone follow-up by the Consultant. Nonetheless, despite some difficulties encountered, it has been possible to gather sufficient and relevant information to achieve the objective of this study as stated below.

A close and constructive dialogue was established with EMSA from the very beginning of this study. Whenever problems arose in getting questionnaires returned from the ports, EMSA provided assistance and followed-up with individual contacts.

The waste (SGW and CR) delivery practices, including the waste notification systems and the fee systems, have been analysed by checking their compliance with Article 8 of Directive 2000/59/EC, which states that Member States shall ensure that the costs of PRFs for SGW, including the treatment and disposal of the waste, shall be covered through the collection of a fee from ships, and that the cost recovery systems for using PRFs shall provide no incentive for ships to discharge their waste into the sea (see Appendix 1 for a full text of Article 8). This analysis has been complemented with an assessment of both the relation and the impact of the waste notification and fee system on the waste delivery behaviour.

To the extent possible, the individual enclosed port report describes the influence of an effective monitoring and enforcement system on the waste delivery behaviour.

An individual port report, prepared for each of the ports that have responded to the questionnaire and the telephone interview, has been prepared. The report comprises answers to the questionnaire by the port, the port's additional comments and the Consultant's preliminary assessment of each of the topics analysed.

Waste volume figures from 2004 to 2010/11 from the ports have been compiled in the enclosed Waste Summary Sheets, see Appendix 3. Data for the following waste types, according to the MARPOL Convention, has been collected:

- Annex I (Oily waste from machinery space)
- Annex IV (Sewage)
- Annex V (Garbage)

For those ports that did not provide figures for all the years analysed, the figure for the following year has been used as no inter-extrapolation has been possible due to too many fluctuations.

This has been done in order to get comparable and accumulated waste figures for the different years.

No figures or inter-extrapolations for the following three waste types have been used or made due to the very limited number of actual waste figures provided:

- Annex I (Oily cargo residues);
- Annex II (Nox. liquid substances); and
- Annex V (Liquid cargo residues from dry cargoes).

1.2 Specific Objectives and Main Achievements

The Consultant has structured the work according to three main tasks stated in the tender specifications. A summary of the main achievements per task is provided below.

Task 1: for a sample of 50 EU ports, update and complete the EMSA-dataset on delivered volumes of ship-generated waste, and supplement it, where applicable, with data on the delivered volumes of cargo residues.

This task has been completed by performing the following activities:

- Contact, via e-mail and telephone, and if necessary through national authorities and port associations, 50 EU ports;
- Update and complete the existing set of data already available within EMSA on the delivered volumes of SGW in the 40 EU ports, which responded to the questionnaire submitted;
- Supplement the dataset with available data on the delivery of SGW for the 10 additional EU ports; and
- Supplement the dataset with available data on the delivery of CR in the 40 EU ports, which responded to the questionnaire submitted.

The following 50 ports (ref. Table 1), grouped by country, have been contacted by the Consultant in connection with this study:

Table 1: List of Ports incl. in the Study

Country	Port No.	Port Name	Responded to Questionnaire
Belgium	1	Antwerp	
	2	Gent	
	3	Zeebrugge	
Bulgaria	4	Varna	
	5	Burgas	
Cyprus	6	Limassol	
Denmark	7	Copenhagen	
	8	Fredericia	
Estonia	9	Tallinn	
	10	Verne-Balti	
Finland	11	Helsinki	
	12	Rauma	
	13	Turku	
France	14	Dunkerque	
	15	Le Havre	
	16	Marseille	
Germany	17	Bremerhaven	
	18	Hamburg	
	19	Rostock	
Greece	20	Piraeus	
	21	Volos	
Ireland	22	Cork	
	23	Dublin	

Country	Port No.	Port Name	Responded to Questionnaire
	24	Shannon-Foynes	
Italy	25	Genoa	
	26	Venice	
	27	Trieste	
Latvia	28	Liepaja	
	29	Riga	
Lithuania	30	Klaipeda	
Malta	31	All ports	
The Netherlands	32	Amsterdam	
	33	Groningen/Delfzijl	
	34	Rotterdam	
Poland	35	Gdansk	
	36	Swinoujscie/Szczzecin	
Portugal	37	Lisbon	
	38	Sines	
Romania	39	Constantza	
	40	Galatz	
Slovenia	41	Koper	
Spain	42	Algeciras	
	43	Barcelona	
	44	Bilbao	
Sweden	45	Gothenburg	
	46	Karlshamn	
	47	Stockholm	
United Kingdom (UK)	48	Immingham	
	49	Belfast	
	50	Southampton	

The SGW analysed, as part of this study, comprised MARPOL Annex I (oily waste from machinery space), MARPOL Annex IV (sewage) and MARPOL Annex V (garbage) as well as Annex I, II and V on CR. Waste Summary Sheets for the mentioned waste types are enclosed as Appendix 3.

In most cases data on the delivery of SGW and CR has covered the time period from 2004 to 2010. In some cases data from 2011 has been included. In total the Consultant has provided data for a sample of 40 (out of the foreseen 50) ports. For CR the data provided is limited, since very often this kind of service is not managed directly by the port but by external operators and terminals not controlled directly by the relevant competent authority (e.g. Harbour Master, Port Authority, Maritime Authority etc.). With regard to SGW it is clear that all the involved ports have an interest in and take responsibility for this particular issue, although very often these services are contracted out to private external operators.

Task 2: provide a detailed description of the applied system for ship-generated waste and cargo residues in the sample of 50 ports listed in Appendix A of the Tender Specifications.

The Consultant has prepared a port report for each individual port. The report provides detailed descriptions of:

- The applied fee system for SGW;
- The applied fee system for CR, when possible;
- The applied system for the exemption of vessels (according to Article 9 of Directive 2000/59/EC);
- The waste information scheme which is to be notified by the vessel before entering the port (according to Article 6 of Directive 2000/59/EC);
- The available PRF, including the types of waste that can be delivered, information on the type of facility (fixed/mobile), opening hours and other specific information (e.g. pumping hours); and

- The enforcement and inspection regime (e.g. which bodies/authorities are involved in enforcement and inspection?).

There are many variations at EU, national or regional level, and in some cases, at the individual port level on the interpretation of Article 8 of Directive 2000/59/EC on fees for SGW and the cost recovery system. The transposition of the Directive into national legislation leaves room for different solutions on how to introduce incentives for waste delivery in the ports through e.g.

- A 100% indirect fee;
- Partial indirect fee for garbage or oily waste only (partial significant contribution according to the definition stated in Article 8 of the Directive);
- Fixed fee to be paid to the Port Authorities beyond the direct charge from operators with possibilities of being refunded as well as on how the ships can contribute significantly to the cost of treatment and disposal of waste; and
- Payment ex-post or “Sanctions” in case of no delivery of waste.

The applied fee system for CR is very similar for all the ports analysed, that is, a system with a 100% direct fee, by which ships pay for the waste services requested. The ports regard the collection of CR as a matter to be dealt with directly by the external waste operators or the individual terminals and therefore outside their scope of work and responsibility. No clear and systematic communication seems to be in place between the cargo terminals and the responsible port authority with regard to waste handling.

The waste notification/information scheme, through which vessels have to notify their intended waste deliveries before entering the port (according to Article 6 of the Directive), very often functions by means of IT systems, which enable monitoring of waste delivery and ensure communication between the port and the ship agents. In some ports the competent authority responsible for the control and enforcement, e.g. Port State Control (PSC) officers or inspectors, has access to such systems. All ports interviewed have implemented a notification system and are as such in compliance with Directive 2000/59/EC, although the systems seem to work differently in the various ports. Most ports use the latest updated version of the EU's official advance notification form of Annex II (now including sewage) entered into force in 2009, with some national amendments and translations. Other ports use the IMO's official form, and finally some ports employ a mixture of the various official forms with national amendments. However, all the waste notification forms used seem to fulfil the needs of the port in question.

The ports have also provided information on the availability of PRF, including the types of waste that can be delivered as well as the type of facility available. All ports provide PRF for MARPOL Annex I (oily waste from machinery space) and MARPOL Annex V (garbage, solid waste). The majority of ports (<80% of the ports that have responded to the questionnaire) accept sewage. All ports ensure the availability of facilities for the collection, treatment and disposal of waste inside and outside the port area operated by either public authorities and/or private operators.

Information concerning issues such as “exemptions” and “enforcement” was in general poor. One of the reasons for the poor feedback on these issues could be the fact that ports are often not directly involved in “enforcement” and “exemptions” and therefore have less interest in these issues. In some cases it has been stated that the cooperation with the PSC is insufficient in terms of communication. In other cases the ports have underlined the fact that the applied system for the exemption of vessels in general complies with Article 9 of Directive 2000/59/EC. Exemptions are granted for ships engaged in scheduled traffic with frequent and regular port calls and if there is sufficient evidence of an arrangement to ensure the delivery of SGW and payment of fees in another port along the ship's route.

The information gathered on enforcement and inspection regime shows that ports are often not directly involved in “enforcement”. It has not been possible to obtain a clear statement from ports regarding this issue. Indirectly, many ports indicate that they regard calling ships “as clients” and therefore are not interested in creating any trouble for them with regard to their ship's waste delivery. However, they declare that control of the ships not delivering waste is needed to influence the ship-waste delivery behaviour. Unfortunately the information received

from ports on this issue is insufficient to prepare any precise statistic showing the actual involvement in enforcement. Very often the authority interviewed has been the Port Authority, or the Port Management Company in the case of privately operated ports, which is not systematically communicating with the PSC.

Task 3: provide a detailed analysis of the impact of the applied system on the delivery of ship-generated waste in these ports.

To the extent possible, the Consultant has analysed the parameters influencing the delivery behaviour for SGW and CR, linked them with the data made available through Tasks 1 and 2, and identified possible success factors for the delivery of ship-waste. When possible and when the data was adequate and sufficient, the Consultant has highlighted the changes and indicated the reason for the changes experienced (e.g. following a change in traffic, new enforcement regime, different fee system etc.).

With regard to the volume of SGW and CR delivered, then this figure can be influenced by several factors, such as:

- Traffic to the port;
- Ship size and type of the ship calling the port;
- Maintenance level of the ships calling the port;
- Sailed distance from previous port where waste was delivered;
- Availability of PRFs;
- Simplicity for the ship/agent to deliver waste e.g. “one-stop shop” or whether the agent has to deal with several waste operators;
- Price level for the waste collection services;
- Implementation of a cost recovery/fee system which provides incentive to deliver waste in the port;
- Efficiency of the waste collection system in the port;
- Design of the waste notification system;
- Type of port operations; and
- Monitoring and control functions in the port, e.g. on waste notification systems and garbage record books.

Given all these factors and taking into consideration the results from the analysis it is not possible to say specifically which of the above-mentioned reasons have affected the increase or decrease in the waste volume delivery in the European ports analysed for this study. It is also not possible to make any reliable statistical analysis of the relation between the waste volume delivered and the factors influencing the ships' behaviour based on the figures provided by the individual ports in the study. Furthermore, some waste volume figures do not cover the total waste handled in the port as figures from some individual waste operators are not included. Moreover, due to the high number of factors influencing the waste delivery behaviour it is also very difficult to conclude on factors influencing the delivery behaviour to PRF when analysing the waste volume figures provided by the individual ports. All ports, except one, provided figures for waste “actually delivered”, one on what was “notified”. One port provided both figures. It is therefore not possible to conclude whether the notified figures were higher or lower than what was actually delivered.

However, irrespective of these difficulties, it can be concluded, based on factual data with regard to SGW (oily waste from machinery space and garbage), that there is an increase in total delivery from 2004 to 2008 for oily waste and from 2004 to 2009 for garbage (accumulated figures for all ports). The decrease, experienced in 2009 and 2010, for oily waste and garbage, respectively, is explained by many ports as a result of the financial crisis and thus a decrease in the number of calls to the ports (ship/cargo traffic). For some ports the decrease is also explained by bigger and thus fewer ships calling the port. Correlated figures for both the total number of port calls as well as the total number of Gross Tonnage (GT) calling the ports confirm this pattern.

With regard to the delivery of sewage there seems to be no clear trend regarding the quantity collected from 2004 to 2011. Similarly for CR, no conclusions can be drawn, since the management of this is often handled by private operators and terminals outside the control of the port.

All the information for this study is, when possible, substantiated by statistics presented in this overall report and in the enclosed individual port reports.

Please note that the numbers stated below each figure/diagram refers to the number assigned to each port in the study, ref. Table 1 above.

Throughout this report the Consultant uses the terms “a majority of ports” and “a minority of ports”, since it has not been possible to otherwise categorise the ports given the many and mixed approaches to ship-waste handling experienced in the ports.

2. INTRODUCTION

The overall objective of this study is to provide EMSA with a study on the delivery of SGW and CR to PRF in EU ports.

The specific objectives are:

- to prepare waste volume fact sheets for identified ports based on figures received in a questionnaire and verified through an interview;
- to describe the applied waste handling system in mentioned ports; and
- to analyse factors influencing the ship-waste delivery behaviour of ships based on information received and interviews carried out.

2.1 Methodology for the Study

Following agreement on the study's approach and methodology a detailed questionnaire was developed by the Consultant and approved by EMSA in order to obtain the most relevant information. The questionnaire - focusing on the volume of SGW and CR and on the waste fee and handling system - has been sent to 50 selected European ports.

The 40 ports that responded to the questionnaires were subsequently contacted to follow-up on the information submitted by means of personal interviews and more detailed discussions. In order to fully complete the questionnaires received, the ports' websites and, in some cases, individual port waste management plans, were consulted. ESPO was also contacted for a more general discussion on ship-waste delivery behaviour. However, no written material was provided by ESPO.

ESPO and the vast majority of the ports contacted were very cooperative and provided valuable information. However, it was very difficult to receive information from a few select ports for various reasons. Therefore, in some cases, it was difficult to obtain all the information needed for a proper analysis. Some information also had to be gathered through websites and other internet researches.

In some cases the ports did not reply at all to the e-mails and reminders sent and the subsequent telephone follow-up by the Consultant (see Figure 1 below). In other cases national port associations, such as Assoporti in Italy, and regional waste management organisations, such as OVAM in Flanders, were contacted for further support and information. In some cases the ports replied after the Consultant had been in contact with the National Port Association or the competent national Ministry. In other instances, the ports replied with a reasonable delay but did not provide the requested information or just sent limited or partial information, eventually re-addressing the Consultant to consult websites or other sources of information.

The waste (SGW and CR) delivery practices have been analysed by checking their effectiveness in relation to the waste notification systems, the mandatory delivery and the fee systems, according to Article 6, 7 and 8 of Directive 2000/59/EC (see Appendix 1 for a full text of the stated Articles). The analysis has been complemented with an assessment of both the relation and the impact of the waste notification and fee system on the waste delivery behaviour.

To the extent possible, the individual enclosed port report describes the influence of an effective monitoring and enforcement system on the waste delivery behaviour.

An individual port report has been prepared for each of the ports that responded to the questionnaire and subsequent telephone interview. The report comprises answers to the questions by the port, the port's additional comments and the Consultant's preliminary assessment of each of the topics analysed.

The individual port report comprises the following sections:

1. SGW and CR – notified and actually delivered;

2. Port operations and traffic data;
3. Waste notification procedures in the port;
4. Type of waste accepted by the port;
5. Waste fee system in the port;
6. Waste reception facilities available in the port for each waste type; and
7. Monitoring, enforcement and inspection procedures and systems in the port.

The 40 individual port reports are enclosed as Appendix 5 of this Report.

Waste volume figures from 2004 to 2010/11 for the ports have been compiled in the enclosed Waste Summary Sheets (see Appendix 3). Data for the following waste types, according to MARPOL, has been collected:

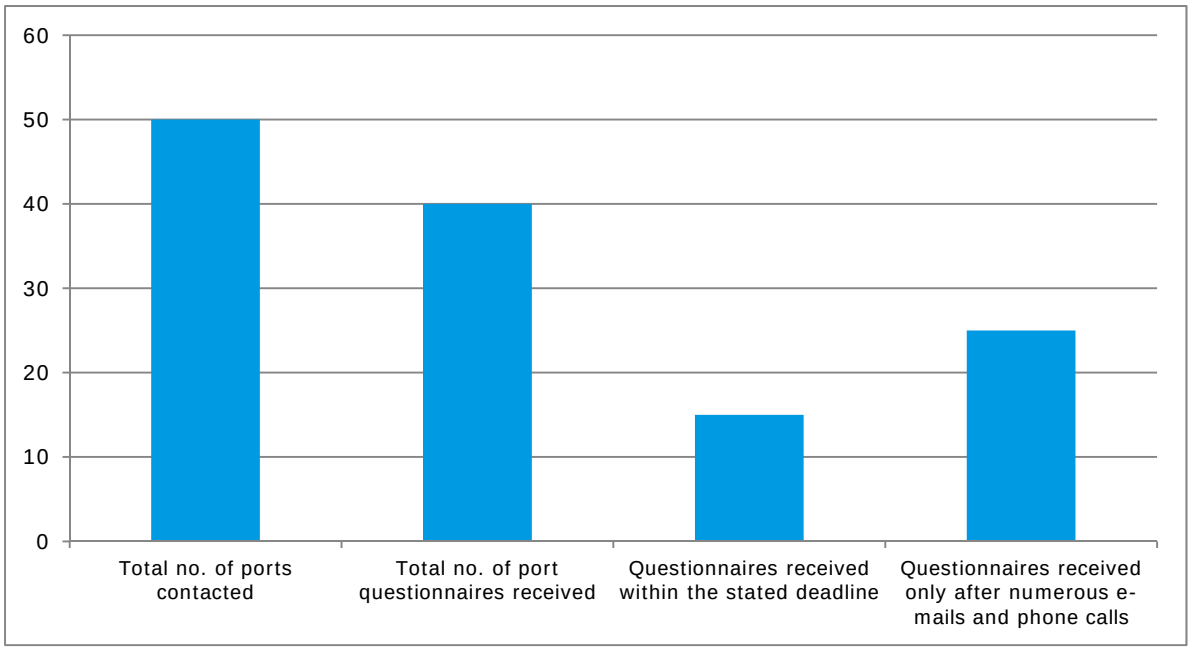
- Annex I (oily waste from machinery space);
- Annex IV (sewage); and
- Annex V (garbage).

For those ports that did not provide figures for all the years analysed, the figure for the following year has been used as no inter-extrapolation has been possible due to too many fluctuations. This has been done in order to get comparable and accumulated waste figures for the different years.

No figures or inter-extrapolations for the following three waste types have been used or made due to the very limited number of actual waste figures provided:

- Annex I (oily cargo residues);
- Annex II (nox. liquid substances); and
- Annex V (liquid cargo residues from dry cargoes).

Figure 1: Overview - Feed-back from Ports



2.2 Preliminary Assessment of the Information Collected

The information collected for SGW and CR (notified and actually delivered) is limited but sufficient to assess certain types of waste volume, the waste handling system as well as the ship-waste delivery behaviour. Particularly the waste figures provided for “garbage” and “oily waste from machinery space" are deemed sufficient. However, information on issues such as “enforcement” and “exemptions” was in general poor. One of the reasons for the poor feedback on these issues could be the fact that a majority of ports are not directly involved in “enforcement” and

“exemptions” and therefore have less interest in these issues. In some cases it has been stated that cooperation with the PSC is insufficient.

With regard to the figures for waste collected by the ports, the information provided was sufficient for SGW (oily waste from machinery space and garbage) but often limited for CR for several reasons, such as:

- Often the waste collection operations in ports were contracted out to private operators and although the waste figures are "notified" on the waste notification form most ports actually provided figures for what was "actually delivered". However, there was, in some ports, some uncertainty as to whether all figures collected were accumulated from the external waste operators and systematically compiled in the statistics.
- Most ports provided figures for SGW but not for CR because the latter was anticipated to be taken care of by individual terminals and no clear communication seemed to be in place between cargo terminals and the responsible authority in the port for waste handling.

The analysis for this particular study was expected to be based on information provided by the ports themselves given the questionnaire distributed. However, due to both the inconsistency and incompleteness of the information provided, it has not been possible to conduct a thorough and meaningful analysis on the basis of this information only. Hence, it has been necessary to complement this information with follow-up interviews and internet research. The interviews provided some additional information and clarifications. Nonetheless, for some ports, these interviews did not give a complete picture of the situation. The reason for this is most likely that these ports do not have one overall person with full knowledge of the waste handling system and therefore the interviewees were only partly able to answer all questions asked.

3. ANALYSIS OF PARAMETERS INFLUENCING THE DELIVERY BEHAVIOUR OF SGW AND CR

This chapter analyses all the sections of the questionnaire distributed to the 50 ports, out of which 40 replied. For easy reference, the subsequent sub-sections relate to the sections of the questionnaire.

As stated above, the information used for the analysis comprises: written response to the questionnaire; follow-up interviews with ports; websites searches and statistical information provided by EMSA. The information collected is both objective and quantitative (ref. questionnaires, EMSA and websites) and subjective and qualitative (ref. interviews); therefore, the Consultant has decided to present factual and quantitative information in diagrams and subjective and qualitative information as statements.

The Consultant has gathered information on waste delivery (waste volumes) as totals for both all ports and per region. Waste volume data has been aggregated according to the following regions, classified according to the European Commission's (EC) European Atlas of the Seas:

- **Mediterranean Sea**: Limassol, Marseille, Piraeus, Volos, Genoa, Venice, Trieste, Koper, Algeciras, Barcelona and Malta.
- **Bay of Biscay and Iberian Atlantic Coast**: Lisbon, Sines and Bilbao.
- **Baltic Sea**: Copenhagen, Fredericia, Tallinn, Vene-Balti, Helsinki, Rauma, Turku, Rostock, Riga, Liepaja, Klaipeda, Gdansk, Szczecin/Swinoujscie, Gothenburg, Karlshamn and Stockholm.
- **North Sea**: Antwerp, Gent, Zeebrugge, Bremerhaven, Hamburg, Amsterdam, Groningen/Delfzijl, Rotterdam and Immingham.
- **Celtic Sea**: Dunkerque, Le Havre, Cork, Dublin, Shannon-Foynes, Belfast and Southampton.
- **Black Sea**: Varna, Burgas, Constantza and Galatz.

3.1 Section 1: SGW and CR – Waste Volume Figures

The volume of SGW and CR delivered to a port can be influenced by several factors, such as:

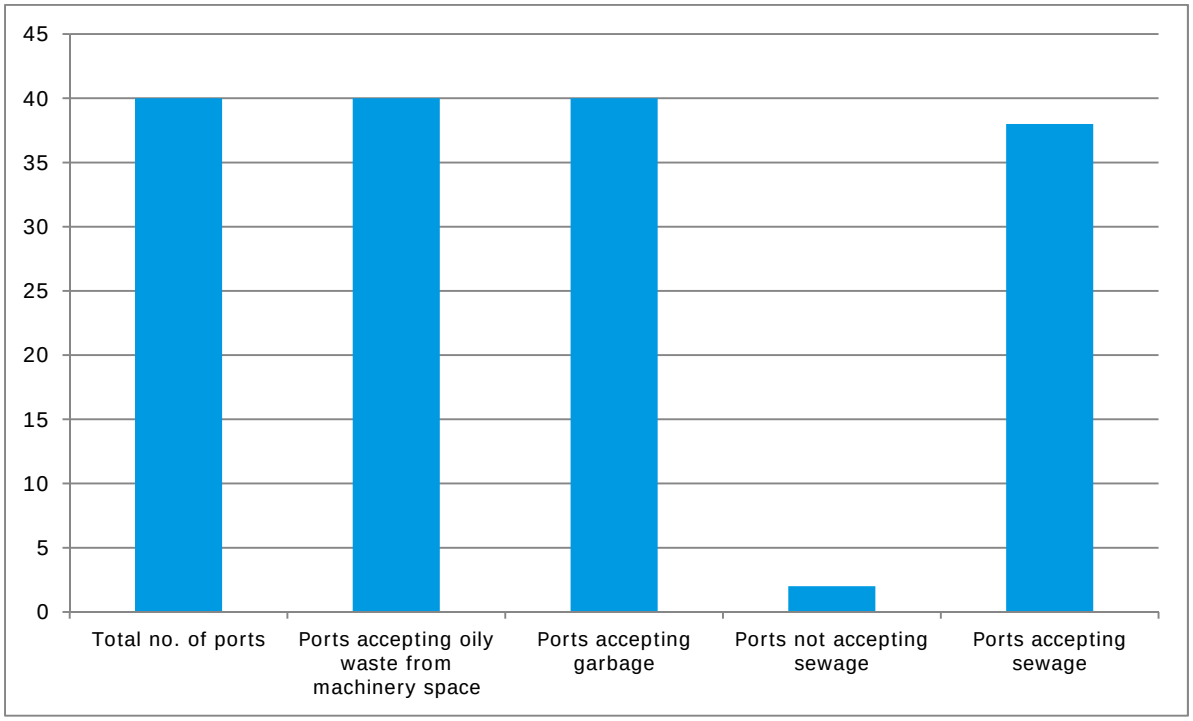
- Traffic to the port;
- Ship size and type of the ship calling the port;
- Maintenance level of the ships calling the port;
- Sailed distance from previous port where waste was delivered;
- Availability of reception facilities in the port;
- Simplicity for the ship/agent to deliver waste e.g. “one-stop shop” or whether the agent has to deal with several waste operators;
- Price level for the waste collection services;
- Implementation of a cost recovery/fee system which provides incentive to deliver waste in the port;
- Efficiency of the waste collection system in the port;
- Design of the waste notification system;
- Type of port operations; and
- Monitoring and control functions in the port e.g. on waste notification systems and garbage record books.

It is not possible to identify which of above-mentioned reasons have affected the ship-waste volumes reported by the European ports analysed for this study. It is also not possible to make an independent and reliable statistical analysis of the figures provided by the ports on the basis of the information provided in the questionnaires. Another reason for this is the fact that some waste volume figures do not cover the total waste handled in the port given that figures from some individual waste operators are not included in the data submitted.

However, the information and figures received for the 40 ports reviewed indicate that (ref. Figure 2 below):

- All ports receive MARPOL Annex I (oily Waste from machinery space) and MARPOL Annex V (garbage);
- All ports accept MARPOL Annex IV (Sewage) except for 2, and 27 out of 40 ports actually receive MARPOL Annex IV (Sewage);
- Some ports notify their CR (MARPOL Annex I and V) on their waste notification form, but few have real information about the actual delivery due to a lack of communication with the terminals receiving the CR; and
- Most ports leave the handling of any CR to the individual terminal dealing with the cargo and are therefore not involved at any level in the collection of CR, i.e. registration, collection, and payment.

Figure 2: Acceptance of SGW in Ports



Explanation:

Ports not accepting sewage: 5, 42

Ports accepting sewage: 1, 3, 4 , 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 45, 46, 47, 48, 50

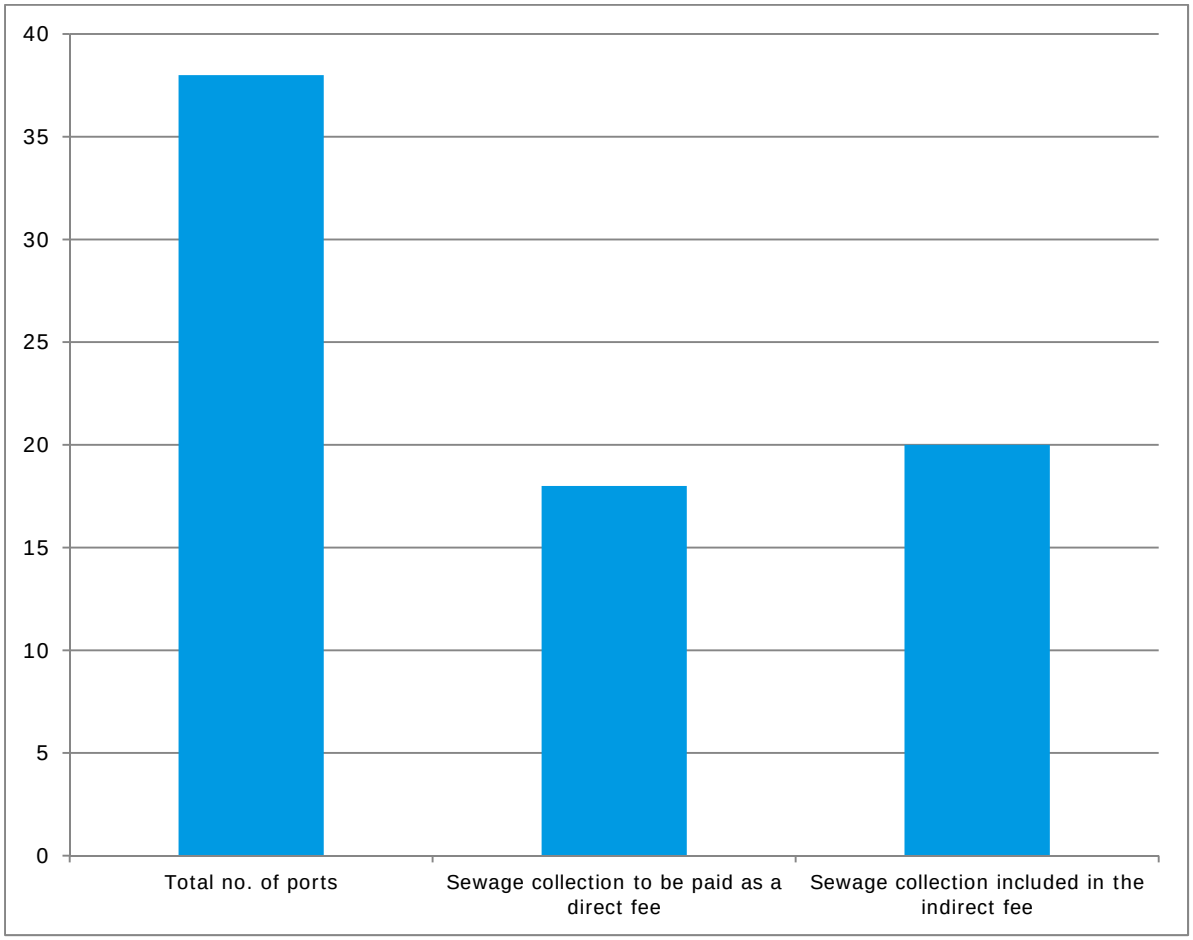
There seem to be a general understanding among ports that the waste types that they shall receive comprise: MARPOL Annex I (oily waste from machinery space) and MARPOL Annex V (garbage). These waste types seem to be the easiest waste types to receive, e.g. garbage via containers placed on the berth or individual garbage collection (a truck drives alongside the ship and takes the plastic bags placed there). Liquid oily waste requires a truck (or barge if collected from seaside) or in some ports just an iso-container placed by the waste operator next to the ship into which the ships can discharge their liquid waste.

A majority of ports (38 out of 40) provide collection of sewage in case the ships request it. However, it seems that the ports do not promote this service as many ships calling the ports do not request this service. The reason for this is most likely that these ships are able to discharge legally into the sea during voyage and therefore have no real need for this service, except if they have to stay for a long period of time in the port. However, 27 ports out of 40 do receive sewage.

As evident from Figure 2 above, all ports accept oily waste from machinery space and garbage, and most ports accept sewage. It should be noted that for all the ports accepting sewage some of them do it under “the official ship waste system” (managed by the port), whereas others let the ship agents deal directly with the private operators for the waste collection. As shown in Figure 3

below, many ports (especially those bordering the Baltic Sea), have included this service into the indirect fee, whereas other ports still consider this as an extra service to be paid for separately. There is no logical explanation for this and most likely reflects a traditional way of dealing with sewage. However, for the Baltic Sea ports (Special Area status regarding MARPOL Annex IV adopted, but not yet in force), all include sewage collection into the indirect fee, as shown in Figure 4 below.

Figure 3: Type of Fee in Ports Accepting Sewage

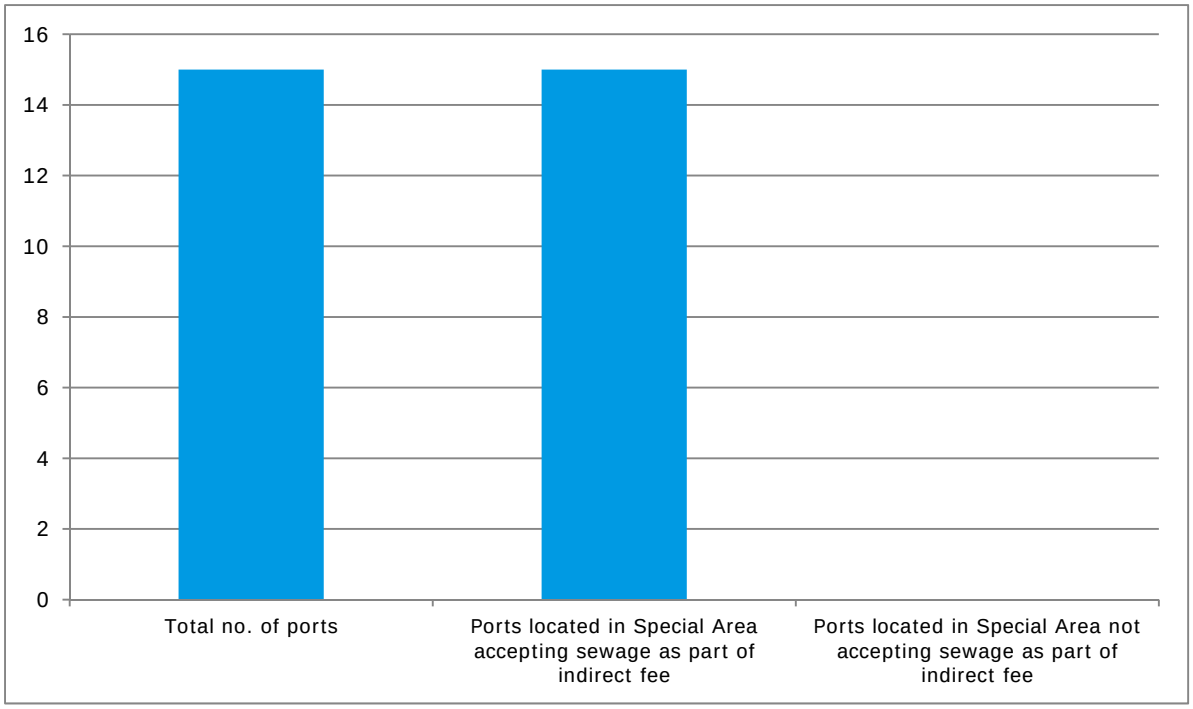


Explanation:

Sewage collection paid as direct fee: 1, 3, 4, 14, 15, 16, 17, 22, 25, 26, 27, 31, 32, 33, 34, 38, 41, 48, and 50

Sewage collection included in indirect fee: 6, 7, 8, 9, 10, 11, 12, 13, 21, 24, 28, 29, 30, 35, 36, 37, 39, 45, 46, 47

Figure 4: Ports within a Special Area (Baltic Sea)



Explanation:

Total no. of ports: 7, 8, 9, 10, 11, 12, 13, 28, 29, 30, 35, 36, 45, 46, 47

Included into the indirect fee: 7, 8, 9, 10, 11, 12, 13, 28, 29, 30, 35, 36, 45, 46, 47

Not included into the indirect fee: None

As evident from Figure 4 above all ports in the Baltic Sea area have included the collection of sewage into the indirect fee. Although the future Special Area status regarding MARPOL Annex IV is not yet in force, the work carried out by the Helsinki Commission (HELCOM), including all its recommendations, seem to have influenced the delivery behaviour of sewage and the way of pricing sewage collection. A majority of other ports outside the Special Area have not included this cost into the indirect fee; most likely because ships to a lesser degree ask for this service due to their possibility to discharge sewage legally into the sea before entering the port.

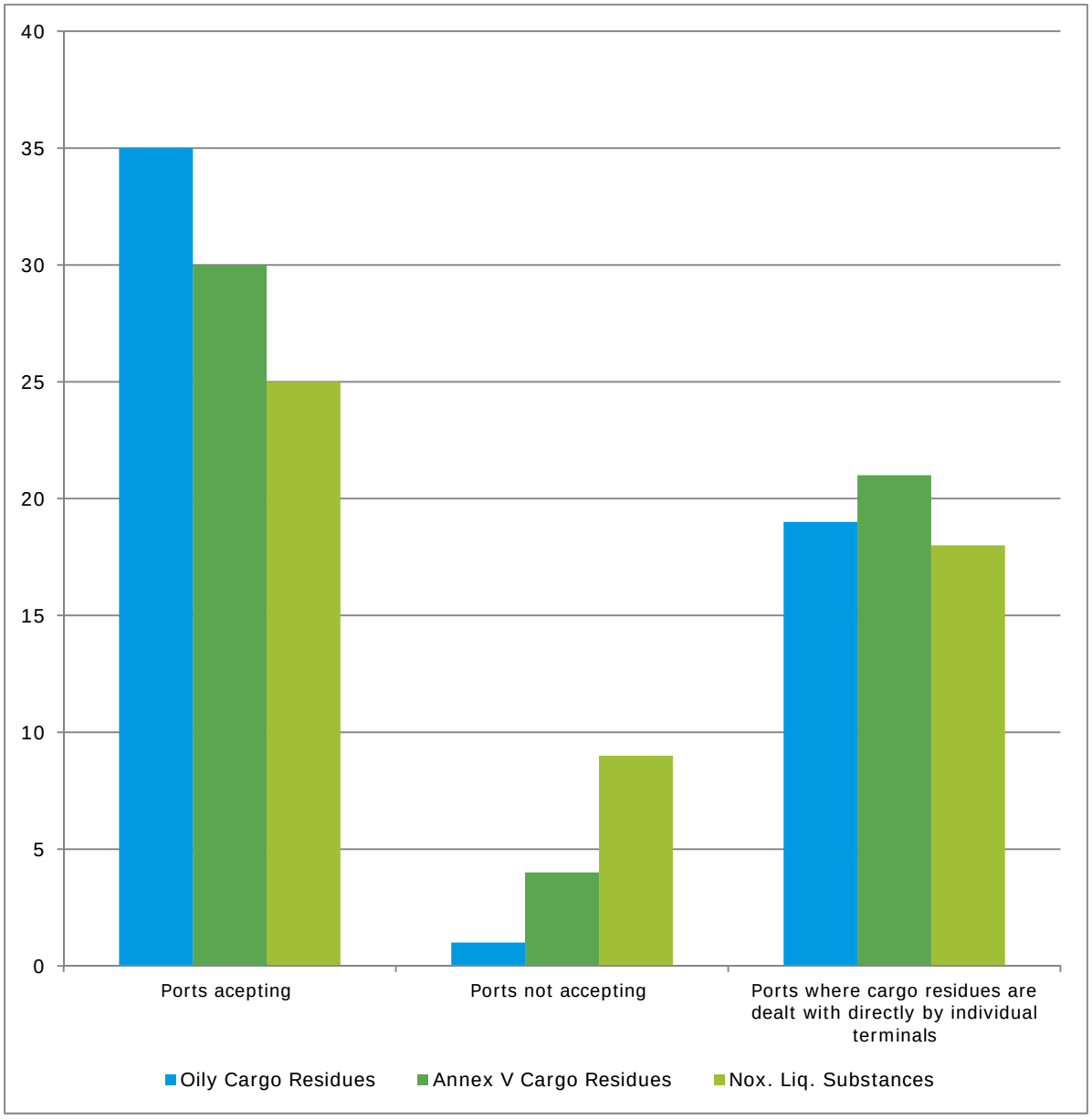
Although it is a legal requirement for calling ships to notify estimates of CR quantities on the advance notification form, only few ships do so to the official authority in the port prior to arrival. The waste collection and any payment thereof are dealt with directly with the terminal or waste operator.

Most ports prefer to let individual terminals handle CR as the terminal already loads/unloads this particular product type and therefore is in a better position to collect CR. There seems to be a general acceptance of this behaviour between the responsible ship-waste handling authority in the port and the individual terminals. SGW (oily waste from machinery space, sewage and garbage) is normally generated by all ships, whereas CR are not. The cost of collecting CR is not included in the indirect fee in any of the ports analysed (except one, which claims that it will just take all waste in order to “keep it simple”). In most ports it is priced and paid for by the ship directly to the waste operator or the terminal, if they collect it (it is not possible to provide precise figures for the ports analysed as some ports just accept smaller quantities as SGW). This could also explain why the PRF system concentrates on SGW and leaves the handling of CR to the individual terminals.

The fact that most CR are handled directly by the individual terminals (ref. Figure 5 below) indicates (although not documented) that this seems to be the most efficient way for the reasons mentioned above. However, it should be noted that this pattern for the delivery of CR is not very transparent due to insufficient communication (advance waste notification) and data registration. It should also be mentioned that ships sometimes have the possibility to keep CR on board until the next port of call or legal discharge.

As evident from Figure 5 most ports accept CR. However, it must be mentioned that those ports not accepting these CR either do not have the type of port operations that could accommodate such facilities or they do not have sufficient knowledge of how the system is working (subjective evaluation). However, this does not mean that CR cannot be discharged to the port. In principle a shipping agent can always call an external waste operator to collect such CR and take it for treatment at an approved facility.

Figure 5: Ports Accepting Cargo Residues



Explanation:

Ports accepting:

Annex I (oily CR): 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17,20, 21, 22, 24, 25, 26, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 46, 47, 48, 50,

Annex V (liquid CR):1, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 22, 24, 26, 29, 30, 32, 33, 34, 35, 37, 38, 39, 46, 47, 48, 50

Annex II (nox. liq. Substances):1, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 32, 33, 34, 35, 37, 38, 39, 46, 47, 48, 50

Ports not accepting:

Annex I (oily CR): 3

Annex V (liquid CR): 3, 16, 25, 36

Annex II (nox. liq. Substances): 3, 9, 10, 24, 25, 26, 29, 30, 36

Ports in which CR handling is dealt with directly between agents and terminals/operators:

Anne I (oily CR): 7, 8, 11, 12, 13, 17, 22, 24, 29, 30, 32, 33, 34, 35, 42, 46, 47, 48, 50

Annex V (liquid CR): 4, 5, 7, 8, 11, 12, 13, 17, 22, 24, 29, 30, 32, 33, 34, 35, 42, 46, 47, 48, 50

Annex II (nox. liq. Substances): 4, 5, 7, 8, 11, 12, 13, 17, 22, 32, 33, 34, 35, 42, 46, 47, 48, 50

As mentioned above it is not really possible to make precise individual port conclusions on the actual volume of SGW and CR delivered to the ports. Due to the high number of factors

influencing waste delivery it is also very difficult to identify factors influencing the delivery behaviour to PRF when analysing the waste volume received for individual ports. All ports except one provided figures for waste "actually delivered", one port provided both figures and only one on what was "notified". It is therefore not possible to see whether the notified figures were higher or lower than what was actually delivered.

In order to identify any trends regarding the waste volume delivered over the years, waste figures for all ports have been accumulated (per waste type per year). The accumulation of waste figures from the 40 European ports analysed provides a more precise picture of the European waste delivery system, than by just looking at one individual port. It is anticipated that the 40 ports analysed represent a significant part of the total number of calls (movements) to European ports as they constitute the major ports in Europe (according to the database at EMSA, Marinfo, almost 30% of total port calls to European ports goes to the 40 ports analysed for this study).

Since the number of calls to the 40 ports studied changes from year to year the Consultant has tried to correlate the actual figures in the subsequent graphs (accumulated waste collected for the 40 ports).

Table 2 below shows the total number of port calls for the 40 ports studied from 2007 to 2010, as collected and provided by EMSA.

Year 2007 is set to index 100 in order to correlate waste figures with the total number of port calls and total number of GT. Due to insufficient data for 2011 this year has been excluded from the figures.

Table 2: Total number of port calls (ship categories as defined by EMSA) for the 40 ports analysed

2007	2008	2009	2010
180,650	179,303	164,101	203,541
Index factor			
100	99,3	90,8	112,7

As evident from Table 2 above, the number of port calls decreases from 2007 to 2009 but then significantly increases from 2009 to 2010.

It is assumed that the numbers of port calls are proportional to the waste volumes delivered. However, correlating the waste figures with the port calls will not take into account changes in the total cargo delivered to the port, i.e. fewer and bigger ships and thus more cargo. Therefore, correlating the change in the total number of GT, as shown in Table 3 below, probably gives a more precise picture of the development in waste volumes.

Table 3: Total number of GT (ship categories as defined by EMSA) for the 40 ports analysed

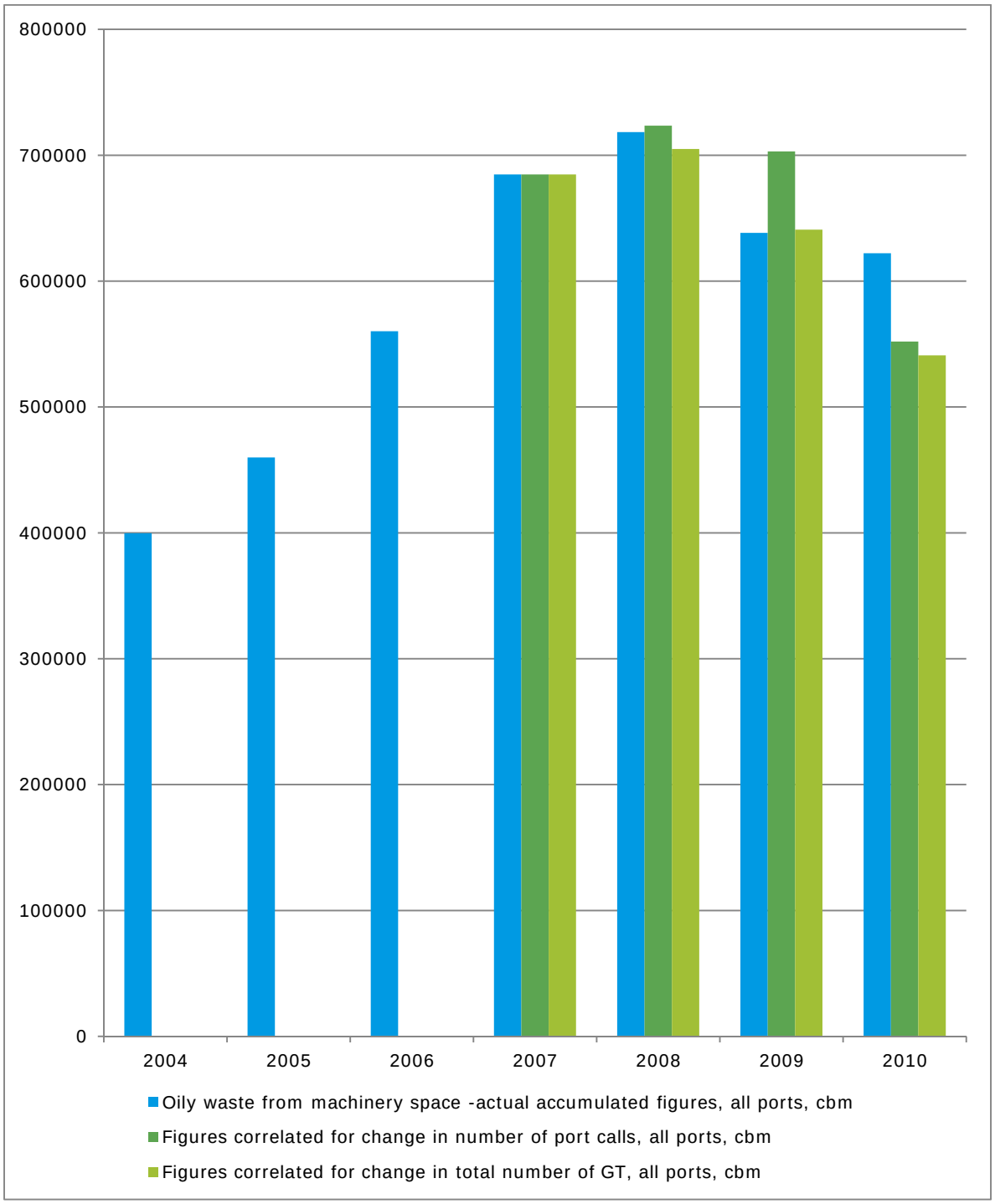
2007	2008	2009	2010
3,091,230,678	3,151,725,526	3,078,977,699	3,634,514,379
Index factor			
100	101,9	99,6	115

The graphs below show the delivery of the five waste categories over a 6-year period (2004 to 2010) as actual figures. For the years 2007 to 2010 these figures have been correlated with the total number of port calls and the total number of GT calling the port. However, it should be mentioned that the total number of port calls and total number of GT for the 40 ports analysed have been adjusted for ships belonging to the port (permanently based) e.g. smaller ships. However, in many ports such ships do also deliver to the PFR and therefore also contribute to the figures for the total volume of waste collected.

As evident from Figure 6 below there seems to be an 80% increase in the delivery of Annex I (Oily waste from machinery space) from 2004 to 2008 followed by a 10% decrease from 2008 to 2010 (actual figures for Oily waste delivered). The decrease experienced in year 2009 is by many ports explained as a result of the financial crisis and thus a decrease in the number of port calls.

This statement is further supported by the fact that there was a decrease in the number of port calls and total GT from 2008 to 2009 (ref. Table 2 and Table 3 above). However, the small decrease in actual figures for oily waste from 2009 to 2010 cannot be fully explained since there was a significant increase in both the number of port calls and total GT in 2010. It may be that the ships have delivered said waste type in other ports not part of this study or in some of the 10 ports, which did not provide feedback to the questionnaire distributed for this particular study. Given the increase in both the number of port calls and the number of GT, the correlated figures for the year 2010 show a greater decrease than the actual figure. It is a small discrepancy, which cannot be explained without widening the scope of this study.

Figure 6: Oily Waste from Machinery Space – Accumulated Figures, 40 Ports, m^3



Explanation:

Ports, which have received oily waste from machinery space: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 46, 47, 48, 50

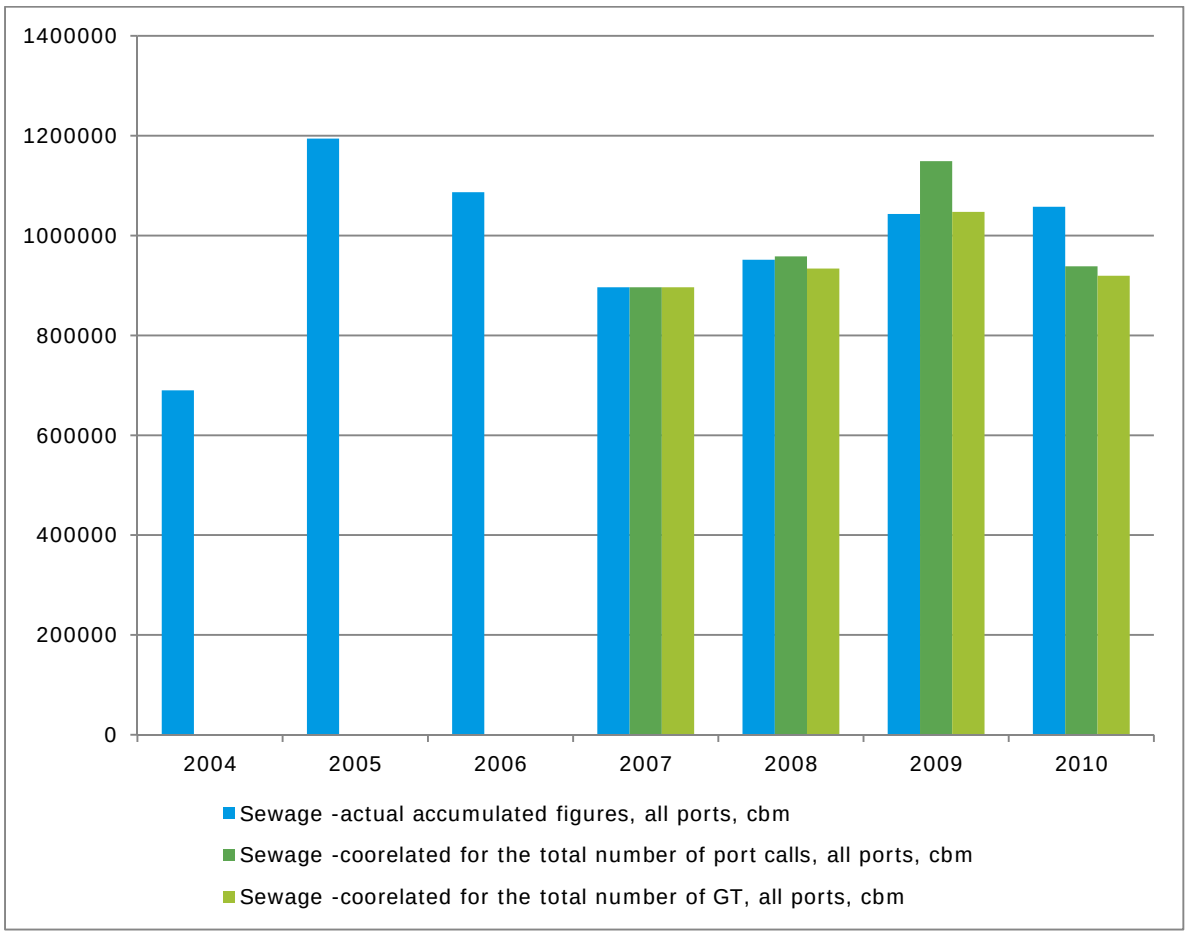
Table 4 below lists the percentage change for oily waste from machinery space according to actual figures, correlated to the number of port calls, and correlated to the number of GT calling the port for the period(s).

Table 4: Annex I (oily waste from machinery space) – Actual and Correlated Figures (40 Ports Analysed)

Oily Waste from machinery space	Period	Approx. % change
Actual figures	2004-2007 2007-2010	+71 -9
Correlated for total number of port calls	2007-2010	-19
Correlated for total number of GT calling the port	2007-2010	-21

As shown in Figure 7 below there seems to be no clear trend regarding the collection of MARPOL Annex IV (Sewage). However, there seems to be a significant increase from 2007 to 2010 in **actual delivered** m^3. However, the correlated figures for the number of port calls and number of GT only confirm the increase from 2007 to 2009. The decrease in sewage delivery in 2010 for correlated figures seems to confirm the statement made by some ports that they had "fewer, but bigger ships" (increase in GT, but with fewer ships and relatively smaller crew).

Figure 7: Sewage – Accumulated Figures, 26 Ports, m^3



Explanation:

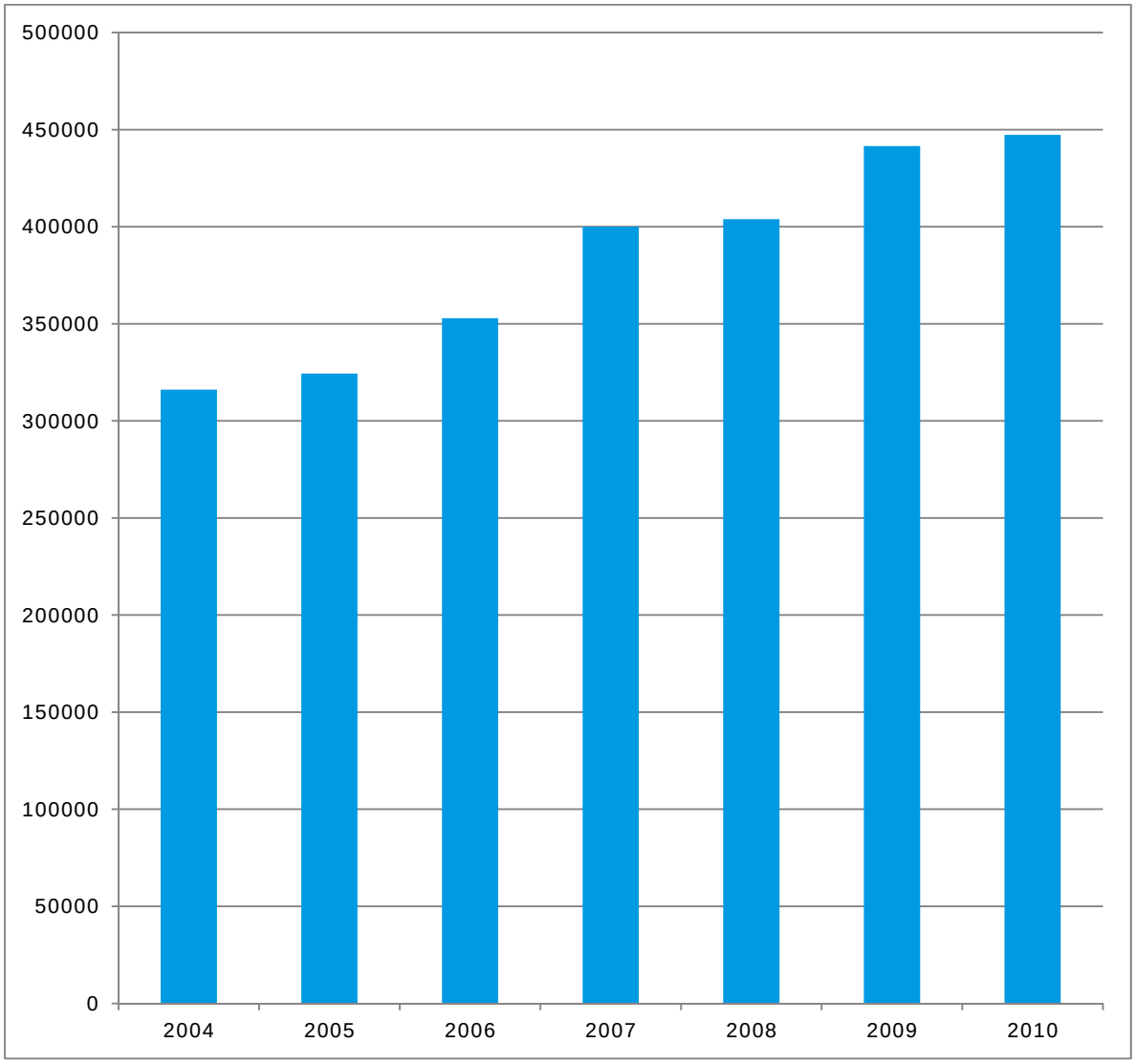
Ports, which have received sewage: 1, 3, 4, 6, 7, 9, 10, 11, 12, 13, 15, 20, 21, 25, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 47, 50

However, it should be noted from the above waste figures (ref. Figure 7), that Stockholm Port constitutes the major part of the total sewage collection (between 60% and 90%) due to the registration of sewage actually delivered from a high number of cruise liners.

Figure 8 below therefore shows the figures for sewage delivery excluding the Port of Stockholm (However, please note that the waste delivery data has not been correlated as the Consultant does not have the changes in port calls/GT for the Port of Stockholm).The figures show an increase of almost 40% from 2004 to 2010.

It should be mentioned that Stockholm port in its waste fee system accepts sewage from cruise liners without any limitations. In other ports it is anticipated that cruise liners work under special arrangements agreed with the port and as such do not fall under the waste system applied for other ships calling the port. This is, however, not documented by the information received from the ports.

Figure 8: Sewage – Accumulated Figures, 25 Ports, m^3 (exclusive of Stockholm Port)



Explanation:

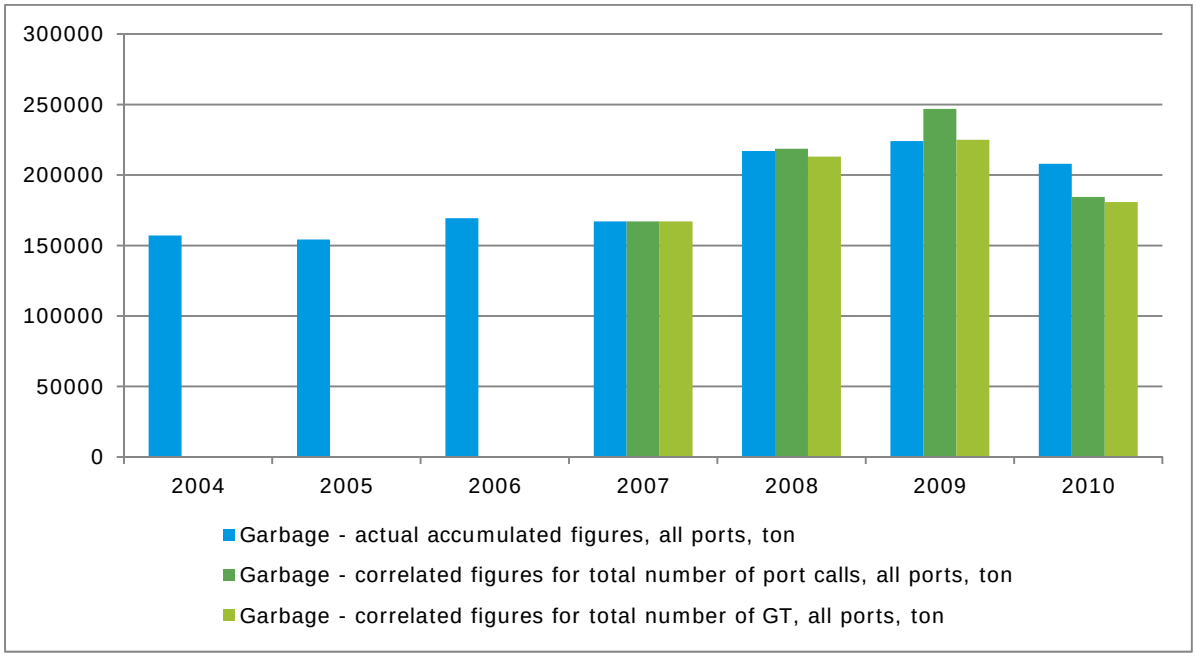
Ports, which have received sewage: 1, 3, 4, 6, 7, 9, 10, 11, 12, 13, 15, 20, 21, 25, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 50

As evident from Figure 9 below there seems to be a quite stable delivery of garbage in the years 2004 to 2007 (actual delivered) and then an increase the following years until 2009 and a small decrease in 2010. The variations (increase and decrease) are more significant for the correlated figures (see Table 5 below).

The increase in garbage delivery from 2007 to 2009 cannot be explained by the increase in traffic as there was a decrease in the number of port calls and GT in 2009, as also evident from the correlated figures. The increase could be explained by the increase in cruise liner traffic and thus

an increase in garbage delivery, i.e. fewer and bigger ships with more garbage. However, the decrease in garbage delivery in 2010 contradicts this trend and explanation. The Consultant thus assumes that some cruise liners have entered into special agreements with the ports/garbage operators and therefore do not notify their garbage any longer; hence, their waste delivery is not registered officially. Another reason for the decrease in 2010 could also be that ships are processing a larger part of their garbage on board and then discharge it legally into the sea during voyage.

Figure 9: Garbage – Accumulated Figures, 40 Ports, Ton



Explanation:

Ports which have received garbage: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 46, 47, 48, 50

Table 5 below lists the percentage change for garbage according to actual figures, correlated to the number of port calls, and correlated to the number of GT calling the port for the period(s).

Table 5: Annex V (Garbage) – Actual and Correlated Figures (40 Ports Analysed)

Garbage	Period	Approx. % change
Actual figures	2004-2007 2007-2009 2009-2010	+6 +34 -7
Correlated for total number of port calls	2007-2009 2009-2010	+47 -25
Correlated for total number of GT calling the port	2007-2009 2009-2010	+35 -20

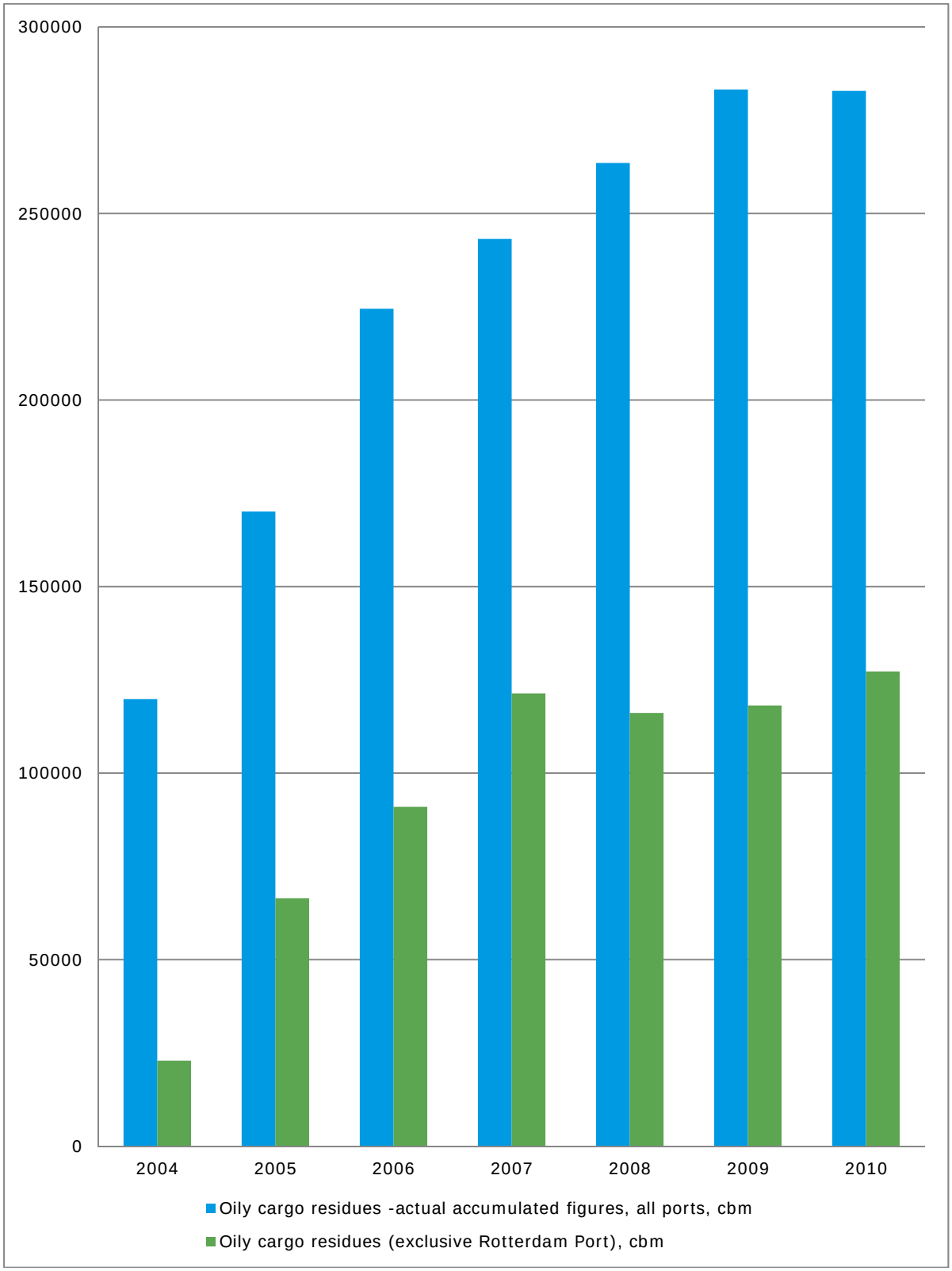
As evident from Figure 10 below there seems to be an increase over the years in the delivery of oily CR in total for all 18 ports included in this study. However, if Rotterdam Port is excluded the figures show an increase from 2004 to 2007 and then a stable development onwards.

Rotterdam Port counts for a substantial part of the increase in collected oily CR (approximately 60,000 m^3 over the 6-year period). The increase is due to the increase in the number of oil tankers in dry dock requesting cleaning services. Otherwise, there is no clear explanation for the slight increase. It should be noted that the figures only represent 18 ports out of 40 which have collected oily CR.

One port mentioned during the follow-up telephone interview that its collection of oily CR originated from an oil rig transported to the port for dismantling.

The waste figures have not been correlated with traffic data since no specific figures are available for oil tankers and it therefore makes no sense to correlate them according to total number of port calls or GT.

Figure 10: Oily Cargo Residues – Accumulated Figures, 18 Ports, m^3



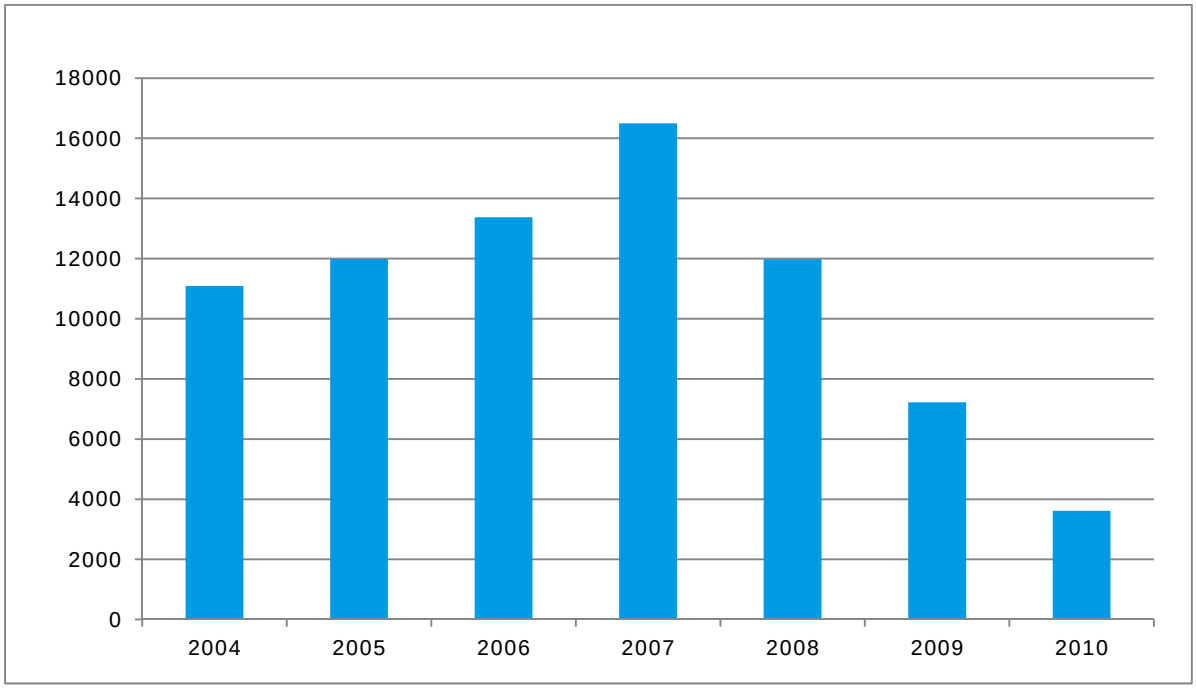
Explanation:

Ports, which have received oily CR: 1, 3, 4, 8, 9, 14, 15, 21, 22, 29, 30, 32, 34, 36, 37, 38, 39, 48

As evident from Figure 11 below there seems to be a decrease in the delivery of Annex V (CR). It should, however, be noted that Rotterdam Port and Antwerp Port constitute more than 90% of the volume registered and that only smaller volumes are registered by 10 other ports. It is therefore difficult to conclude on any trend in this waste type delivery except for these two ports. The increase in delivery from 2004 to 2007 is followed by a decrease until 2010, but there seems to be no logical explanation for this. No explanations were provided from the two ports regarding this decrease.

Again, the waste figures have not been correlated with traffic data since no specific figures are available for ships carrying liquid Annex V (CR) and it therefore makes no sense to correlate them according to total number of port calls or GT.

Figure 11: Annex V (Liquid Cargo Residues from Dry Cargoes) – Accumulated Figures, 12 Ports, m^3

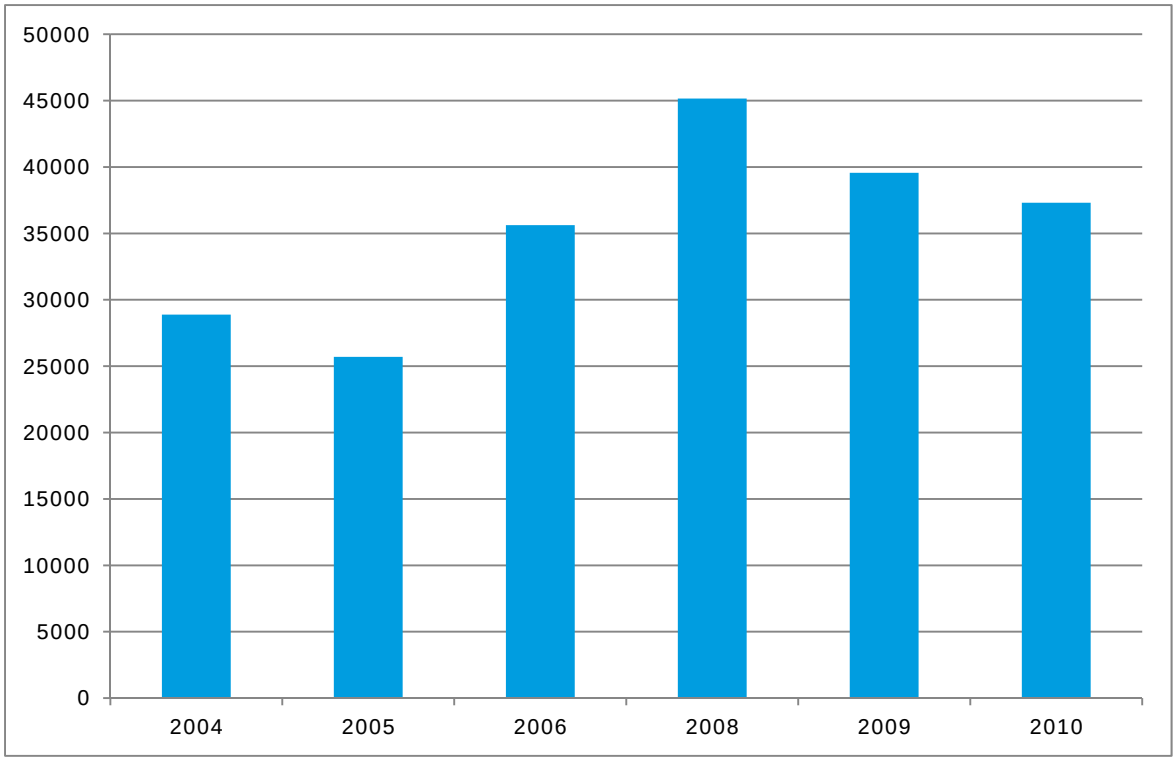


Explanation:

Ports, which have received Annex V (liquid CR): 1, 10, 14, 15, 20, 21, 22, 24, 32, 34, 37, 48

As evident from Figure 12 below, only 4 ports have provided figures for Annex II (nox. liquid substances). These ports (Rotterdam, Amsterdam, Antwerp and Immingham) are the main ports in the North Sea. It is not really possible to make any conclusion regarding these figures except that there seems to be a 60% increase from 2005 to 2008 followed by a 17% decrease until 2010. Again, the waste figures have not been correlated with traffic data as no individual port figures are available for ships carrying Annex II waste.

Figure 12: Annex II (Nox. Liquid Substances) – Accumulated Figures, 4 Ports, m^3



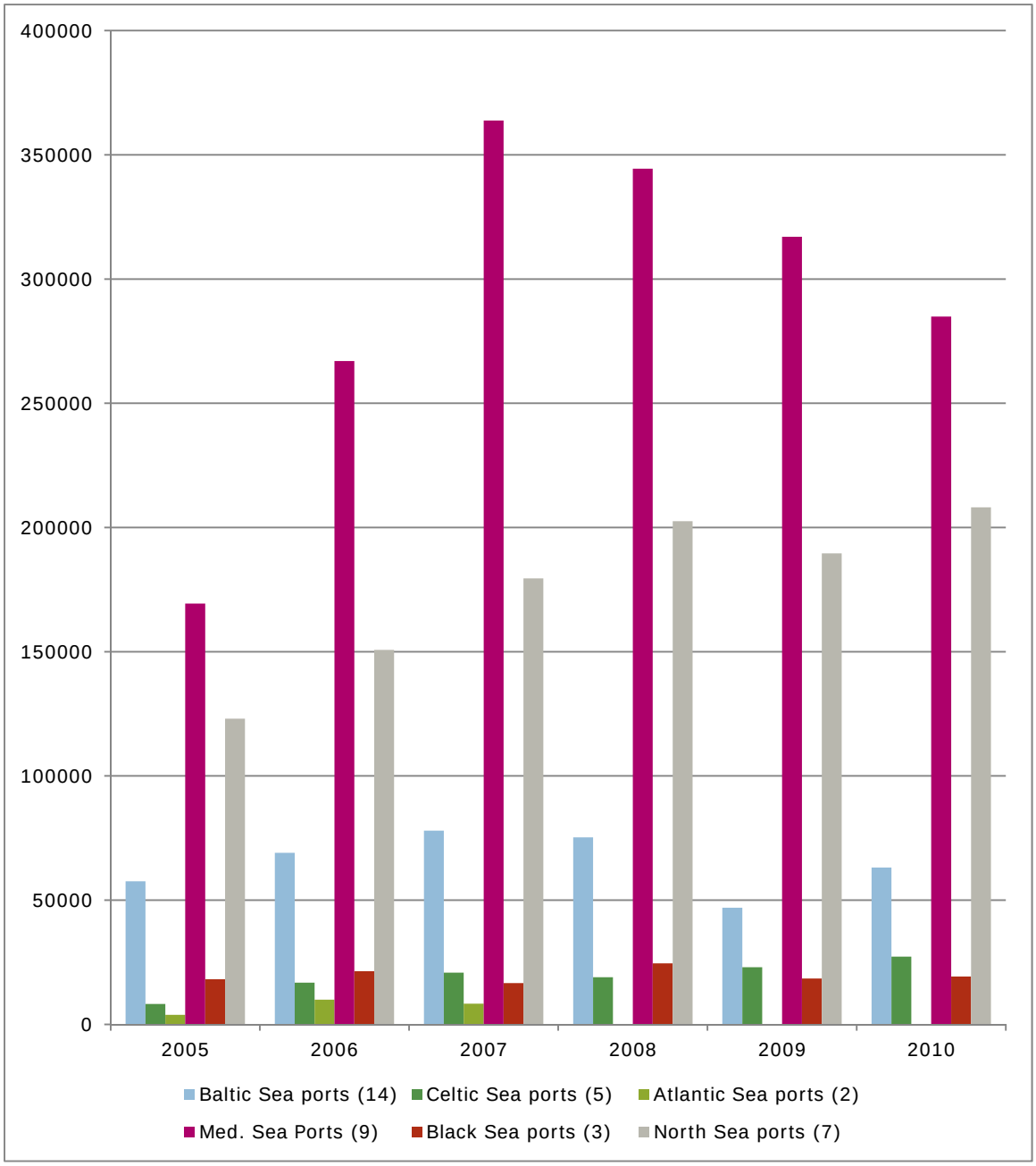
The above figures show accumulated figures for all 40 ports (or less than 40 ports when the waste type analysed was not received by the port in question).

The figures below show the same data but relate it to the following 6 geographical areas/regions in order to identify any significant differences between these areas/regions. The figures have not been correlated because no individual figures regarding the number of port calls per geographical area/region are available.

- **Mediterranean Sea**: Limassol, Marseille, Piraeus, Volos, Genoa, Venice, Trieste, Koper, Algeciras and Malta.
- **Bay of Biscay and Iberian Atlantic Coast**: Lisbon and Sines.
- **Baltic Sea**: Copenhagen, Fredericia, Tallinn, Vene-Balti, Helsinki, Rauma, Turku, Riga, Klaipeda, Gdansk, Szczecin/Swinoujscie, Karlshamn and Stockholm.
- **North Sea**: Antwerp, Zeebrugge, Bremerhaven, Amsterdam, Groningen/Delfzijl, Rotterdam and Immingham.
- **Celtic Sea**: Dunkerque, Le Havre, Cork, Shannon-Foynes and Southampton.
- **Black Sea**: Varna, Burgas and Constantza.

As evident from Figure 13 below there seems to be a similar trend for the largest areas defined (the Baltic Sea area, the Mediterranean Sea area and the North Sea area); that is there has been an increase from 2005 to 2007/8/9 and then a decrease for the Mediterranean Sea ports from 2007 but a somewhat stable trend for the Baltic Sea and North Sea ports.

Figure 13: Delivery of Oily Waste from machinery space (m^3)

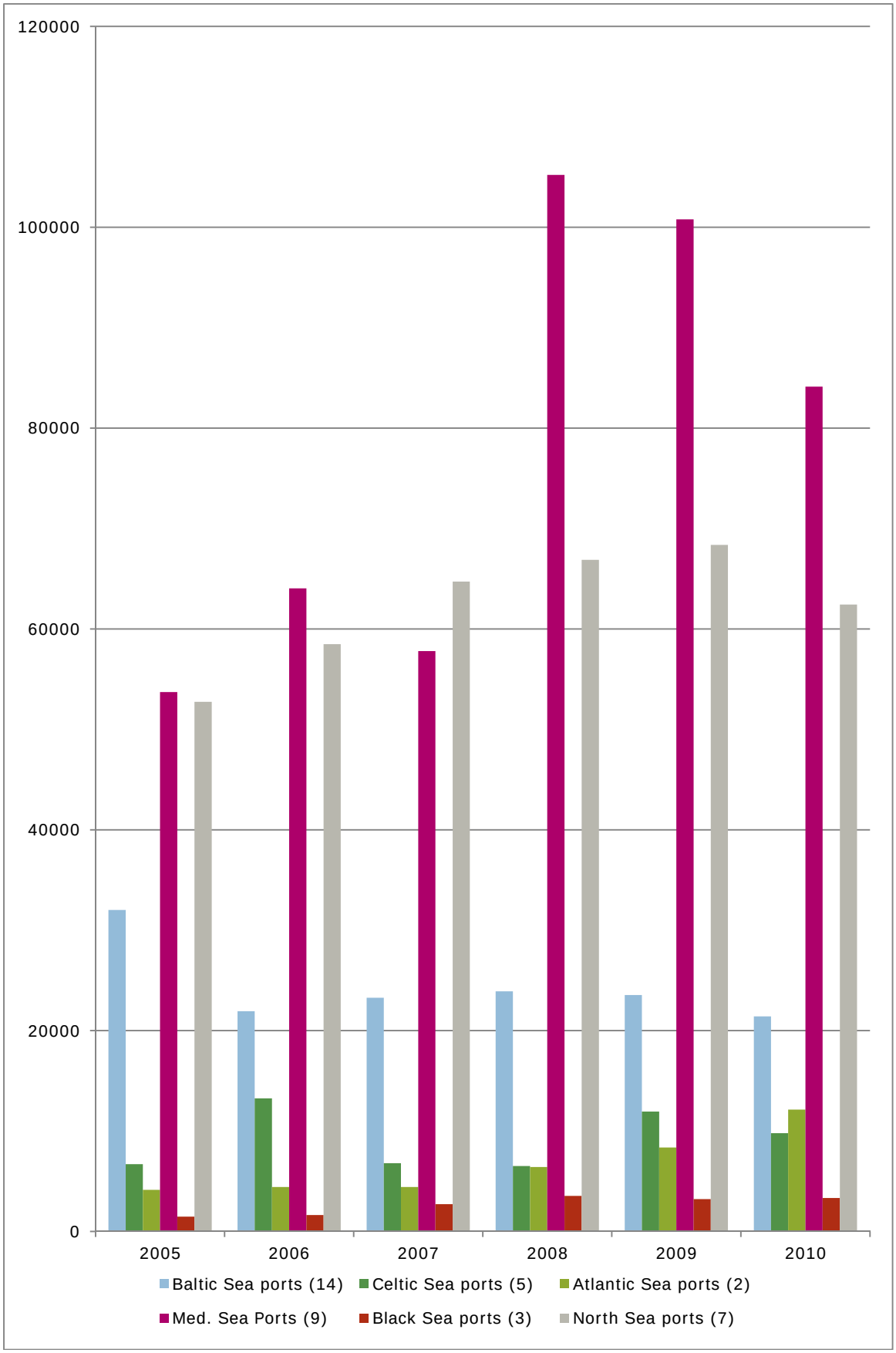


Note: Where figures are missing, the figure for the following year has been used.

As illustrated in Figure 14 below there is a lot of fluctuation in the delivery of garbage and it is therefore difficult to make any conclusions on the basis of these figures. The significant increase for Mediterranean ports is mainly due to the increase registered by Piraeus Port. This increase could be explained by the new IT system implemented in the port, which seems to register waste deliveries more precisely than before. It also registers garbage from cruise liner traffic, which, most likely, was not been recorded previously.

It is somewhat odd that the figures for each individual area and also for the total 40 ports are peaking in 2008/9 when fewer ships were calling the ports following the financial crisis. However, an increase in cruise liner traffic to European ports, following heavy promotion by travel agencies, and thus an increase in the volume of garbage delivered could explain this increase.

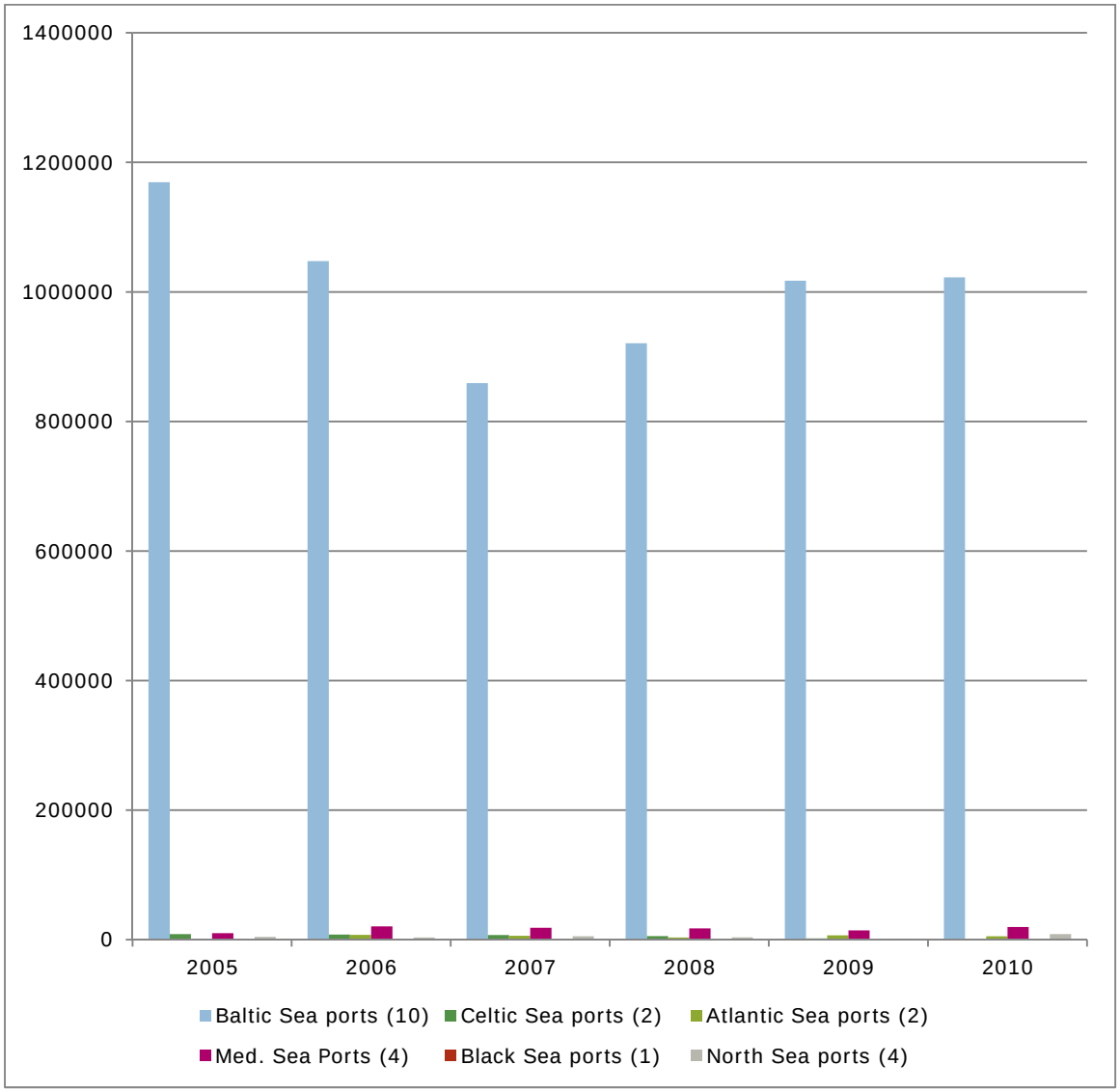
Figure 14: Delivery of Garbage (ton)



Note: Where figures are missing, the figure for the following year has been used.

As evident from Figure 15 below then it is primarily the Baltic Sea ports that receive sewage in any significant volumes. This is most likely due to the initiative of providing this area with a "Special Areas" status, which will soon come into force.

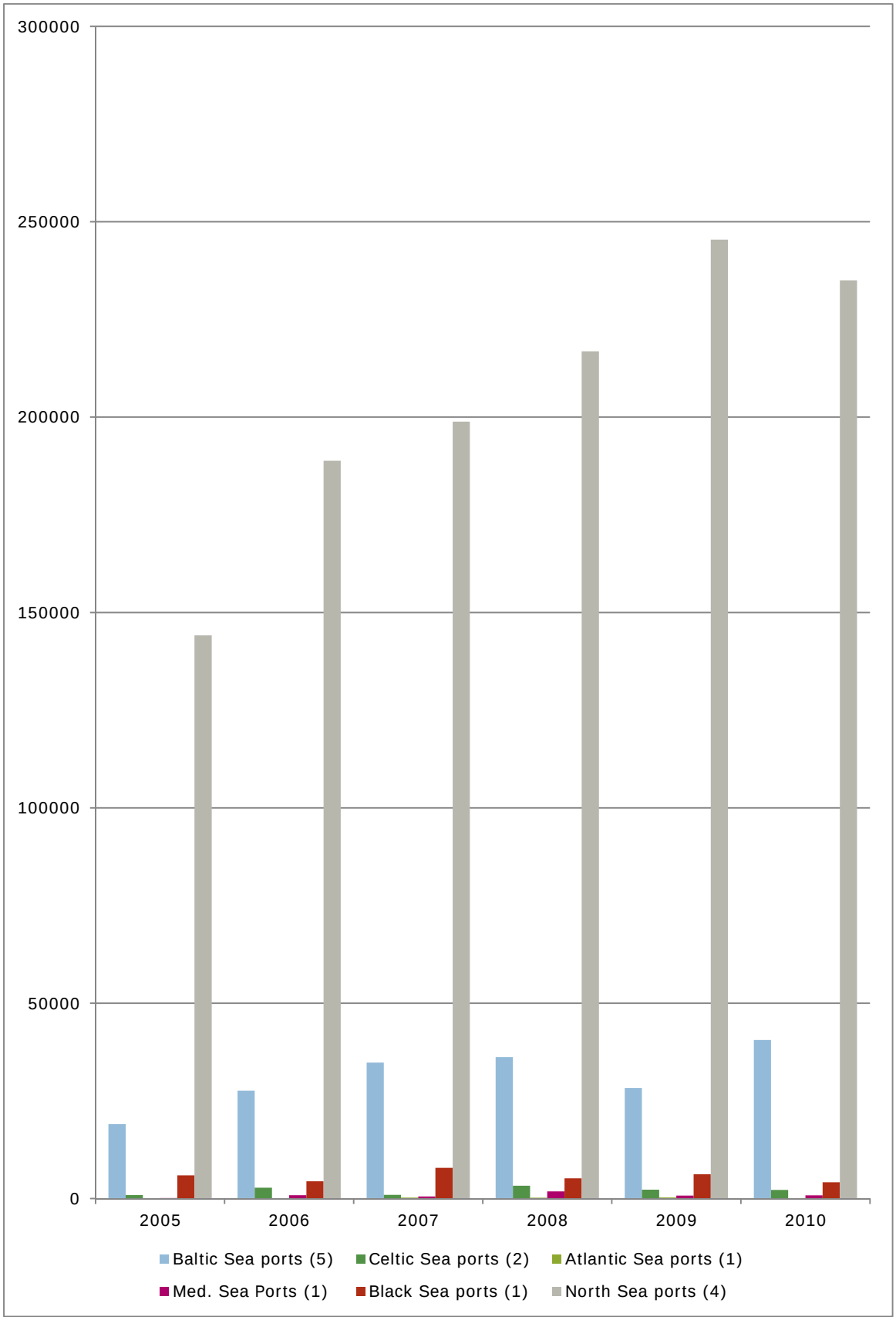
Figure 15: Delivery of Sewage (m^3)



Note: Where figures are missing, the figure for the following year has been used.

As evident from Figure 16 below it is mainly the North Sea ports and the Baltic Sea ports that register the collection of oily CR. The main volumes are collected by Rotterdam and Antwerp. Oily CR are most likely also received in ports in other areas but not officially registered. This could explain the low figures for these areas. As the figures are limited in the Waste Summary Sheets no extrapolation has been done for "oily CR".

Figure 16: Delivery of Annex I (Oily Cargo Residues) (m^3)



Note: As the figures are limited in the Waste Summary Sheets no "extrapolation" has been done for Annex I (oily CR).

As evident from Figure 17 below it is mainly the North Sea ports (Rotterdam and Antwerp) that register and/or collect MARPOL Annex V liquid CR (incl. dry bulk cargoes in liquid form). There seems to be a decrease in delivery/registration from 2007 to 2010, which cannot be explained.

Rotterdam Port and Antwerp Port had no real explanation for the decrease. Rotterdam Port assumed that the decrease could be due to the following reasons:

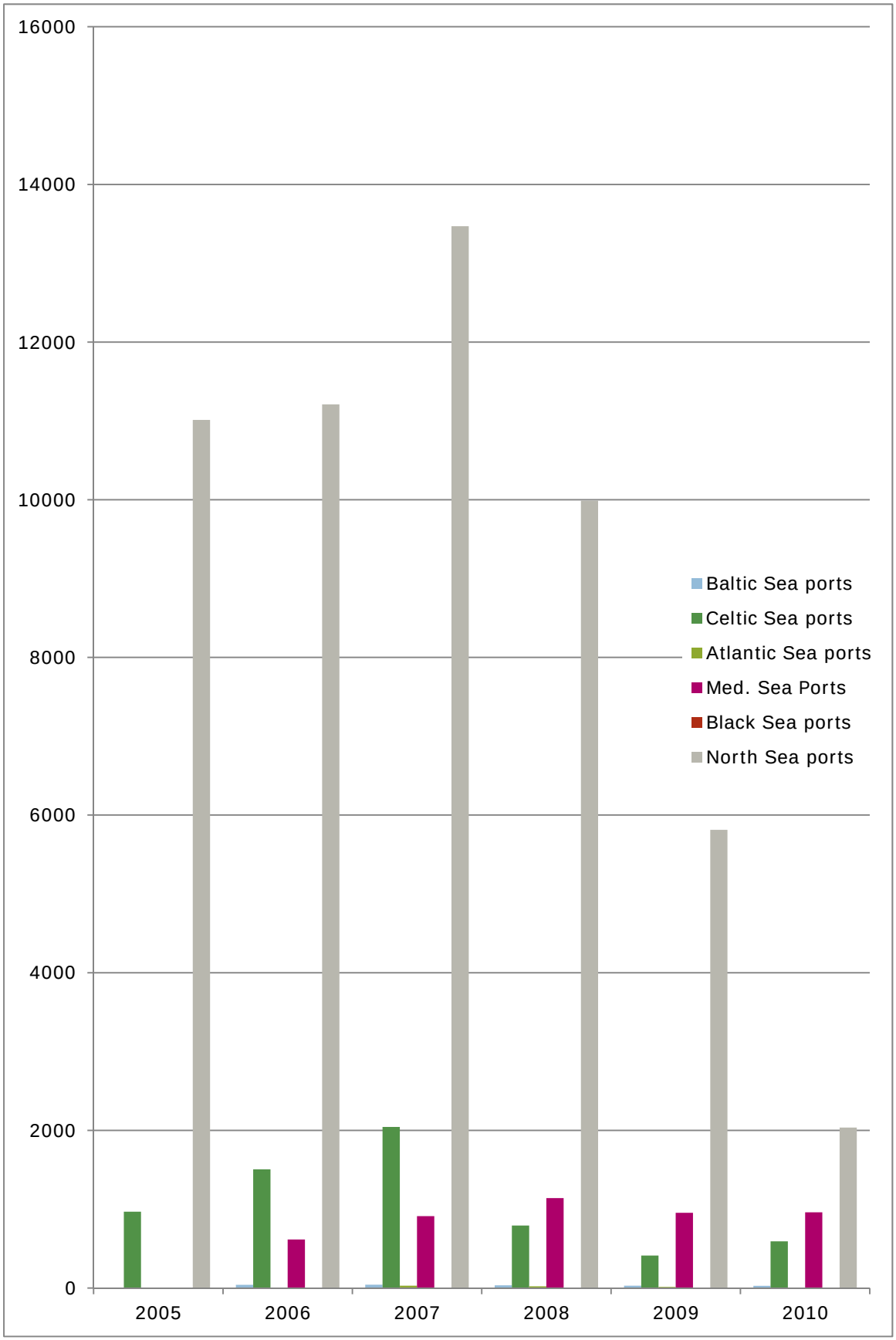
- Not included in the indirect fee, and therefore "more visible" on the waste bill;
- Lack of enforcement, no or low attention (priority) of PSC; or
- The ship is free to dispose most of this waste at sea, and (most of the time) allowed until January 2013.

Rotterdam Port mentioned that during the next year and until the up-coming amendments to MARPOL Annex V it expects an increase in disposals.

Antwerp Port mentioned that delivery of CR has to be reported in the waste information and monitoring system. However, due to the fact that CR fall outside the scope of the waste fee system, the delivery of this type was probably more influenced by commercial agreements than by the Directive.

The lack of registration of waste delivery in the other surveyed geographical areas could explain the low or missing figures for these.

Figure 17: Delivery of Annex V (Liquid Cargo Residues from dry cargoes) (m^3)



Note: As the figures are limited in the Waste Summary Sheets no "extrapolation" has been done for "Annex V (liquid CR from dry cargoes).

3.2 Section 2: Type of Port Operation and Traffic

Based on personal interviews with the ports it is the Consultant's impression that most ports seem to have a reasonably good overview of what type of individual terminals that are present in the port and what type of port operations take place in the port. However, this does not mean that certain employees (dealing with e.g. PRF or environment) are aware of all the relevant aspects of their port's features.

When it comes to the collection and management of SGW most ports seem to have a good communication and overview of the waste handling activities. However, when it comes to collection and management of CR, there seems to be a lack of communication between the official waste handling authority (often the Port Authority) and the terminals, and therefore also a lack of information. Basically the terminals are left to take care of the collection of CR without any involvement from the official Port Authority's side. A majority of ports accepts CR (ref. Figure 5 above). However, although accepting CR does not mean that CR are handled by the port (collected and paid for).

COLLECTION AND HANDLING OF CR

Ports tend to assume that the individual cargo terminals will handle any CR including Annex II (nox. liquid substances) and have little knowledge of how the actual collection takes place. It is not clear if this is regulated in specific contracts or agreements between the port and the terminals. It seems that all ports (except Stockholm) are not involved at any level in the collection of CR (notification of waste operator, collection or payment for services).

The collection of any CR and Annex II (nox. liquid substances) is not included in the indirect fee in any of the ports analysed.

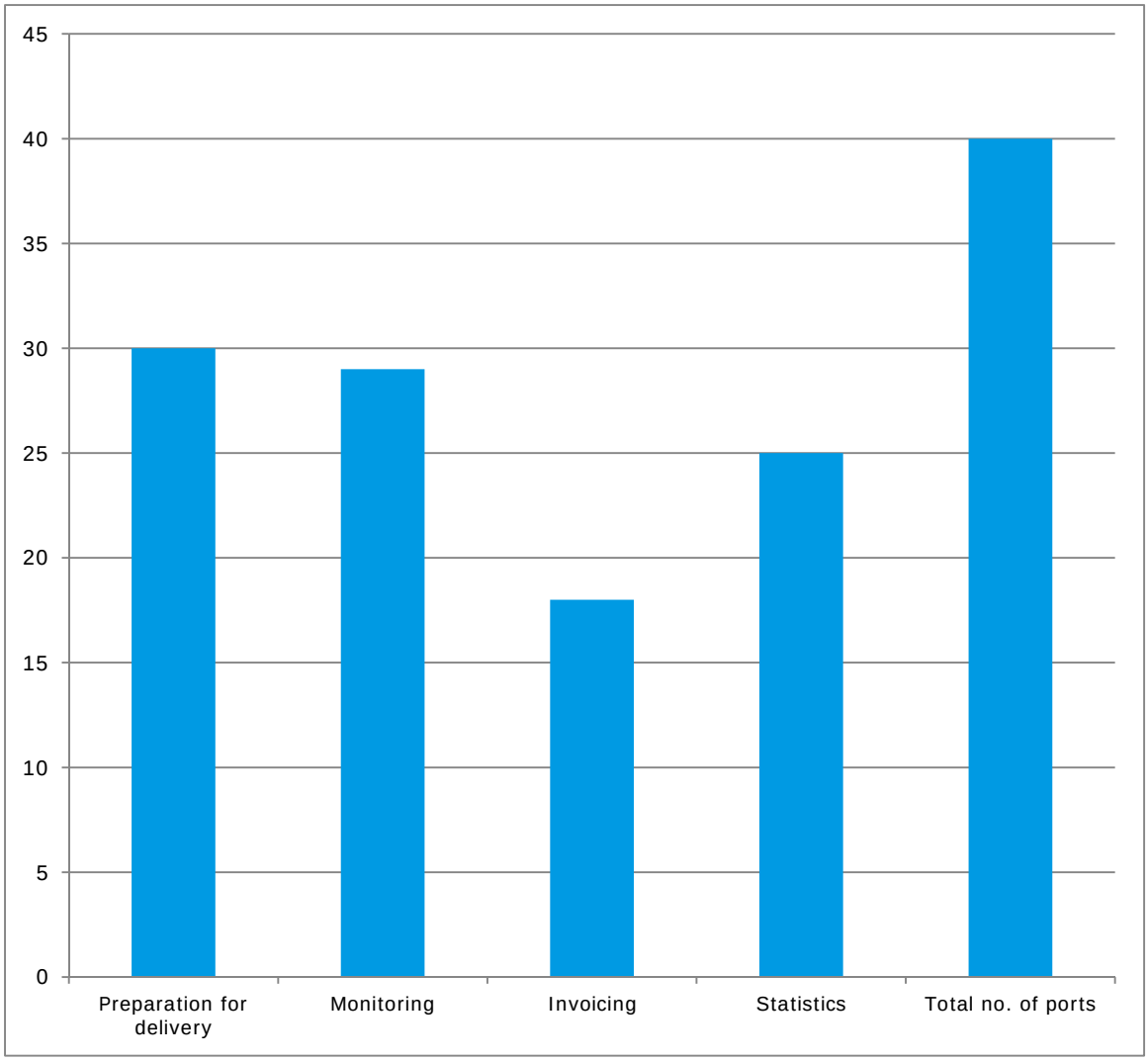
3.3 Section 3: Waste Notification

Directive 2000/59/EC prescribes that the port shall establish a notification procedure and utilise the "advance waste notification form" developed and annexed to the Directive. All ports interviewed have implemented such a notification system and are as such in compliance with the Directive, although the systems seem to work differently in the ports.

A majority of ports use the latest updated version of the official EU form (now including sewage) which entered into force in 2009, with some national amendments and translations. Other ports use the official IMO form (MEPC.1/Circ.644) and some ports use a mix of various official forms with national amendments. However, all the waste notification forms used seem to fulfil the needs of the port in question. The main differences relate to the level of details to be filled into the form. The IMO form appears as the most detailed with sub-groupings for each of the MARPOL Annexes (I, II, IV and V). The IMO form also requires more detailed information than the EU form such as that related to Annex II Nox. Liquid Substances (X, Y, Z substances), and Annex VI Air Pollution Residues.

As evident in Figure 18 below, the applied waste notification systems in the ports serve different purposes, i.e. preparation/planning for delivery; monitoring and control; invoicing; and statistics.

Figure 18: Purposes of the Waste Notification Form (40 ports analysed)



Explanation:

Preparation for delivery: 1, 3,4,5, 6, 8,9, 10, 11, 12, 14, 15, 16, 20, 21, 22, 24, 25, 26, 29, 30, 31, 33, 34, 36, 38, 39, 46, 47, 50

Monitoring: 1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 14, 15, 16, 17, 20, 21, 24, 25, 26, 29, 30, 31, 33, 34, 36, 37, 38, 48, 50

Invoicing: 6, 7, 8, 10, 16, 17, 21, 22, 25, 29, 30, 31, 32, 34, 36, 38, 47, 50

Statistics: 1, 3, 4, 5, 6, 7, 8, 11, 14, 15, 16, 17,20, 21, 24, 25, 26, 29, 30, 32, 33, 36, 37, 48, 50

In all ports, Port Authorities receive the waste notification together with the notification of arrival. In the waste notification all information regarding waste is provided.

All ports, except for 3 (Karlshamn, Turku and Constantza), have implemented a mandatory waste notification system. This means that the Port Authority receives the waste notification form (sometimes in copy to the waste operator). However, in some ports, where private operators carry out the waste collection, there seems to be a parallel information channel between the shipping agent and the waste operator and relevant information is communicated directly between the two. It has not been possible to obtain detailed information at port level on the precise information flow beyond what is shown in Figure 18 above.

A majority of ports do not see it as their obligation to inform inspection authorities in case of “suspicious ships”. However, 4 ports (Limassol, Bremerhaven, Malta and Immingham) mentioned that they will inform relevant inspection authorities in case of major discrepancies regarding length of voyage and the content of the waste notification. Based on the information provided in the waste notification and/or on the receipt after delivery (actually delivered), the port will invoice the ships. Some ports have implemented this procedure in their Vessel Traffic System

(VTS) system or in electronic systems (ref. Figure 19 below) to which all stakeholders have access. It has not been possible to obtain detailed information on the different electronic systems, but ports mentioned that notifications are entered directly into the system by the ships' agents. Operators, and often also "enforcement/inspection authorities", have access to such systems.

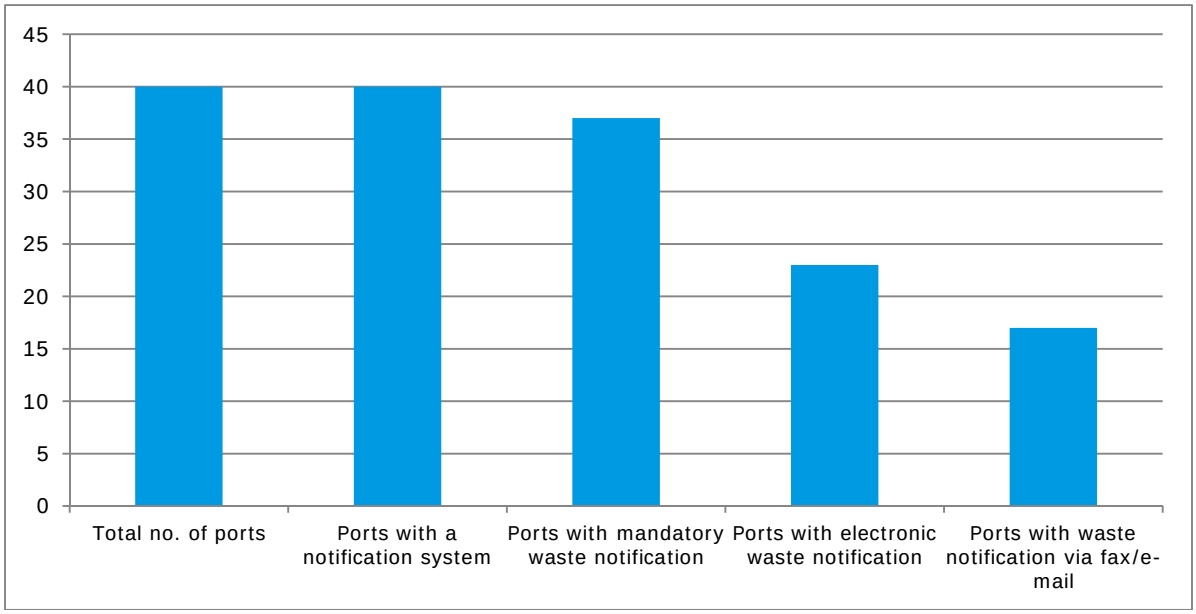
As seen from Figure 18, 25 out of 40 ports receive the waste notifications for statistical analysis purposes and 18 out of 40 for invoicing ships the indirect fee. However, whether the waste notification form is actually needed for invoicing is doubtful given that the ports receive sufficient information on the ships through the "Notification of Arrival" scheme for them to charge the indirect fee. Ports using private operators often have an informal waste notification system in place where direct contact is established between the agent and the operators, and thus without any direct involvement from the ports. One port has provided waste figures in the questionnaire based only on the information stated in the waste notification forms whereas all others have provided figures based on what was actually delivered. One port provided both figures. There seems to be some discrepancy here as most ports actually use "actually delivered" for statistical purposes and not what is provided on the waste notification form. Finally, some ports receive the waste notification, but only use the part for which they have decided to be involved e.g. in garbage collection. Hence, if the ship wants to deliver waste oil, the notification is done directly between agents and operators.

As mentioned above, for a majority of ports direct communication systems have been established between shipping agents and waste operators/individual cargo terminals; thus Port Authorities do not play a central role in the waste notification process. However, it seems (although not documented) that having the Port Authority in charge of all waste notification and dissemination of information to relevant stakeholders and waste operators ensures that the Port Authority has very good knowledge of the total waste to be delivered in the port.

The flow of information regarding CR seems a bit redundant as CR are not specifically managed by the port, but handled directly by the individual terminals and through direct communication between the shipping agent/ship and waste operator/terminal. Although waste handling is outsourced to the terminals it is still the overall responsibility of the Port Authority to ensure compliance with Directive 2000/59/EC.

Figure 19 below shows that most ports have implemented a mandatory waste notification system (except for ship exempted). An increasing number of ports also employ an electronic waste notification system rather than the traditional notification one by fax.

Figure 19: Types of Waste Notification Systems



Explanation:

Ports with a notification system: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 46, 47, 48, 50

Ports with mandatory waste notification: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 20, 21, 22, 24, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 47, 48, 50

Ports with electronic waste notification system: 1, 3, 4, 5, 9, 14, 15, 16, 17, 20, 21, 22, 26, 27, 29, 30, 31, 34, 37, 38, 42, 48, 50

Ports with waste notification with fax/email: 6, 7, 8, 10, 11, 12, 24, 25, 29, 30, 32, 33, 35, 36, 39, 46, 47

USE OF THE WASTE NOTIFICATION FORM FOR CR

Many ships seem to notify CR on the waste notification form, but this information is seldom used by the official port waste handling system since the collection of CR is handled directly between ship/ship agents and waste operators/ terminals.

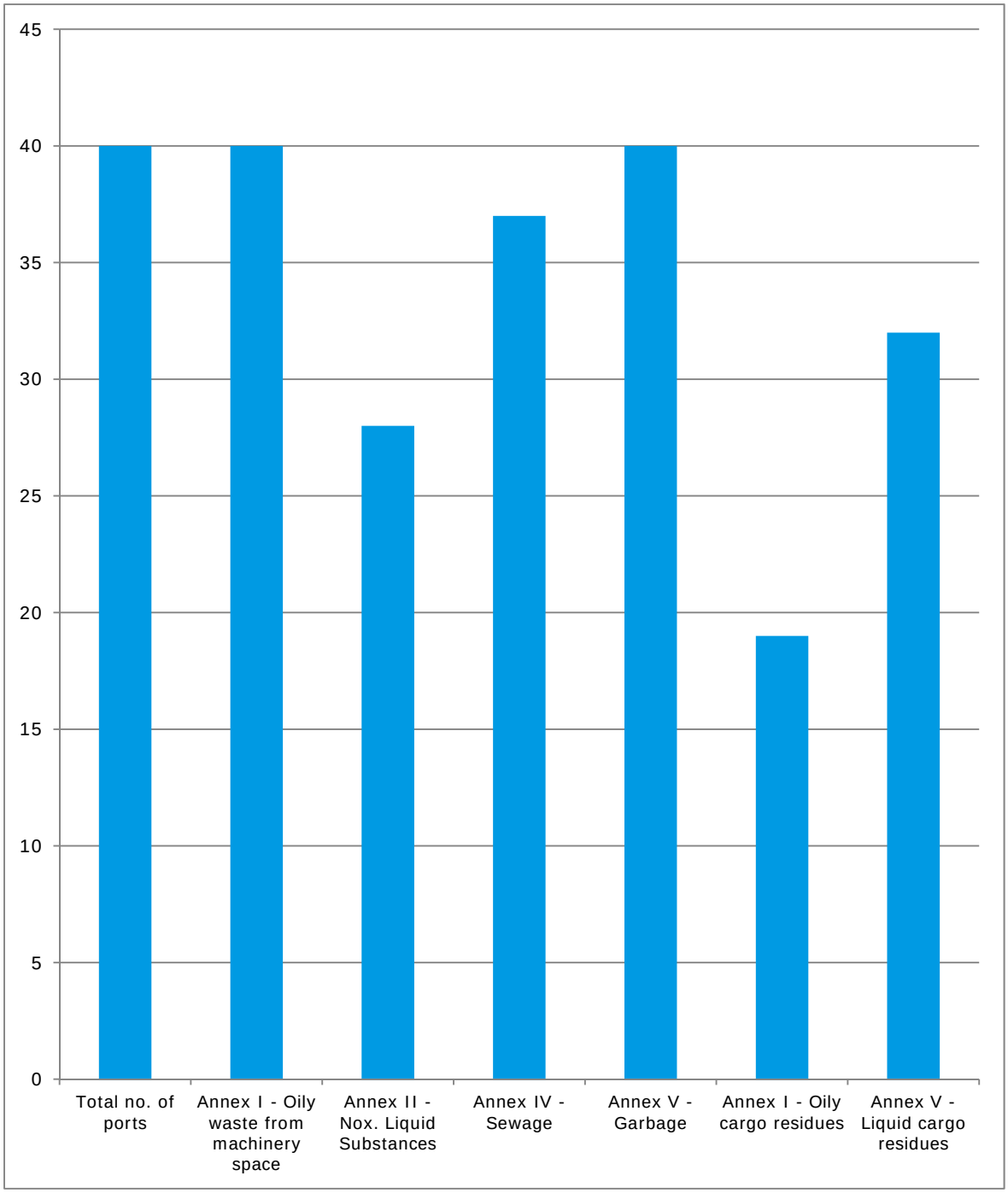
In some ports however, enforcement authorities have access to the waste notification forms and could investigate delivery of cargo residues.

3.4 Section 4: Waste Types Accepted in the Port

Figure 20 below shows that all ports accept Annex I (oily waste from machinery space) and Annex V (garbage). The “acceptance” of sewage is a bit unclear, but the majority of ports (except Burgas and Algeciras) accept sewage, which can be notified on the notification form and then handled by the port or by external operators. In the two mentioned ports, which claim that they do not accept sewage it means that the official waste handling system does not accept sewage, but if the ships request this service it has to be arranged directly with external operators without any involvement from the port.

Ports not accepting any CR or Annex II (nox. liquid substances) are often ports, which do not have operations to accommodate these types of waste.

Figure 20: Acceptance of Different Waste Types



Explanation:

Annex I (oily waste from machinery space): All ports,

Annex II (nox. Liquid substances): 1, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 20 21, 22, 31, 32, 33, 34, 35, 37, 38, 39 46, 47, 48, 50

Annex IV (sewage): 1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 45, 46, 47, 48, 50

Annex V (garbage): All ports

Annex I (oily CR): 7, 8, 11, 12, 13, 17, 22, 24, 29, 30, 32, 33, 34, 35, 36, 46, 47, 48, 50,

Annex V (liquid CR): 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 20, 21, 22, 24,26, 29, 30, 31, 32, 33, 34, 35, 37, 38, 39, 46, 47, 48, 50

3.5 Section 5: Waste Fee System

There are many variations at EU, national, and in some cases, individual port level of the interpretation of Article 8 of Directive 2000/59/EC on fees for ship-generated waste. The transposition of the Directive into national legislation leaves room for adopting different ways of introducing incentives for waste delivery in the ports.

Interviewed ports in Denmark, Finland, Sweden, Poland, Estonia, Latvia, Lithuania, Bulgaria, Cyprus and Greece have implemented an indirect fee of 100%, however, with some differences with regard to the volume of waste accepted.

In Germany, a "reverse model of the indirect fee system" has been implemented, i.e. a direct charge with the possibility of reclaiming the cost, or part of it, after delivery.

In British and Slovenian ports and in individual ports such as Sines, Dunkirk, and Genoa the percentage of the indirect fee is difficult to determine since it is only related to the collection of garbage. In Romania the percentage of the indirect fee is also difficult to determine since it is only related to the collection of oily waste from machinery space and sewage, leaving the garbage collection to be handled directly by the waste operators using direct charges.

In the Netherlands, Amsterdam and Groningen, an indirect fee has to be paid which then provides the ship with a "discharge right" for its waste delivery (deducted from the total cost of the collection). However, for some ports this indirect fee is not only related to waste collection services. Rotterdam port uses the same principle although with some modifications.

In Belgian ports a deposit system has been implemented, which provides an incentive to deliver waste in the ports. This model foresees the payment, by all the ships calling the port, of an indirect fee which can then be partly refunded (only the variable fee part, 70%, is refundable) if the ship can demonstrate that it has delivered waste in another EU-HELCOM-EEA port (HELCOM includes Russian ports). The fixed part of the fee, 30%, is not refunded to the ship. The fixed part of the fee thus contributes to the cost of PRF.

Ports in Malta and France have applied a system based on a direct charge, with possible financial sanctions (penalty fee) for those ships not delivering any waste. Spain employs a differentiated penalty scheme. Ports in Spain have changed the system in 2010 into a fee system where the Port Authority charges an indirect fee for ships calling at each stop in the harbour, or make use of waste reception services. This indirect fee will entitle the ship to deliver without being charged, during the first seven days of the scale, all waste Annexes I (machinery space) and V.

In Italian ports the situation is more complex. The level of implementation of the Directive depends on the initiative of the specific ports. The indirect fee is applied by Genoa Port for garbage, however, the oily waste is still charged with the direct fee. In the other ports considered, i.e. Venice and Trieste, a direct charge for waste delivery is still applied.

There seems to be a lot of uncertainty among ports on how to understand the Directive on this issue. A significant part of the costs (the EC's declaration annexed to the Directive implies minimum 30%) shall be collected as an indirect fee. However, the Directive seems quite open as to how this can or shall be done. The interpretation by most ports is that the minimum of 30% is of the total cost for ship-waste handling. However, most ports do not have information of the total cost, since all or most ship-waste handling is carried out by external waste operators and therefore it has not been possible for ports to comply fully with this part of the Directive. Furthermore, the ports have to understand the meaning of "30%" and the relation of this percentage to the costs of PRF for SGW, including the treatment and disposal of the waste. If ships only discharge garbage and the indirect fee covers only garbage with no limitation it will be close to 100%, whereas if the ship also discharges, e.g. oily waste and sewage the indirect fee will most likely be well below 30%. This has led to a number of variations in the introduction of such an indirect fee.

Table 6 below provides a brief description of the cost recovery systems implemented in EU Member States' ports. For a more detailed description please consult the individual port reports, annexed to this Report.

Table 6: Description of Cost Recovery Systems Implemented in Member States' Ports

Ports	Waste Types Included	Description
Indirect Fee 100% (no limitations in waste volume)	SGW: ▪ Waste oil/sludge from machinery space ▪ Sewage ▪ Garbage	No limitations here mean that ships can deliver all its SGW regardless of volume. All ships pay a fixed fee to the port based on GT.
Direct Fee 100%	Liquid CR (oil and other) Special waste and other special requests	Collection and payment handled by terminal operator based on quotation from waste operator.
Karlshamn		
Goteborg		
Stockholm		
Tallinn	Sewage (up to 7 m^3)	Waste fee calculated according to: Ship's type; Ship's gross tonnage (GT);
Indirect Fee 100% (limitations in waste volume)	Ship Generated waste: ▪ Waste oil/sludge from machinery space ▪ Sewage ▪ Garbage	Reasonable amounts are accepted by ports (volume generated from last port of call). Based on a simple table and "reasonable volume" defined in a pragmatic and flexible way.
Direct Fee 100%	Liquid CR (oil and other Special waste and other special requests)	Collection and payment handled by terminal operator based on quotation from waste operator.
Helsinki		
Rauma		
Turku		
Vene Balti		
Copenhagen	No limitations for garbage	
Fredericia		
Riga		
Klaipeda		
Varna		
Burgas	Sewage not included	
Cyprus		
Lisbon		
Volos	Sewage not included	
Piraeus	Sewage not included	
Gdansk		
Szczecin/Swinoujscie		
Shannon F.		

Ports	Waste Types Included	Description
Indirect fee according to different systems	Varies from port to port	Each port has its own model for indirect fee regarding how it is paid and what it includes.
Direct Fee 100%	Liquid CR (oil and other Special waste and other special requests)	Collection and payment handled by waste or terminal operator.
Algeciras	Indirect fee: Garbage (not incl. hazardous)	1. All ships always pay a fixed indirect fee. The Port Authority charges an indirect fee - depending on the units of gross registered tonnage 2. Sewage is not included in the indirect fee payment
Antwerp		1. The system is based on a payment of a so-called fee, which is in fact a guarantee/deposit. 2. All ships that enter the port have to pay a fee to the Port administrator. The deposit applies to oily waste from machinery space and garbage. Sewage is collected, paying a direct fee.
Zeebrugge		1. The system is based on a payment of a so-called fee, which is in fact a guarantee/deposit. 2. All ships that enter the port have to pay a fee to the Port administrator. The deposit applies to oily waste from machinery space, sewage and garbage.
Constantza		1. All ships pay a fixed indirect fee with limitation for oily waste from machinery and sewage. 2. The port due includes the indirect fee. 3. Direct fee for collection of garbage is directly paid from the ship agent to the waste operator. Oily waste from machinery space (15 tons in Volume limitation) Sewage (15 tons in Volume limitation)
Significant Indirect Fee as incentive		
Direct Fee 100%	Liquid CR (oil and other Special waste and other special requests)	Collection and payment handled by terminal operator based on quotation from waste operator.
Bremerhaven	Indirect fee:	1. A fixed indirect fee is always paid to the

Ports	Waste Types Included	Description
	Garbage, Sewage and Oily Waste from machinery space	Port Authority based on GT. 2. The Agent/ship pays directly the cost to the Waste Operator for oily waste collection services provided 3. The Agent/ship can claim back full or part of the cost for waste collection, based on a proof (invoice paid to operator) from Port Authority.
Southampton Immingham	Garbage	1. All ships always pay a fixed indirect fee to Port Authority for garbage delivery. 2. All other waste types invoiced directly between Agent/ship and Waste Operator.
Cork		1. All ships always pay a fixed indirect fee to Port Authority for garbage delivery (limitations) 2. All other waste types invoiced directly between Agent/ship and Waste Operator.
Rotterdam		1. A fixed indirect fee is paid directly to Port Authority based on engine power 2. The port pays directly all cost to the Waste Operator for the services provided, but keeps an administrative fee. If the ships deliver more waste that anticipated this will be invoices as additional charges.
Amsterdam Groningen		1. A fixed indirect fee is paid directly to Port Authority based on GT and receives a “discharge right” for discharge of garbage and liquid waste 2. The Agent/ship pays directly all cost to the Waste Operator for the services provided. 3. The Agent/ship can claim back full or part of the cost for waste delivery, based on a proof (invoice paid to operator) from Port Authority (discharge right for sewage = 0 meaning direct fee for such discharge)
Dunkerque	Volume is limited to the capacity of garbage containers	1. The indirect fee for solid waste is collected as a part of the port due by the port 2. Direct charge is applied to those ships delivering liquid waste. 3. The direct fee for liquid waste is paid directly by the ship agent to the waste operator. 4. The ships not delivering waste are sanctioned with a fee payment which is invoiced by the customs when the ship leaves the port.
Genoa		1. All ships pay a fixed indirect fee. 2. The indirect fee payment is only in place for garbage including 50 % of the

Ports	Waste Types Included	Description
		cost for garbage. The Port authority (PA) apply the principle of indirect fee on solid waste (Annex V): in case ships do not notify and deliver waste (solid) to the private operators (who invoice the ships according to the tariff established in the port waste management plan by the PA), the PA issue a bill to the ship corresponding to the 50 % of the estimated amount of waste according to the ship size and last port of call.
Koper		1. All ships always pay a fixed indirect fee generally covering the costs of waste delivery. 2. The payment of the indirect fee gives the right of free of charge delivery of Volumes of less than 0.5 m3 3. The collection of liquid waste from a vessel is charged (direct) on the basis of volume 4. Tariff supplements are applied in case of delivery outside the regular working hours.
Sines	Garbage	1. All ships pay a fixed indirect fee. 2. Under the rate of the indirect fee it is guaranteed to the ship a waste collection service. The waste fee system applied by Sines Port is based on a combination of indirect fee (fixed due as defined in the Tariff Regulation) to be paid by all ships calling the port, and variable dues. Included in the indirect fee are garbage –at an amount which is reasonable. Under the rate of the indirect fee it is guaranteed to the ship a waste collection service for garbage, called minimum service, without additional costs up to the maximum value, per GT categories, established by the Tariff Regulation. The limit is not the volume limit but is given by the value in EUR of the waste related services provided.
Indirect fee -as penalty for not delivering SGW - or standard fee/tariff		
Direct Fee 100 %	SGW Liquid CR (oil and other Special waste and other special requests)	Collection and payment handled by terminal operator based on quotation from waste operator.

Ports	Waste Types Included	Description
Malta		1. The system applied is direct fee. Ships not delivering waste are sanctioned with a fee payment, which is invoiced when the ship leaves the port. The ships not delivering waste (not requesting services from operators and not proving they have discharged waste in Malta or in other Community port) are sanctioned with a fee payment, which is invoiced when the ship leaves the port.
Le Havre		1. Direct charge is applied to those ships delivering waste. 2. 2. An indirect fee (according to the ship size) is applied – *ex post* -to the ships leaving the port without delivering waste: i.e. the private operators inform the Maritime Authority about ships not delivering waste (not requesting services from operators). The indirect fee - which could be considered as a penalty - is invoiced by the Toll when the ship leaves the port
Marseille		1. Direct charge is applied to those ships delivering waste. 2. 2. An indirect fee (according to the ship size) is applied – *ex post* -to the ships leaving the port without delivering waste: i.e. the private operators inform the Maritime Authority about ships not delivering waste (not requesting services from operators). The indirect fee - which could be considered as a penalty - is invoiced by the Toll when the ship leaves the port
Venice		1. All ships pay a tariff based on their size and type. 2. Direct charge is paid to private operators with a price system controlled by the Port Authority. The fee system is based on two tariffs one indirect and one direct charge a) All ships pay a tariff based on their size and type. However this fixed indirect fee/tariff does not give any right to deliver free of charge neither solid nor liquid waste.
Trieste		1. All ships pay a indirect fee/tariff based on their size and type. 2. Direct charge is paid to private operators with a price system controlled by the Port Authority. The fee system is based on two tariffs one indirect and one direct charge a) All ships pay a tariff based on their size and type.

Ports	Waste Types Included	Description
		However this fixed indirect fee/tariff does not give any right to deliver free of charge neither solid nor liquid waste.

As evident from Table 6 above there are many variations of the waste fee system applied in European ports.

Some ports have implemented a 100% indirect fee to cover the cost of ship waste handling. This means that the Port Authority (or similar institution responsible for ship waste handling) will collect the fee regardless of delivery. Such fee is normally calculated based on ship size (GT) and for some ports also based on ship type.

Variations of the 100% indirect fee are seen in some ports, where both the 100% indirect fee and direct cost are paid, but where part of the indirect fee can be reclaimed.

A few ports still work with a 100% direct charge system where only services provided by the waste operators are invoiced to the ships. Invoicing and payment always take place directly between agents and waste operators without any involvement from Port Authorities.

Some ports have decided to collect the indirect fee as part of the cost for garbage collection. In the U.K. for example the indirect fee is collected as a fixed indirect fee for garbage collection only, whereas the cost for collection of other wastes (garbage beyond a reasonable amount, sewage and waste oil) is paid directly to the operator, based on volume collected.

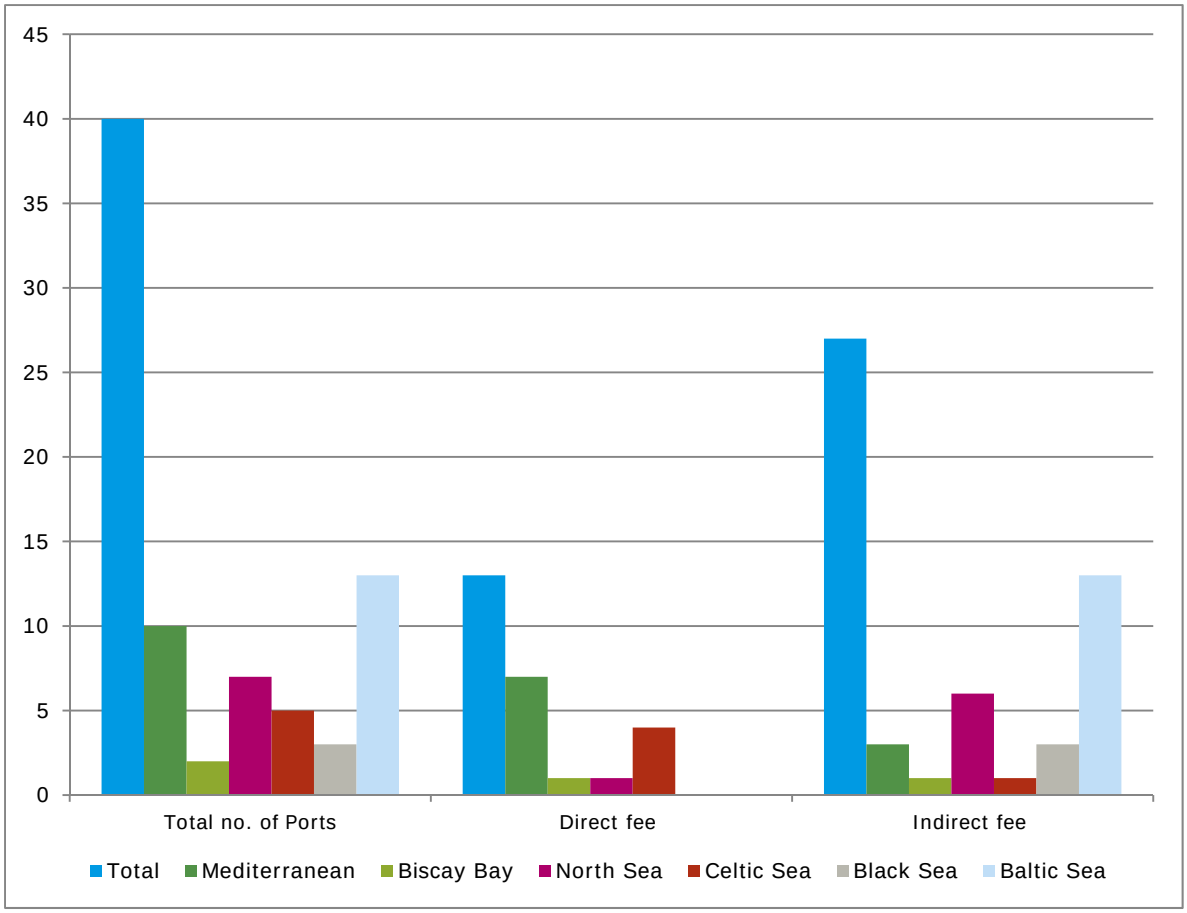
Some ports are operating with a system where the indirect fee is collected as a deposit which can then be reclaimed by the ships, when waste delivery in the port or next port(s) within EU has been documented with a receipt. This deposit should then serve as an incentive for delivery. Unfortunately many other ports do not issue receipts e.g. U.K. for garbage delivery, since it is done in stationary skips to be emptied on a routine basis and not per call. Whether such a deposit actually serves as an indirect fee according to the Directive can of course be questioned, since the ships do not contribute to the reception facilities if they do not deliver and claim their deposit back.

In general many variations have been identified among ports with no clear trend. This has created a very confusing situation in most ports, due to the insufficient guidelines from the Directive. Each port then seems to have adopted a system that least affects its existing system before the Directive came into force, rather than developing a new and more appropriate system.

In the graphs below, the different approaches to cost recovery are presented. Due to the variety of models, each waste type is dealt with separately.

As evident from Figure 21 below a majority of the ports, 27 of the 40 ports analysed, have included collection of oily waste from machinery space into the indirect fee. By grouping the ports according to the geographical areas/regions listed above, Figure 21 shows that all Baltic Sea ports, all Black Sea ports and almost all North Sea ports (6 out of 7) have included oily waste from machinery space into the indirect fee. For the other regions analysed the picture is a bit more uneven and mixed.

Figure 21: Type of Waste Fee for Oily Waste from Machinery Space, All 40 Ports



Explanation:

Ports with direct fee for oily waste from machinery space: 14, 15, 16, 22, 25, 26, 27, 31, 38, 41, 42, 48, 50

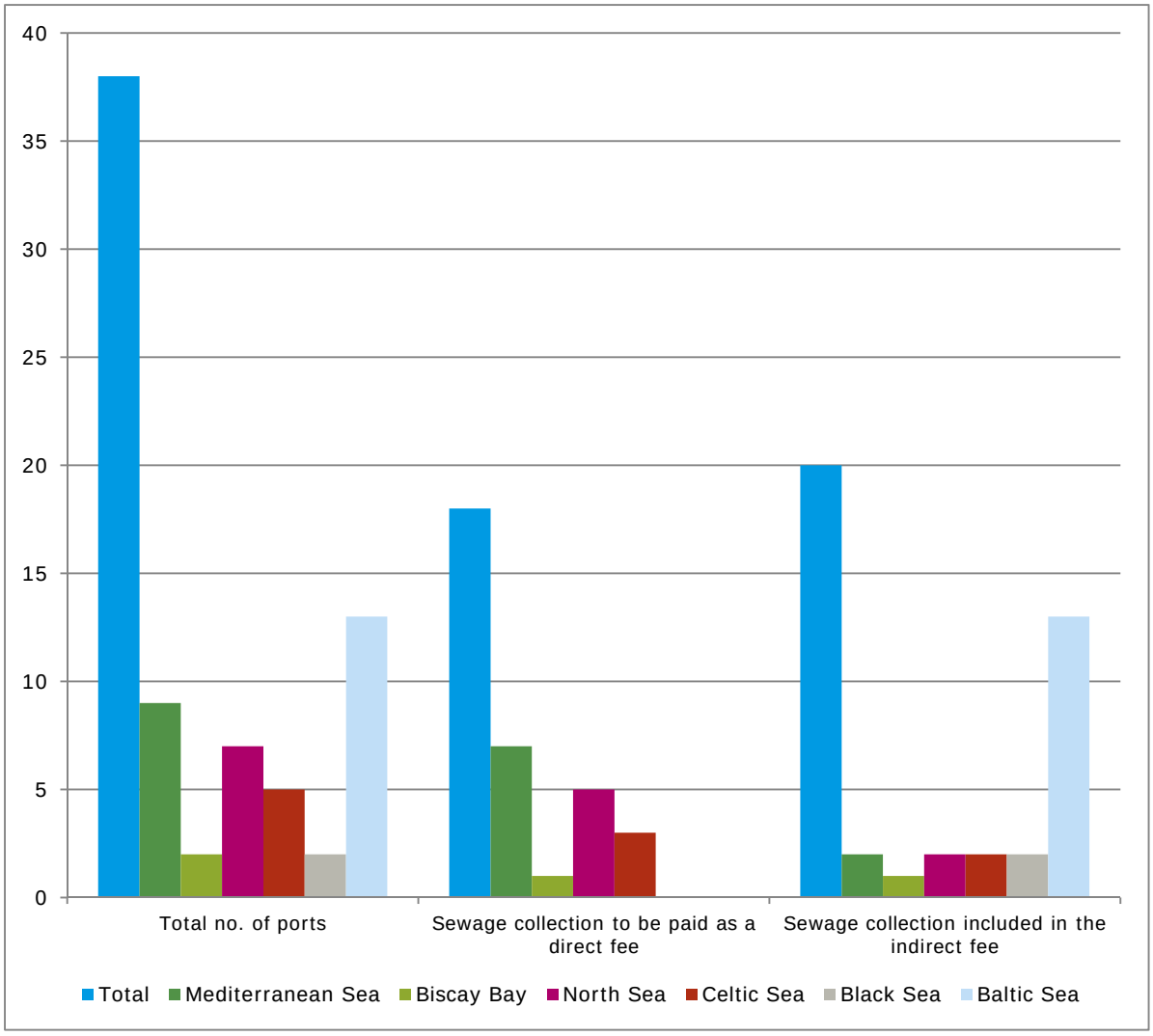
Ports with indirect fee (variations in systems): 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 20, 21, 24, 29, 30, 32, 33, 34, 35, 36, 37, 39, 46, 47

Ports with direct fee for sewage: 1, 3, 14, 15, 16, 17, 20, 22, 25, 26, 27, 31, 33, 38, 41, 48

Ports with indirect fee for sewage: 4, 6, 7, 8, 9, 10, 11, 12, 13, 21, 24, 29, 30, 32, 34, 35, 36, 37, 39, 46, 47, 50

As evident from Figure 22 below a little more than 50% of the ports have included this sewage service into the indirect fee, whereas the remaining ports still consider this as an extra service to be paid for separately. There is no logical explanation for this and it most likely reflects a traditional way of dealing with sewage. However, for the Baltic Sea area (Special Areas status regarding Annex IV, yet to come into force), all ports include sewage collection into the indirect fee. A majority of the North Sea ports and Mediterranean ports still charge a direct fee for the collection of sewage.

Figure 22: Type of Waste Fee in Ports Accepting Sewage



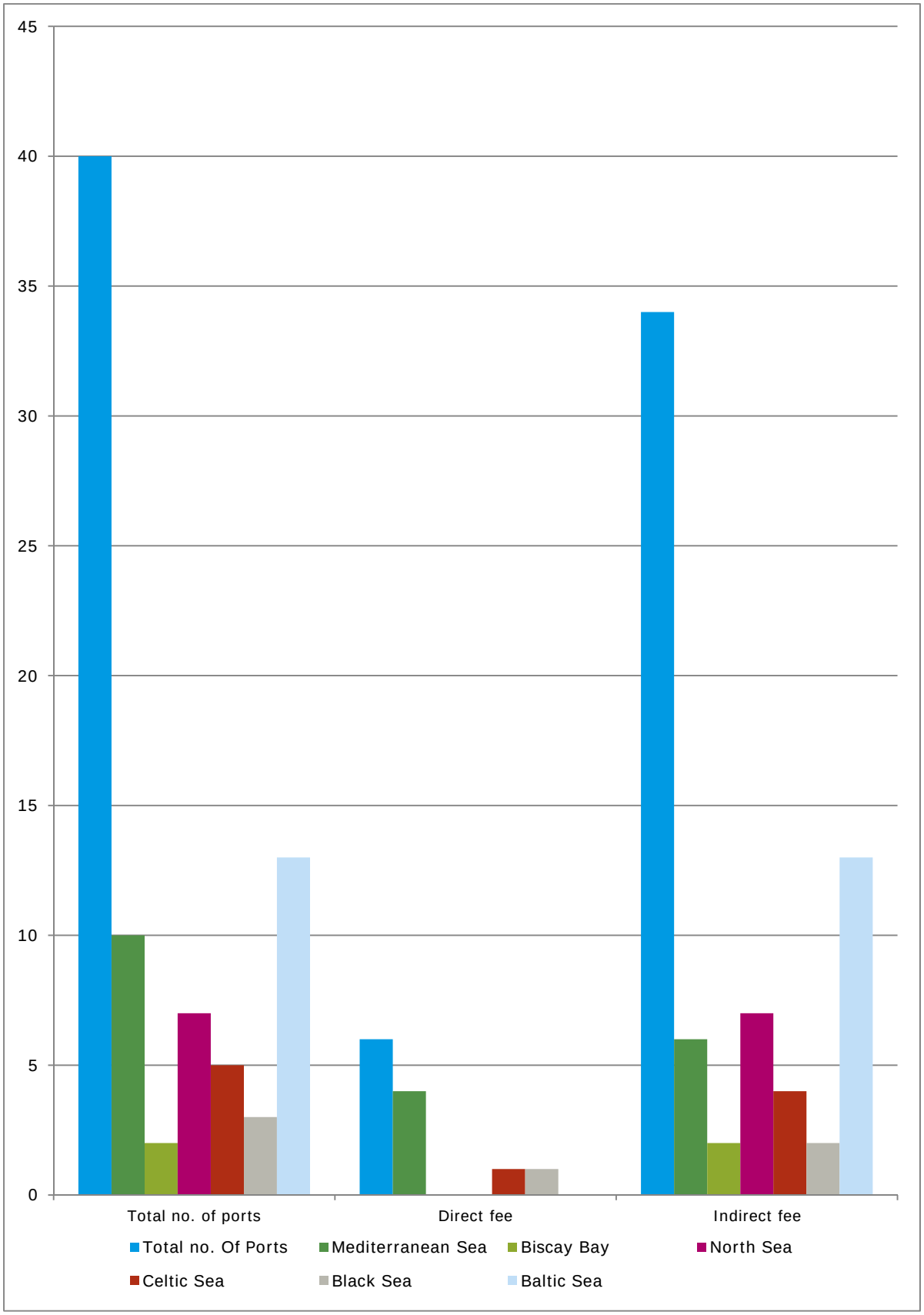
Explanation:

Ports with direct fee for sewage: 1, 3, 14, 15, 16, 17, 20, 22, 25, 26, 27, 31, 33, 38, 41, 48

Ports with indirect fee for sewage: 4, 6, 7, 8, 9, 10, 11, 12, 13, 21, 24, 29, 30, 32, 34, 35, 36, 37, 39, 46, 47, 50

As evident from Figure 23 below, most ports have included garbage collection into their indirect fee. For the ports that still apply a direct fee for garbage collection it is noted that some ports, i.e. Marseille, Le Havre, and Malta, apply a system, which includes an ex-post payment. This can be perceived as a "sanction (penalty fee)" for not delivering waste, i.e. if a ship does not deliver waste it has to pay a penalty. This is not to be considered as an indirect fee as it does not cover any waste collection. In other ports, such as Venice and Trieste, the fee applied significantly contributes to covering the general costs of the PRF, but it does not include any delivery of waste "free of additional charges"; hence, the waste operators may charge the ships for their waste services according to a fixed price list as agreed with the Port Authorities. The Constanta Port is a special case, since it includes the services for delivering, free of charge, oily waste from machinery space and sewage but not the garbage, which is handled directly by a private operator through a direct fee.

Figure 23: Type of Waste Fee for Garbage



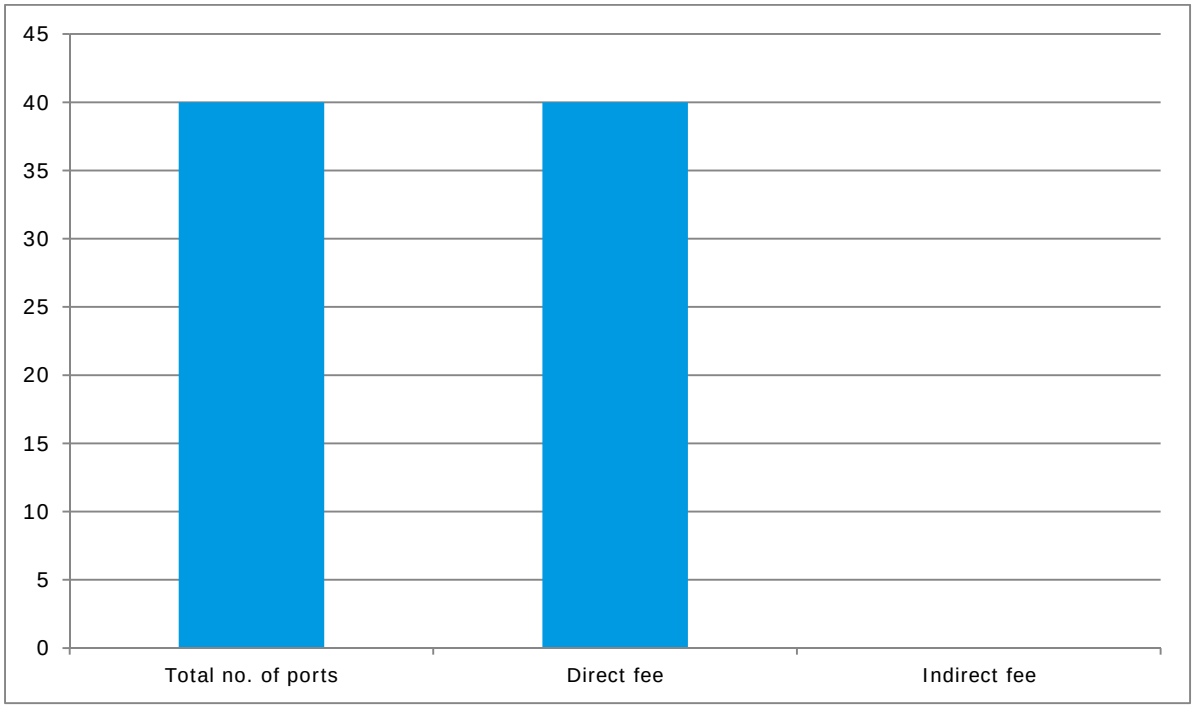
Explanation:

Ports with direct fee for garbage: 15, 16, 26, 27, 31, 39

Ports with indirect fee (variations in systems): 1, 3, 4 , 5, 6, 7, 8, 9, 10, 11. 12, 13, 14, 17, 20, 21, 22, 24, 25, 29, 30, 32, 33, 34, 35, 36, 37, 38, 41, 42, 46, 47, 48, 50

As evident from Figure 24 below all CR (Annex I and V – oily and liquid CR) and nox. liquid substances are for all ports regarded as a waste type that is to be handled by the terminal operator. In practice, this means that all ports leave this waste type as a matter to be dealt with directly between the agents and waste operator, which in most cases is the terminal operator. All invoicing and payment is therefore also done directly between the agent and operator and not included in any indirect fee.

Figure 24: Type of Waste Fee for Cargo Residues and Nox. Liquid Substances



Explanation:

Ports with a direct fee for CR and nox. liquid substances: All ports

Ports with an indirect fee (variations in systems): None

It is not possible to make any concrete and accurate conclusion on the waste delivery behaviour on the basis of the applied waste fee system in the ports and the waste figures provided. However, it should be mentioned that the reported number of illegal discharges (oily waste) into the Baltic Sea according to the Danish Environmental Protection Agency decreased significantly after the implementation of the HELCOM recommendation of a 100% indirect fee for Baltic Sea ports.

3.6 Section 6: Waste Reception Facilities Available in the Port

There are different ways to organise reception facilities in ports, e.g.:

- Port owned and operated - the port invests and operates the facilities itself and collects the waste fees to cover the costs;
- Port owned but privately operated - the port owns all or part of the reception facilities, but a private operator takes care of all operations;
- Port operated but privately owned – the port operates the facilities, but they are privately owned. This model is seldom seen and it is not applicable to any of the ports analysed; and
- Privately owned and operated - the port contracts out all operations to private operators and let them use their own facilities.

The majority of ports analysed have outsourced part or all of their ship-waste handling operations to private external waste operators. Some ports have chosen one operator, selected through public tendering; others have opted for framework-contracts with various operators, who then provide the waste handling services according to market prices. In the latter case, ports

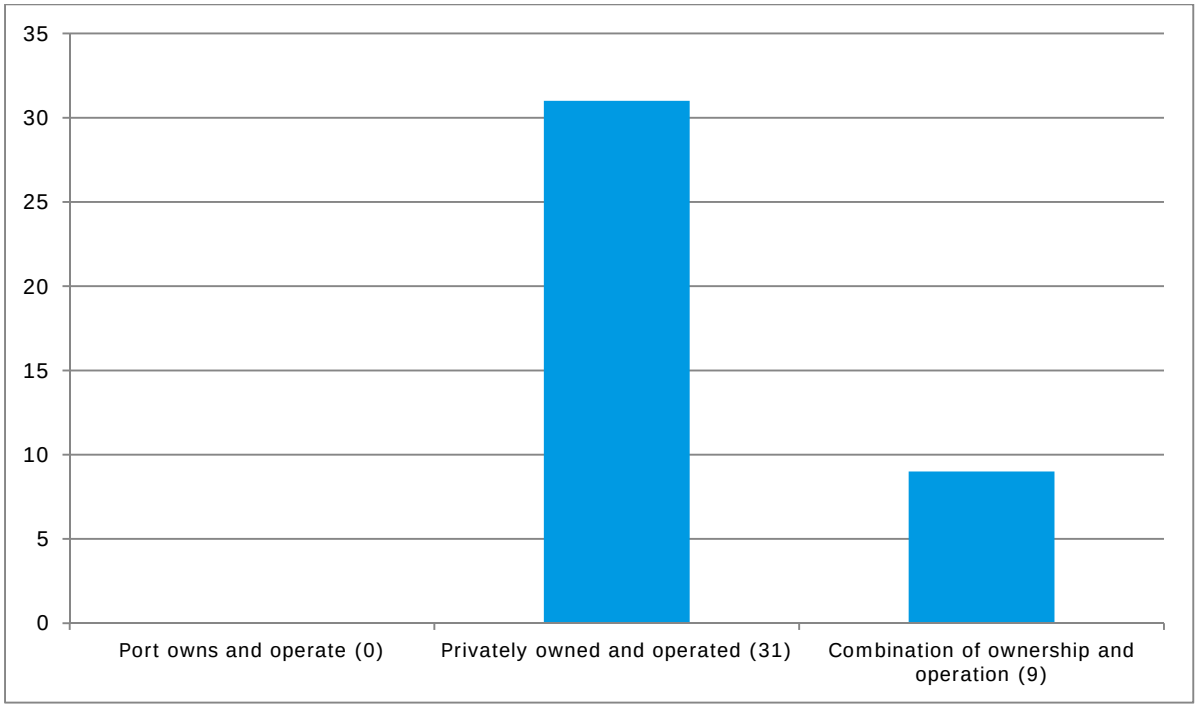
may regulate the maximum level for tariffs (prices). Nonetheless, some ports still just leave it to the ship agents to identify waste operators in the "free market".

Some ports have approved waste operators in advance or they are approved by other authorities (environmental agencies etc.). These ports also leave it to the ship agents to decide which operators shall be contracted for a given waste handling service. In theory and from a competitive point of view, this is a good system, but in reality most agents prefer to employ the operator they normally use and do not collect alternative bids.

Waste reception facilities in ports can be located either inside or outside the port area. They can be owned and operated by the port, by external private operators or by a combination of the two. The decision on who is to own and who is to operate the waste reception facilities is normally taken by the port management as part of the port's policy on waste handling.

As evident from Figure 25 below all ports have involved private waste operators in their ship-waste handling. A majority of ports (31 out of 40) have left all ship-waste handling activities to private operators, but 9 ports employ a combination of the two, i.e. either own or operate facilities. The latter primarily applies to sewage collection, since the infrastructure and facilities for handling sewage already exist in the ports.

Figure 25: Ownership and Operation of Waste Reception Facilities (Collection, Treatment and Final Disposal)



Explanation:

A port owned and operated system: None

A private owned and operated system: 1, 3, 4, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17,20, 21, 22, 25, 26, 27, 29, 30, 32, 33, 34, 35, 36, 37, 38, 41, 42, 50

A combination: 5, 6, 11, 24, 31, 39, 46, 47, 48

When the port decides to contract out all ship-waste handling activities to external waste operator the waste notification system seems to become a bit redundant, since the port does not take active part in it but leaves it solely to the waste operator. Irrespectively, the majority of ports analysed have provided waste volume figures for what has actually been delivered to the PRFs; thus this information must have been provided by the waste operator to the Port Authority in connection with the preparation of the invoice for the indirect fee.

In terms of the system chosen for ship-waste handling, the ports can roughly be grouped and distinguished according to the following levels of involvement:

A system, where the ports, i.e. the Port Authorities, have decided to play a central role in ship-waste handling and therefore want to deal with both ships/agents regarding notification and invoicing and with PRF operators regarding organisation of and payment for waste delivery services. Under this system there is no direct contact between agents/ships and waste operators, unless additional/special services are required/requested. Such a system seems to be the most transparent system, since every party/stakeholder is aware of and accepts the procedures applied.

A system, where the ports, for various reasons, do not take full responsibility for ship-waste handling. Under this system, the ports have separated the collection and payment of waste between themselves and external operators based on waste types. Fee collection and often also garbage handling is taken care of by the ports, but waste oil is left as a matter for ship agents and waste operators to solve directly between themselves. This system is semi-transparent and often leads to confusion, since the ships and their agents have to deal with several contact points in the ports.

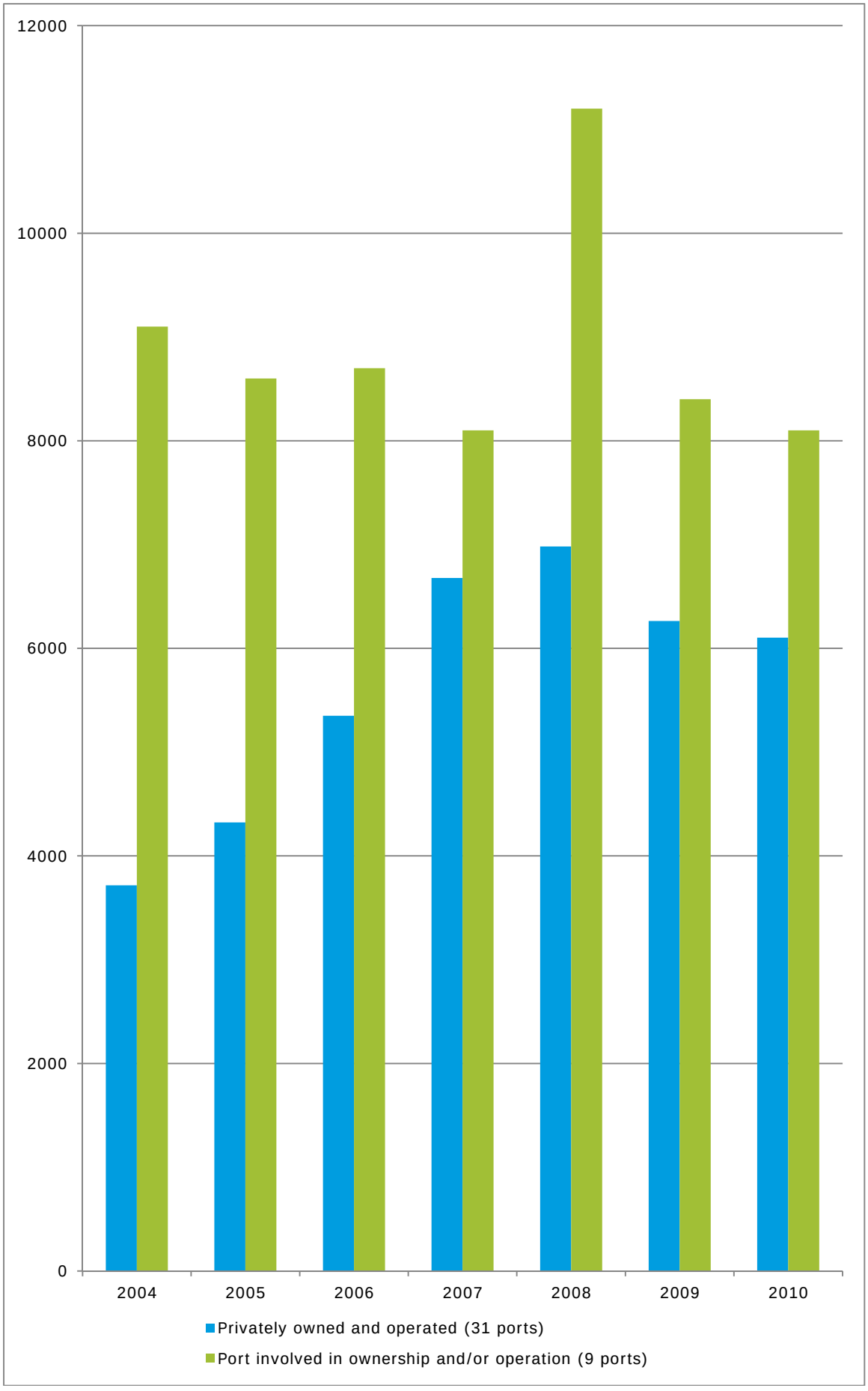
A system with little or no involvement from the ports in ship-waste handling. Under this system the ports leave the collection, processing of all waste and all invoicing (except the indirect fee) as a matter to be dealt with by agents/ships and external operators. Even though the waste notification goes to the Port Authorities it is often not used.

The above grouping is an attempt to prepare a general categorisation of ports regarding their approach to ship waste handling. Unfortunately it is not possible to group the 40 ports analysed into the three stated categories, since this requires a much more comprehensive and personal analysis of the ports than that of this study.

As evident from Figure 26 and Figure 27, there seems to be no apparent relation between delivery behaviour and ownership/operation of the PRF. Only figures for oily waste from machinery space and garbage are shown due to insufficient waste figures for the other waste types.

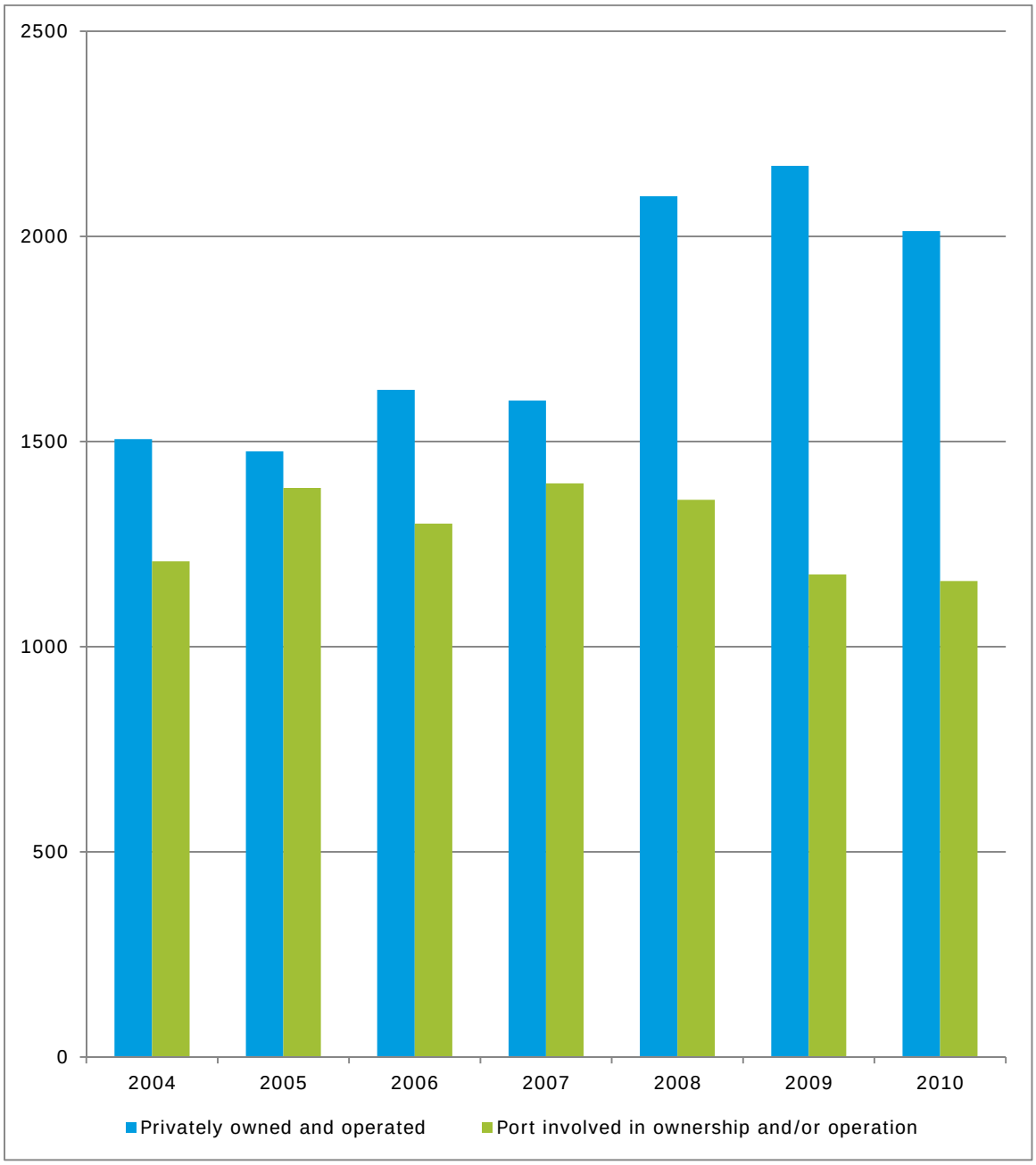
As evident from Figure 26, no clear conclusion on delivery behaviour can be made for oily waste from machinery space, primarily due to the fact that only one port, Constantza, is involved in oily waste collection/treatment and therefore no statistical significance can be obtained (the accumulated waste figures for ports with only private involvement have been divided by 100 to be able to compare with the Constantza port). The fact that a majority of ports prefer to leave collection and treatment of oily waste from machinery space to private operators indicates that ports value the expertise of private operators in handling such waste.

Figure 26: Delivery of Oily Waste from machinery space (ownership and operation), m^3



As evident from Figure 27, no clear conclusion on delivery behaviour can be made for garbage, primarily due to the fact that only 4 ports (Burgas, Shannon Foynes, Karlshamn and Immingham), with limited garbage collection (in terms of volume), are involved in garbage collection/treatment and therefore no statistical significance can be obtained (the accumulated waste figures for ports with only private involvement have been divided by 100 to be able to compare with these 4 ports). The fact that a majority of ports prefer to leave collection and treatment of garbage to private operators indicates that ports value the expertise of private operators in handling such waste.

Figure 27: Delivery of Garbage Depending on Type of Ownership and Operation, ton



3.7 Section 7: Enforcement, Control and Monitoring

Ports are often not directly involved in the inspection of ships regarding waste delivery. This means that a majority of ports, as mentioned earlier, do not react, even if ships provide insufficient waste notification. According to the ports themselves, then they provide services to the ships and they do not regard inspection/control as their responsibility. It has, however, not

been possible to get a clear statement from ports regarding this issue, but in general ports regard inspection/control as the responsibility of other authorities.

Off the record many ports indicate that they regard calling ships “as clients” and therefore are not interested in creating any trouble for them regarding their ship-waste delivery. However, they declare that control is needed to influence the ship-waste delivery behaviour, but prefer to leave this to other authorities with a less prominent client relationship. Unfortunately the information received from ports on this issue is insufficient to prepare any graphs showing the actual involvement in enforcement. Very often the authority interviewed has been the Port Authority or the Port Management Company (in case of privately operated ports), which are not systematically communicating with the PSC.

All ports receive information on the waste volume to be delivered through the waste notification form, which is used for various purposes (37 out of 40 ports have a mandatory waste notification system, see Figure 19 above).Whenever waste receipt data is available, this is used for general statistics, as” actual delivered”. This is also why the statistics for this study, from the outset, were primarily to be based on "actual delivery" data.

Often the waste notification is also received by the PSC (or other inspection authorities), who uses it for control and enforcement purposes only.

By asking the ports regarding the fluctuations in waste delivery from year to year it became clear that ports do not pay much attention to the actual figures for waste collected as long as satisfactory services are provided by the waste operators. The fact that the ports receive information after the waste handling has taken place (often through monthly reports/statistics) also indicates that their interest in the actual figures is limited. Although the flow of information and statistics between the Port Authorities and the PSC is not systematic, most ports confirm that when the monitoring and control by the PSC is reinforced the waste delivery behaviour of the ships changes towards a more environmentally friendly and sound behaviour.

ACTUAL WASTE DELIVERY FIGURES

Ports are generally not interested in the actual figures regarding waste notification and the fluctuations from year to year. There might be several reasons for this e.g. the fact that figures from previous years are not easily available and have to be pulled out from statistics from various waste operators in order to compare, and the fact that ports do not have any enforcement power and therefore do not see themselves in any controlling role. “Ships are clients”!

4. GENERAL CONCLUSION

The following key conclusions on delivery behaviour can be made:

As mentioned in the discussions above, ship-waste delivery depends on a number of factors and it is therefore not possible to make statistical significant conclusions for the individual ports regarding their calling ships' delivery behaviour. However, there seems to be certain trends in delivery over the years when accumulating the figures for the 40 ports analysed. This is confirmed by actual figures, but also by figures correlated for the total number of port calls and the total number of GT calling the port.

For Annex I (oily waste from machinery space) and Annex V (garbage) these trends show an increase up to 2008/2009 and then a decrease and stabilisation in 2010. The increase from 2004/5 to 2008/9 was, by a majority of ports, explained by the implementation of EU Directive 2000/59/EC. The decrease in volume after 2008/9 was, by many ports, explained by a reduced number of port calls following the economic crisis.

For Annex IV (sewage), Annex I (oily CR) and Annex V (liquid CR from dry cargoes) the pattern shows many fluctuations. These are probably due to the limited feedback from ports regarding these three waste types; hence no clear trend can be identified.

Analysing the data by region only supported the above mentioned trends for oily waste from machinery space for the North Sea ports and to some extent the Baltic Sea and Mediterranean Sea ports. For the other waste types no clear trends were observed.

Generally there seems to be an increase in ship-waste delivery from 2004 to 2008 for European ports. The decrease in 2009 was most likely due to less traffic. It is not possible, due to the reasons discussed above regarding delivery behaviour, to confirm this pattern at the individual port level.

According to EU Directive 2000/59/EC all EU Member States shall implement a waste notification system in their respective ports in order to ease waste delivery and, among others, avoid undue delay of the ships. 42% of the ports analysed receive the waste notification form by fax or e-mail whereas 57% have implemented an electronic waste notification system.

All ports have implemented a waste notification system, which serves various purposes, e.g.:

- Planning of waste collection (75%);
- Monitoring (72%);
- Invoicing (45%); and
- Statistics (62%).

There seems to be no clear relation between waste delivery and the applied waste notification system. This observation is mostly due to the fact that in many ports direct contacts are made between shipping agents and external waste operators often bypassing the official notification system and it is therefore difficult to identify any relation to the delivery behaviour. It should however be noted, as mentioned earlier, that a proper communication flow and management of waste collection through Port Authorities seem to provide a much better understanding of the actual waste collection operations.

Regarding acceptance of the different waste types the study shows that:

- All ports accept oily waste from machinery space and garbage;
- 92% accept sewage;
- 70% accept nox. liquid substances;
- 47% accept oily CR; and
- 80% accept Annex V liquid CR.

Since all ports accept oily waste from machinery space and garbage and most ports accept sewage there seems to be no reason for not delivering SGW to the PRF. There might however be preferences for the ships' choice in reception facility unless the indirect fee includes these waste categories.

According to EU Directive 2000/59/EC all EU Member States' ports shall implement an indirect fee into the port waste fee system. All ports have introduced such an indirect fee, but in many different models, e.g.:

- Indirect fee per GT – all SGW accepted;
- Indirect fee per GT – all SGW accepted but limitations on volume;
- Indirect fee per GT, NT or main engine power – discharge right granted;
- Indirect fee per GT as deposit but possibility to reclaim part of it; and
- Indirect fee just as contribution to operating the reception facilities – direct fee payment for all waste delivery.

It is difficult to say whether one system is better than the other and the waste figures cannot document that one system should be more effective than another. The ports' choice of waste fee model seems for some ports to rely on historical reasons and the fact that the waste fee system was in place before the EU Directive was enforced. It seems that:

- Some models are administratively more complicated than others e.g. (Ports 1, 3, 32, 33, 34);
- Some models do not really provide economic incentives for SGW waste delivery e.g.(Ports 25, 26, 27, 41);
- Some models do only provide economic incentives for garbage delivery e.g. (Ports 22, 38, 48, 50);
- Some ports provide economic incentives in various form for oily waste from machinery space delivery (Ports 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 20, 21, 24, 29, 30, 32, 33, 34, 35, 36, 37, 39, 46, 47); and
- Some ports provide economic incentives for sewage delivery (included into the indirect fee) (Ports 6, 7, 8, 9, 10, 11, 12, 13, 21, 24, 28, 29, 30, 35, 36, 37, 39, 45, 46, 47).

The waste volume figures provided by the ports analysed do not document that one waste fee system is more efficient than the other. Although the provisions of Article 8 of EU Directive 2000/59/EC on cost recovery systems clearly states that ports and PRF shall provide no incentive for ships to discharge their waste into the sea, it leaves room for interpretation to the Member States and the ports in its requirements to design the indirect fee to contribute significantly to the costs of PRF, irrespective of the actual use of the facilities. Therefore a number of individual models have been implemented in Member State's ports, which is unfortunate since the incentive of waste delivery in ports may differ from port to port and in different regions.

Most ports prefer to contract out both the collection and treatment of SGW and CR. This indicates that a majority of ports value the experience from private operators regarding collection and treatment. It has not been possible to identify any significant differences in delivery behaviour for ports, which have contracted out these activities to private operators or prefer to carry out themselves.