



Port de Barcelona

Instrumentation & Service Control of MARPOL I / MARPOL V

Sergi Ros

October 14th 2014



Port de Barcelona



INTRODUCTION

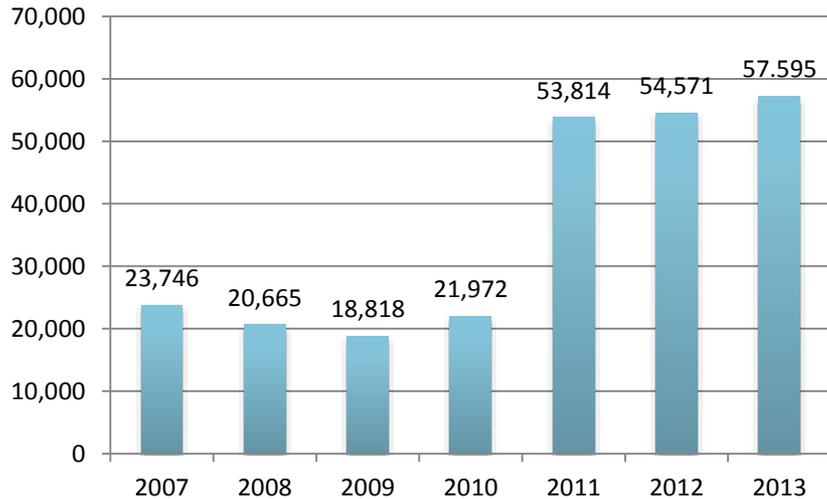
- Port Authorities - provide collection and treatment services of waste (Art. 63.3).
- Port of Barcelona - Annex I and V of the Marpol convention 73/78.
- Concessions to offer these services.
- Services billed by the operators measuring the volume of waste.
- Verify volumes given by the operator.
- Main goal: Analysis of possible alternatives to measure waste volumes.



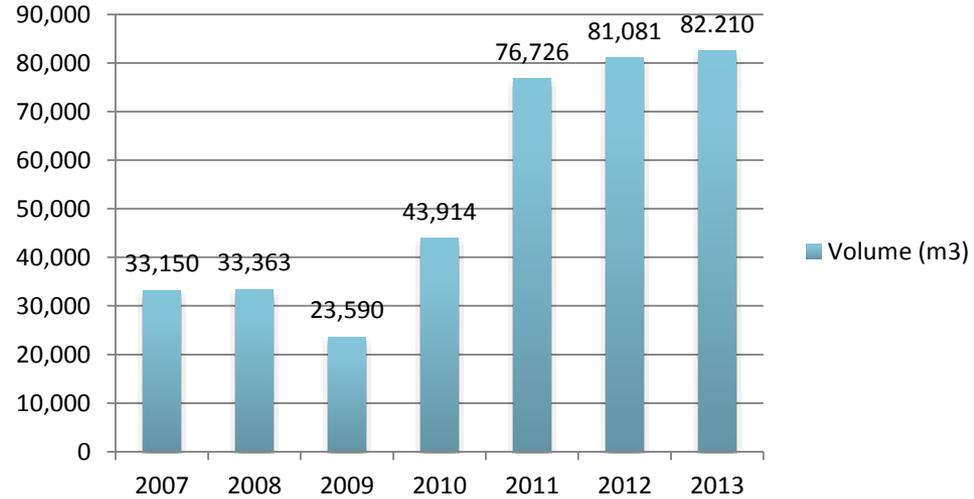
INTRODUCTION

➤ According to the available data:

MARPOL I (2007-2013)



MARPOL V (2007-2013)





WASTE COLLECTION

MARPOL I

Collection with barge:

The waste collected is mixed inside the barge tank and delivered jointly to the homogenization tank at the treatment plant.



31%

Collection with truck:

12 trucks of 14 m³ of capacity and 4 tankers of 29.100 L. Mostly individual operations, but also some joint.



69%

MARPOL V

Collection with barge:

A very simple operation: crew members throw waste bags directly into the barge.



1%

Collection with open-box truck:

Container trucks of several volumes: 5, 8, 16 and 20 m³.



99%



MEASUREMENT OF MARPOL I

Marpol I with barge:



Mass flowmeter

Based on the controlled generation of Coriolis forces, capable of measuring fluid mixtures containing oils, lubricants, fuels, liquefied gases and solvents with a **accurate measurement**. It allows to **measure flow and density** at the same time.

Marpol I with tank truck:

Weighing cell:

Reliable measure.

Must be completed with a **study of densities** depending on the type of vessel that allows developing a translation table of weights to volumes.



Radar probe:

- Measuring range up to 12 m
- Temperature range : -20 to + 80 ° C
- Pressure range: -1 to 6 bars
- Memory storage integrated
- Approved ATEX, IEC Ex, CSA, FM , NEPSI



MEASUREMENT OF MARPOL V

- Most of the solid wastes (MARPOL V) are collected by container trucks.

- 3 different possibilities of measurement:
 - Semi-direct system for measuring volume of waste that allows an estimation of the filling ratio of the waste container: **radar sensors**.

 - Indirect system to measure that allows a later translation to volumes of waste: **scales**.

 - A direct system that measures the volume of waste present on the box of the truck: **radiation**.



MEASUREMENT OF MARPOL V

Marpol V with container trucks:

Radar sensors:



STRENGTHS:

- The **difficulty** of operation and the maintenance costs are **reduced**, since the measurement is performed without contact.
- It is a very **reliable system**, due to there are no wear elements.
- The **accuracy** of the measurements is **high** and not dependent of external factors.
- Acquisition, installation and operational **costs** are relatively **low** compared to other options.

WEAKNESSES

- Equipment's reading indicates the maximum area occupied by the waste in the container. This implies that **the interstices of the container are not considered**.
- Any **superficial element** that stands **between the sensor surface and the container** can lead to **erroneous results**.



MEASUREMENT OF MARPOL V

Marpol V with container trucks:

Scale:



STRENGTHS:

- It is a type of measurement very **quick and effective** with immediate response.
- It is a very **reliable** system due to there are no wear elements.
- The **accuracy** of the measurement is **high** and not dependent on external factors.

WEAKNESSES:

- As a lecture of volume is **indirect** and introduces an **uncertainty** in the final result.
- Acquisition, installation and operational **costs are moderate** compared with the other options.



MEASUREMENT OF MARPOL V

Marpol V with container trucks:

Radiation:

STRENGTHS:	WEAKNESSES:
<ul style="list-style-type: none">- It is a type of measurement very quick and effective.- The accuracy of the measurement is high if it is determined that the system is suitable given the variability of the materials to be measured.	<ul style="list-style-type: none">- There is no guarantee of proper functioning.- Acquisition, installation and operational costs are high compared to other options.



Port de Barcelona



www.portdebarcelona.es

Thank you



Port de Barcelona