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PART 1/2

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

Proposal for a Directive of the European Parliament and of the Council on port reception facilities for the delivery of waste from ships, repealing Directive 2000/59/EC and amending Directive 2009/16/EC and Directive 2010/65/EU

{COM(2018) 33 final} - {SWD(2018) 22 final}

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1. INTRODUCTION

Operational discharges of waste from ships pose a significant threat to the marine environment. The provision of adequate facilities in ports for the reception of waste from ships is an essential precondition for any meaningful control of discharges at sea. Keeping waste on board ships is only feasible and meaningful when there are shore-based facilities to receive this waste.

For these reasons, the European Union introduced Directive 2000/59/EC, which requires the provision of Port Reception Facilities in EU ports, in line with international requirements. More than fifteen years after its entry into force, the Directive is in need of a legislative update and revision to make sure that it can still deliver on its original objectives of reducing waste discharges at sea.

This report builds on the outcome of the REFIT evaluation of this Directive, conducted in 2015, and assesses the options for its revision.

1.1. Policy and legal context

1.1.1. International context

The MARPOL Convention (hereinafter: "MARPOL")[1] is the main international convention for protecting the marine environment against vessel-source pollution. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years[2]. 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, providing regulations for the prevention of pollution by **oil** (Annex I), by **noxious liquid substances** in bulk (Annex II), by **packaged harmful substances** (Annex III), by **sewage** from ships (Annex IV), by **garbage** from ships (Annex V) and the prevention of **air pollution** from ships (Annex VI).

The MARPOL Annexes contain general discharge prohibitions for these different waste streams, but also set out the norms and conditions under which certain types of waste can be legally discharged into the marine environment[3]. At the same time, MARPOL requires its contracting parties to provide for facilities in ports and terminals for the reception of the waste and residues from ships. These port reception facilities must be adequate, i.e. capable of receiving the types and quantities of waste from ships normally visiting the port where those facilities are located, without causing undue delay.

MARPOL has also recognised that some areas of the sea, especially enclosed or semi-enclosed seas (due to their oceanographic and ecological conditions and vessel traffic characteristics) are particularly vulnerable to vessel-source pollution and need a higher level of protection. The Convention therefore provides for the establishment of special areas where more stringent discharge standards apply[4].

[1] International Convention for the Prevention of Pollution from Ships developed by the International Maritime Organisation (IMO); IMO Contracting Parties to the MARPOL Convention: 152 states, representing 99.2% of the world's tonnage. MARPOL has been ratified by all EU Member States.

[2] The amendments to MARPOL Annex IV (Resolution MEPC.200 (62), 2011) and Annex V (Resolution MEPC.201 (62), 2013), are the most relevant in the context of this Impact Assessment, as the introduced more stringent norms for the discharge of sewage and garbage.

[3] See Annex 6 for an overview of discharge norms for Annexes I, II, IV and V

[4] Special areas under MARPOL: Annex I (Mediterranean, Baltic sea, Black sea, Red Sea, Gulfs area, Gulf of Aden, Antarctic, N-W European waters, Oman area, South African waters); Annex II (Antarctic); Annex IV (Baltic sea); Annex V (Mediterranean, Baltic sea, Black sea, Red Sea, Gulfs area, North Sea, Antarctic, Wider Caribbean); Annex VI (Baltic sea, North Sea, North American ECA; US Caribbean sea); see: http://www.imo.org/en/OurWork/Environment/SpecialAreasUnderMARPOL/Pages/Default.aspx

To enhance the smooth implementation and uniform application of the discharge prohibitions and related waste delivery process, a standard Advance Notification Form was developed by the International Maritime Organisation ("IMO"), as well as a standard Waste Delivery Notification Form to provide for uniform records throughout the world. However, both forms are not mandatory and contracting parties remain free not to require any reporting or to use a different form. In addition, the IMO has developed the "guide of good practice on port reception facility providers and users", which provides guidance and easy reference to good practices related to the use and provision of port reception facilities as well as a list of applicable regulations and guidelines[5]. In April 2014, the Consolidated guidance for port reception facility providers and users was adopted, which integrates in a single document the Guide to good practice for port reception facility providers and users, as well as four other circulars related to port reception facilities, including the standard reporting forms[6].

As mentioned above, the Convention has undergone a series of amendments over the years, which have made the framework more comprehensive, in terms of its coverage, as well the discharge norms which have become more stringent. The most relevant amendments in relation to the PRF Directive have been included in the table below, with a more extensive overview included in Annex 6 to this Report of the amendments to the Convention and its Annexes since the year 2000.

Table 1: Amendments to MARPOL

	Adopted		Effective	Amendments
2004	Res.MEPC .115(51)	01.Apr. 2004	01.Aug.2005	Revision of Annex IV: More stringent discharge norms for sewage, and requirements for on board sewage treatment / sewage holding tank.
	Res.MEPC .117(52)	15.Oct. 2004	01.Jan.2007	Revision of Annex I: phasing out single-hull tankers, and tightening the construction, equipment & operational standards
	Res.MEPC .118(52)	15.Oct. 2004	01.Jan.2007	Revision of Annex II: new four-category categorization system for noxious and liquid substances
2006	Res.MEPC .141(54)	24.Mar .2006	01.Aug.2007	Revision Annex I: new regulation on oil fuel tank protection and a definition of "heavy grade oil".
2008	Res.MEPC .176(58)	10.Oct. 2008	01.Jul.2010	Revision of Annex VI: more stringent regulations on harmful emissions from ships
2009	Res.MEPC .187(59)	17.Jul. 2009	01.Jan.2011	Revision Annex I: requirements relating to the on board management of oil residue (sludge). New definitions for oil residue, oil residue tanks, oily bilge water and holding tanks.
2011	Res.MEPC .200(62)	15 July 2011	01.Jan.2013	Annex IV: designation of the Baltic Sea as Special Area under Annex IV; special area provisions
	Res.MEPC .201(62)	15.Jul. 2011	01.Jan.2013	Revision Annex V: updating of definitions; inclusion of a new general prohibition on the discharge of garbage.

[5] MEPC.1/Circ.671/Rev.1
[6] Circular MEPC.1/Circ.834, adopted at the 66th meeting of the Marine Environment Protection Committee, April 2014

2016	Res.MEPC .270(69)	22.Apr. 2016	01.Sep.2017	Revision Annex II: revised GESAMP Hazard Evaluation Procedure. Guidelines for the categorization of noxious liquid substances.
	Res.MEPC .274(69)	22.Apr. 2016	01.Sep.2017	Revision Annex IV: Baltic Sea Special Area, discharge of sewage and form of ISPP Certificate.
	Res.MEPC .277(70)	28.Oct. 2016	01.Mar.2018	Revision Annex V: discharge of substances that are harmful to the marine environment (HME substances) and Form of Garbage Record Book.
	Res.MEPC .280(70)	28.Oct. 2016	01.01.2020	Annex VI: Implementation of the fuel oil standard in regulation 14.13 (sulphur content of fuel oil)

1.1.2. EU Context

Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues aims "to reduce the discharges of ship generated waste and cargo residues into the sea, especially illegal discharges from ships using ports in the EU, by improving the availability and use of port reception facilities" (Article 1). The Directive has a transport legal basis (article 100(2) TFEU) and is designed to harmonise conditions and rules in the maritime transport sector. At the same time, the Directive is instrumental in greening maritime traffic, as defined in the Commission Communication on the EU maritime transport policy until 2018[7], and in reducing marine litter from sea-based sources in line with the commitments made by the EU[8].

The Directive was adopted to implement and strengthen the implementation of the MARPOL Convention in the following ways:

(i) The Directive is based on the international norms provided by MARPOL and its Annexes. It seeks to implement the MARPOL obligations into EU law. Ship generated waste in the Directive has been defined in relation to waste falling under the scope of Annexes I, IV and V of MARPOL. Cargo residues have been defined as remnants of cargo material remaining after unloading and cleaning operations, which also include tank washings covered by MARPOL Annexes I and II.

(ii) The Directive strengthens the regime established under MARPOL through a **port-based approach**: while MARPOL focuses on operational discharges at sea, the Directive focuses on operations in port. The Directive also has a wider scope than MARPOL, as it applies to all ships, as well as all EU ports visited by these ships, from large commercial ports to small marinas. In this context, it is also worth noting that the provision of waste reception facilities in ports qualifies as a service that a port provides to its users, as defined in the new Ports Regulation[9], establishing a framework for the provision of port services and common rules on the financial transparency of ports.

The reasons for adopting this port approach in the Directive are pragmatic, policy-based and, importantly, legal. It is generally accepted that the main problems in international regime for operational ship-source pollution are not related to insufficient standards, but rather to the

[7] COM(2009)8 "Strategic goals and recommendations for the EU's maritime transport policy until 2018"
[8] Rio+20 conference and implementation of Sustainable Development Goals
[9] Regulation (EU) 2017/352 of the European Parliament and of the Council of 15 February 2017 establishing a framework for the provision of port services and common rules on the financial transparency of ports (OJ L57, 3.3.2017, p. 1)

inadequacy of their implementation and enforcement. Striving for a harmonised implementation of internationally agreed rules, where necessary complemented by specific EU requirements, is one of the fundamental pillars of EU maritime safety policy. The United Nations Convention for the Law of the Sea ("UNCLOS") provides wide jurisdiction for states to prescribe and enforce rules while ships are voluntarily present in their ports, while there are considerable constraints to do so in the coastal jurisdictional zones. UNCLOS also stipulates the fundamental principle of "avoiding undue delay to ships" which is incorporated both in the MARPOL Convention and the Directive. Hence, the Directive aims at administrative burden reduction to safeguard efficiency of maritime operations in ports. If coastal Member States were only to rely on MARPOL, they would be struggling with the implementation and enforcement of discharge rules for ships in their coastal waters. It would be even more difficult to implement those rules outside the jurisdiction of the Member States, at the high seas.

In order to achieve a proper implementation and enforcement of the general MARPOL provisions, the Directive provides a **number of additional instruments and requirements** for both ports and port users:

- Development of Waste Reception and Handling Plans in ports; these plans should provide a description of the waste reception facilities available in the port, as well as the port's waste management process.
- Advance Waste Notification by ships before their entry into port; ships are required to report on the waste they intend to deliver in the next port of call, the waste delivered in the previous port, as well as the remaining storage capacity until the next port of delivery. The reporting of information on (intended) waste delivery from the ship to the ports is a key element for effective planning of waste management and monitoring mandatory delivery. The notification also lies at the basis of the calculation of on board storage capacity, on the basis of which the ship may be allowed to depart from port without delivering the waste but keeping it on board until the next point of delivery.
- Payment of fees by ships for the reception of their ship-generated waste (based on the "polluter pays principle"); Member States are required to set up cost recovery systems in their ports to ensure that the costs of reception and treatment of ship-generated waste is covered through the collection of a fee from ships, and that part of that fee is charged irrespective of delivery ("indirect fee") so that no incentive is created for the ship to discharge its waste at sea.
- Exemptions for ships engaged in scheduled traffic with frequent and regular port calls; to safeguard the smooth operation of maritime transport and avoid undue burden, ships in scheduled and regular traffic may be exempted in a port from waste notification, delivery of waste, and payment of the fee, provided there is sufficient evidence of an arrangement in place for delivery and payment in a port along the ship's route.
- Inspections to verify that ships comply with the delivery requirements; based on the information reported through the advance waste notification, ships shall be selected for inspection. Irrespective of the inspection framework, a 25% annual inspection target shall be applied.
- Development of the common information and monitoring system in order to improve the identification of ships which have not delivered their waste in accordance with the Directive, and to ascertain whether the goals of the Directive have been met.

These key elements seek to ensure that EU ports provide for adequate port reception facilities, as established by the waste reception and handling plans, and to ensure that all ships deliver

their ship-generated waste and cargo residues to those facilities before departure. In conclusion, the Directive builds on the obligations which Member States have already accepted under MARPOL, but goes further by addressing in detail the legal, financial and practical responsibilities. The following table shows the main parallels between MARPOL and the PRF Directive, clearly indicating which elements are mandatory under both instruments and which are the additional requirements under the Directive, giving effect to the general international norms as well as the voluntary guidance and forms developed under MARPOL.

Table 2: Comparison MARPOL and the PRF Directive

	MARPOL[10]	**EU legislation (Directive 2000/59/EC)**
Scope	Ships entitled to fly the flag of a party to the Convention; the Convention does not apply to any warship, naval auxiliary, or other ship owned or operated by a state and used on a government non-commercial basis. "A ship means a vessel of any type operating in the marine environment…"	**Article 3**: "(a) All ships, including fishing vessels and recreational craft, irrespective of their flag, calling at, or operating within a port of a MS, with the exception of any warship, naval auxiliary or other ship owned or operated by a State, and ..used only on government non-commercial service; (b) All ports of the MS normally visited by ships falling under the scope of (a)." **Article 2(a):** "Ship shall mean a seagoing vessel of any type whatsoever operating in the marine environment…"; **Article 2(c):** Ship generated waste shall mean all waste including sewage and residues other than cargo residues which…fall under the scope of Annexes I, IV and V to MARPOL; **Article 2(d):** cargo residues shall mean the remnants of any cargo material on board which remain after unloading and cleaning operations".
Requirements for provision of adequate PRF	Annex I – Reg. 38 (oily waste) Annex II – Reg. 18 (Noxious Liquid Substances) Annex IV – Reg. 12 (sewage) Annex V – Reg. 8 (garbage, including fishing gear) Annex VI – Reg. 17 (waste from exhaust gas cleaning systems/ODS)	**Article 4**: "MS shall ensure the availability of PRF that are adequate to meet the needs of the ships normally using the port without causing undue delay to ships".
	IMO Consolidated Guidance for PRF providers and users: recommendation for the preparation of a Port Waste management Plan	**Article 5**: Waste Reception and Handling Plans (WRH Plans)
	IMO Consolidated Guidance, Appendix 4, MEPC.1/Circ.834: waste reception facility reporting requirements for flag states	**Annex I**: requirements for WRH Plans
	MO Consolidated Guidance, Appendix	**Article 4(3):** Complain procedure on alleged

[10] Parts in italics refer to non-mandatory elements

	1, MEPC.1/Circ.834:Format for reporting alleged inadequacies of PRF	inadequacies, in line with the procedures agreed by IMO.
Discharge prohibitions and norms / delivery obligation	General prohibition, but discharges allowed under certain conditions as specified in the Annexes: Annex I: oily bilge waster, oily residues, other Annex II: NLS Annex IV: sewage Annex V: garbage Annex VI: waste from EGCS / ODS	**Article 7 (1):** "The master of a ship calling at an EU port shall, before leaving the port, deliver all ship generated waste to a port reception facility."; **Article 7(2):** ..a ship may proceed without delivering its waste…if it follows from the information submitted.., that there is sufficient dedicated storage capacity on board.. ". **Article 10**: Cargo residues shall be delivered to PRF in accordance with the provisions of MARPOL.
Reporting of waste information	*IMO Consolidated Guidance for PRF providers and users, including IMO Circular 834: standard format for the waste notification and waste receipt*	**Article 6(1):** The master of a ship, other than a fishing vessels or recreational craft authorised to carry no more than 12 passengers, shall complete the form in Annex II and notify the information before calling in a port.
Cost Recovery Systems	*IMO Guidelines on adequacy of PRF (Resolution MEPC.83(44): "Fees should not be unreasonably high so as to deter the use of the facilities"*	**Article 8.1**: "MS shall ensure that the costs of PRF shall be covered through the collection of a fee from ships". **Article 8.2:** "the CRS shall provide no incentive to discharge waste at sea…" (a) all ships (apart from fishing vessels and recreational craft < 12 passengers) shall contribute significantly to the costs of the facilities, irrespective of actual use of the facilities (indirect fee)
Separate collection of waste from ships	*On Board: ISO 21070: Management and Handling of Shipboard Garbage 2012 Guidelines for the implementation of MARPOL Annex V, MEPC.219(63) as amended*	*In EU ports/municipalities: Articles 10 and 11 of the **Waste Framework Directive** ("…where this is technically, environmentally and economically practicable").*
Monitoring and Enforcement	*PMOU, Port State Control: control of MARPOL documentation and discharge norms* *Port Reception Facilities Database (GISIS)*	**Article 11(1):** MS shall ensure that any ship may be subject to an inspection in order to verify it complies with article 7 and 11 of the Directive; **Article 11(2b**): Inspections may be undertaken within the framework of the PSC Directive; whatever the framework.., 25% inspection requirement shall apply; **Article 11(3)**: MS shall establish control procedures to the extent required for fishing vessels and recreational craft < 12 passengers.., to ensure compliance with the requirements of the Directive; **Article 12(3**): establishment of EU information and monitoring system

The Directive also bears strong links to EU environmental legislation, especially in the area of waste management and protection of the marine environment:

- The Directive specifies in article 2 that ship-generated and cargo residues shall be considered to be waste within the meaning of the **Waste Framework Directive** (Directive 2008/98/EC). Furthermore, article 12(g) of the Directive requires MS to ensure that the treatment, recovery or disposal of ship generated waste and cargo residues is carried out in accordance with the relevant waste legislation, in particular the Waste Framework Directive[11]. One of the fundamental elements of this Directive is the introduction of the "**waste hierarchy**" (article 4), which provides the order of preference as regards waste management operations, with waste prevention given the highest priority, followed by preparation for re-use, recycling, other recovery (such as incineration), and disposal at the bottom of the hierarchy. In addition, the Waste Framework Directive imposes a general requirement for providing separate collection in Member States. Another key element is the "**polluter pays principle**", which has also been incorporated in the PRF Directive's provision on cost recovery systems for ship generated waste.

- The Directive also links closely to the **Marine Strategy Framework Directive[12]**, which has as its main objective to achieve Good Environmental Status of EU Marine Waters by 2020, in order to protect not only the marine environment, but also related economic and social activities. Under the Marine Strategy Framework Directive monitoring tools have been defined to evaluate progress towards the environmental targets, as well as a set of indicators for monitoring "good environmental status" of the four main European Sea regions[13], including levels of contaminants, eutrophication and marine litter. In is recently adopted **Circular Economy Strategy**[14], the Commission has set a target of 30% reduction of marine litter found on beaches and lost fishing gear found at sea by 2020. The marine litter waste categories coincide with the definition of garbage in MARPOL Annex V, and are covered by the definition of ship generated waste in the Port Reception Facilities Directive. The latter can thus make a direct and significant contribution to the reduction of the marine litter generated by ships.

1.2. Assessment and monitoring

The Commission has assessed the implementation and effectiveness of the Port Reception Facilities Directive over time. In a first phase, implementation reports were received from all Member States[15]. Subsequently, several workshops and discussions were organised with stakeholders, and the European Maritime Safety Agency (EMSA)[16] prepared a horizontal assessment report following a number of visits to Member States to verify the correct implementation of the Directive[17].
In 2014, the Commission decided to undertake a REFIT Evaluation of the PRF Directive and to that end launched an evaluation study, which was completed in May 2015[18]. The

[11] The Waste Framework Directive is currently being revised, with more ambitious recycling targets proposed by the Commission, COM(2015)0595 amending Directive 2008/98/EC on waste, 2.12.2015
[12] Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (O.J. L164/19, 25.6.2008)
[13] Baltic, North East Atlantic, Mediterranean and the Black Sea
[14] Commission Communication "Towards a circular economy: a zero waste programme for Europe", COM(2014)398fin
[15] Status reports on the implementation of Directive 2000/59/EC, which were submitted by Member States in 2006
[16] Workshop reports can be found at: http://www.emsa.europa.eu/implementation-tasks/environment/port-waste-reception-facilities.html
[17] Horizontal Assessment Report – Port Reception Facilities Directive (Directive 2000/59/EC), EMSA, 2010 http://ec.europa.eu/transport/modes/maritime/consultations/doc/prf/emsa-report.pdf
[18] Ex-post evaluation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues, final report (Panteia/PwC, May 2015), available at:

evaluation addressed questions on the relevance, effectiveness, efficiency, European added value and coherence of the PRF Directive. The main findings from the Evaluation have been described by the Commission in an Evaluation Report[19], and can be summarised thus:

- The Directive has been **relevant** to achieving the objective of reducing waste discharges at sea, and has had clear **EU added value**, by providing for an EU common approach to the effective implementation and enforcement of the MARPOL requirements.
- The Directive has only been partially **effective and efficient**. Its effectiveness has been evidenced by higher volumes of ship generated waste being delivered to EU ports since the implementation of the Directive (see Annex 5 – waste volumes). This is mainly due to differences in interpretation of its scope and implementation of the main obligations in the Directive, in particular as regards the provision of adequate facilities (including the development of the waste reception and handling plans), the design and operation of the cost recovery systems, the use of the advance waste notification form and enforcement of the mandatory delivery.
- The Directive is only **partially coherent,** as key principles of EU waste legislation have not been properly implemented in ports, and significant changes to the international legal framework in recent years have not been reflected.
- The lack of systematic recording of waste delivered in port and the insufficient exchange of information between Member States have hampered an effective monitoring and enforcement of the Directive, and have resulted in significant data gaps on waste streams in port.

These findings have also provided the basis of the problem definition set out in the current Impact Assessment Report.

2. PROBLEM ANALYSIS

2.1. Description of the main problems

2.1.1. Main problem 1: Ship generated waste and cargo residues discharged at sea

A significant part of marine litter (garbage) at sea originates from sea-based sources[20]. Other waste streams, such as oily waste and sewage, also continue to be discharged at sea in contravention of existing delivery requirements.

The **ex-post evaluation** of the Directive established that the delivery of ship-generated waste and cargo residues to port reception facilities has increased since the adoption of the Directive. However, trends are uneven between the different waste categories, and for some of these categories a significant amount of waste continues to be discharged at sea.

Quantification of the waste discharged at sea is difficult in the absence of direct data available. To provide for the best estimate of what is (potentially) discharged at sea, an alternative approach has been developed for this Impact Assessment: a "**waste gap**" has been calculated for all waste types, which is defined as the gap between the waste expected to be

http://ec.europa.eu/transport/modes/maritime/studies/doc/2015-ex-post-evaluation-of-dir-2000-59-ec.pdf

[19] REFIT Evaluation of Directive 2000/59/EC, COM(2016)168 final (31.03.2016)

[20] Literature generally distinguishes sea-based sources of marine litter from the land-based sources. Besides ships, sea-based sources of marine litter also include off-shore platforms, and marine aquaculture. However, in the context of this Impact Assessment only ships are considered where reference is being made to sea-based sources of marine litter

generated on board of the ship (and the part expected to be delivered in ports), and the waste actually delivered in ports, based on waste delivery data available. This approach has been implemented by using:

(i) The so-called ***MARWAS model***[21]. This model is focused on *merchant and passenger ships*, and has made calculations of the waste gap for **oily waste and sewage**;
(i) Existing reports and literature[22], which provide for the calculation of the waste gap for **garbage** from *all types of ships*, including fishing vessels and recreational craft.

A detailed **analysis of waste volumes** is provided in Annex 5.

Assessment of the waste gap/potential discharges:

There are no indications that the amount of garbage from ships (marine litter) has decreased in recent years. Time series of marine litter on European shores indicate that the problem has persisted since the implementation of the Directive. Although land-based sources are dominant in generating marine litter, sea-based sources actively contribute to the problem with an estimated EU average of 32% and values up to 50% for some sea basins[23]. Recent studies have also indicated that among the sea-based contributors to the problem of marine litter, the fishing sector features quite dominantly, with the recreational sector also taking a significant share[24]. Although garbage delivered in ports has increased since the introduction of the Directive, a significant delivery gap remains, estimated between 60,000 and 300,000 tonnes, i.e. 7% to 34% of the total to be delivered annually.

The illegal discharge of **oily waste** into the sea has substantially decreased over time, as also evidenced by aerial surveillance data on oil spills detected in surface water[25]. Notwithstanding the apparent progress in delivery, some oily waste that should be delivered in EU ports is not, indicating potential discharges into sea, causing harm to the marine environment. The gap between oily waste generated and treated versus the waste delivered in ports is estimated at 31,000 m3, representing 2.5% of the total volumes to be delivered annually.

Regarding the **sewage** that originates from merchant shipping that is to be delivered to port, it is estimated that approximately 10% of the sewage that should be delivered on land is not received by port reception facilities (and thus potentially discharged illegally), corresponding to a possible waste gap for sewage of 136,000 m^3

Available data on waste deliveries show that after a three-year decrease in volumes delivered, a slight increase has been recorded since 2008 (see graph). However, lack of registration of delivered sewage and insufficient knowledge of on-board treatment and mixing with grey water on board, reduce transparency of the data on sewage deliveries. As regards the recreational and fisheries sectors, while volumes of sewage generated are similar to those for the merchant sector, no data on delivery are presently available to determine whether there is

[21] The MARWAS model, which was developed and applied in the context of the IA support study (Ecorys, 2016), has calculated volumes of waste generation on board of vessels, and estimates of expected waste delivery volumes for a list of 29 ports, which together represent 35% of the throughput of all EU merchant ports, and are located across the EU. These volumes were compared to waste delivery data obtained from the same ports included in the list. For an explanation see Annex 4
[22] In particular the European Commission (DG ENV) study "to support the development of measures to combat a range of marine litter resources" (Eunomia, 2016), which has analysed the issue of marine litter from sea-based sources (see p.101 Figure 24. Delivery Gap).
[23] Eunomia (2016), p. 74
[24] http://www.fishingforlitter.org.uk/assets/file/Report%20FFL%202011%20-%2014.pdf; Marine Pollution Bulletin 2016 Unger et al. (2016); UNEP OSPAR (2009); Marine Litter Distribution and Density in European Seas (2014); Eunomia (2016), p.95, 30% estimate share for the fishing sector, and 19% for the recreational sector; the balance of sea-based sources is provided by the merchant sector; Arcadis (2012) has estimated a share of 65% share for the fishing sector alone
[25] EMSA (2014) CleanSeaNet; Bonn Agreement (2012)

a similar waste gap. However, based on available sources, estimations point to a possible waste gap for sewage representing 10% of the total volumes to be delivered annually.

Other waste categories are at present not as problematic, but may become an issue in the future. Current volumes of **Annex VI waste,** which includes the sludge from exhaust gas cleaning systems (also referred to as "scrubbers") as well as the bleed-off water from these systems, are limited, as there are only a small number of ships that have installed scrubbers on board[26]. Future developments, such as special areas being designated under MARPOL[27] and increasing oil prices, may lead to an increased use of these systems on board to meet more stringent sulphur emission norms. A higher uptake of scrubbers will result in more sludge and bleed-off water being generated. As no waste delivery data is currently available, it has not been possible to calculate the waste gap for this type of waste.

Cargo residues are normally a matter for the terminals operating within a port and the shippers to handle, without direct involvement of the port. For that reason data on **cargo residues** is limited and a delivery/waste gap could not be calculated for this type of waste. As cargo residues have an embedded value and delivery implies revenues instead of costs, it is generally considered that this constitutes a sufficient incentive to deliver cargo residues on shore, instead of discharging the residues at sea. Nonetheless, volatile commodity market prices affect their delivery, which is currently the case for oily residues due to the low oil prices. In addition, it may be very expensive to deliver cargo residues containing noxious liquid substances to PRF due to high treatment costs[28].

Discharges of ship-generated waste and cargo residues negatively affect the marine environment, causing damage to marine ecosystems and resources. In this context, it is worth highlighting the overall costs at EU level associated with ship-source pollution, in particular oil (based on estimates of oil spill clean-up) and garbage (based on available estimates of beach clean-up costs and damage to the fisheries sector):

- Cost of shoreline clean-up of oil spills: between **9,000€ and 49,000€** per tonne of oil spilled[29]
- Beach clean-up costs (marine litter): approximately **297 million** euro annually[30].
- Damage to fishermen (marine litter): estimates range from 1% of the total revenue generated by the EU fleet in 2010[31] to 5% of revenue[32], i.e. **between €60 million and €300 million per year**. The damage is caused through fouling of propellers, blocked intake pipes and valves, snagging of nets, silting of cod ends and contamination of catch.

[26] The report from the ESSF Scrubber Subgroup on waste from scrubbers (September 2016) refers to a total of 400 scrubbers having been sold to date. Sludge and bleed-off water are mostly generated by scrubbers operating in closed-loop mode

[27] Recent changes to MARPOL Annex VI include a progressive global reduction in emissions of SOx, NOx and particulate matter and the introduction of emission control areas (ECAs) to reduce emissions of those air pollutants further in designated sea areas. Furthermore, the global sulphur cap will be reduced from current 3.50% to 0.50%, effective from 1 January 2020, subject to a feasibility review to be completed no later than 2018

[28] Concerns over high prices for the delivery of hazardous cargo residues and/or non-availability of PRF adequate to receive these residues have been voiced at several occasions in the context of the ESSF PRF Subgroup

[29] Etkin, D.S. (2001). Methodologies for Estimating Shoreline Clean-up Costs clean-up costs per tonne of oil spilled for the Erika, Prestige and Alfa I incidents, 1999-2012. However, it should be noted that the clean-up costs for operational discharges of oil will not be at the same level as the costs for clean-up operations in response to large accidental oil spills, as assessed in the study

[30] Ex-post evaluation (Panteia, 2015), p.74-75; Although estimated costs for beach clean-up operations also concern marine litter from land-based sources, the average removal cost of a cubic metre of garbage from the beach will not be substantially different for litter from sea-based sources. The removal cost was estimated at 673 euro p/m3 of garbage

[31] JRC Technical Report: Harm caused by Marine Litter, 2016, p.40

[32] Newman, S. et al(2015), p.373

These figures help provide an order of magnitude of the costs associated to marine pollution. Although it should be acknowledged that there are many different methods in environmental economics on how to monetize these effects, the above mentioned cost figures indicate that the environmental costs are significant, so that even with a minimal reduction of discharges at sea significant benefits can be achieved.

Table 3: Amount of ship-generated waste generated and delivered annually, and the resulting "waste gap"

	Annex I - oily waste		Annex IV - sewage		Annex V - garbage		Annex VI -scrubber waste
	Merchant shipping	All, including fishing and recreational craft	Merchant shipping	All, including fishing and recreational craft	Merchant shipping	All, including fishing and recreational craft	All (only applicable for merchant shipping)
Waste to be delivered (after treatment and legal discharge [33])	1,226,000 m^3	1,290,000 m^3 Merchant: 1,226,000 m^3 Fishing vessels: 55,000 m^3 Recreational craft: 9,000 m^3	1,362,000 m^3	2,312,000 m^3 / 2,562,000 m^3 Merchant: 1,362,000m^3 Fishing vessels: 500,000 / 750,000 m^3 Recreational craft: 450,000 m^3	434,000 tonnes[34]	881,000 tonnes Merchant: 434,000 tonnes Fishing vessels: 266,000 tonnes Recreational craft: 171,000 tonnes[35]	24,000m^3 sludge 360,000 m^3 bleed-off (generated by scrubbers operating in closed-loop mode, i.e. 5% of 400)
Actually delivered (4)	1,195,000 m^3	*Unknown, as waste delivery data for fishing ports and marinas are unknown*	1,226,000 m^3	*Unknown, as waste delivery data for fishing ports and marinas are unknown*	Range from 286,000 to 404,000 tonnes[36]	Range from 580,000 to 820,000 tonnes	*Unknown*
Delivery gap (3) – (4)	**31,000 m^3 (2.5%)**	Unknown, but consisting of 31,000 m^3 caused by merchant shipping and a contribution from fishing vessels and recreational craft from 0 to 64,000 m^3	**136,000 m^3 (10%)**	*Unknown*	**Between 30,000-148,000 tonnes (7-34%)**	**Between 60,000-300,000 tonnes (7-34%)**	*Unknown*

Source: MARWAS (Annex I-IV waste); Annex V waste estimates are based on Eunomia (2016)

[33] The models applied have accounted for the waste that is treated on board and/or legally discharged under MARPOL to avoid overestimating the gap between generation and delivery; detailed estimates are provided in Annex 5 (total waste volumes and illegal discharges)
[34] Based on data from Eunomia (2015), including the identified sectors: shipping; cruises; and passenger
[35] The balance of waste generated (10,000 tons) is created by navy
[36] To get insight in the delivery data of the merchant sector, the total delivered waste volumes are applied to the share of waste produced by merchant shipping (thus considering a common garbage delivery pattern per sector)

Environmental Vulnerability Assessment:

In order to gain a deeper understanding of the actual environmental impact of the waste being (potentially) discharged at sea, the impact of waste volumes has to be considered in the context of the **vulnerability of the marine environment** to the different categories of waste, recognising that different waste types have different effects and levels of impact on marine ecosystems. To this end, a vulnerability assessment has been done per sea basin (Mediterranean sea, Black sea, Baltic sea and East Atlantic)[37], thus providing further insight into the different territorial impacts of this initiative, as also set out in the Territorial Impact Assessment report (see Annex 8 for a summary of the report). Given that the methodology has certain limitations, in as much as it is only based on two specific regional projects and takes a simplified approach compared to what is being developed in the context of the Marine Strategy Framework Directive, this analysis is to be taken as an "add-on" to the above analysis of waste volumes. At the same time, and in the absence of other methodologies currently available, it provides interesting indications of how the different types of waste may impact on marine ecosystems in the sea basins.

The vulnerability of the sea regions has been determined on the basis of a number of features (species, habitats, protected areas and socio-economic effects on human activities) in relation to the different waste types, taking into account: fate of pollutants, impact of pollutants, length of interruption and compensation possibility. The following table summarises the total vulnerability of the sea basins to each waste type.

Table 4: Summary of environmental vulnerability for ship-generated waste in four regions of European Seas[38]

Environmental weight[39]	**Oily waste**	**Sewage**	**Garbage**
Baltic Sea	27	22	35
East Atlantic Sea	28	19	35
Mediterranean Sea	24	24	35
Black Sea	28	19	35

From the above table two main conclusions can be drawn:

- Firstly, garbage poses the most significant risk to all sea basins, with no regional differences among them, followed by oily waste and sewage.
- Secondly, it seems that the East Atlantic and Black Sea regions are more sensitive to oily waste than the Mediterranean and the Baltic Sea, whereas the Mediterranean region is the most vulnerable in relation to sewage from ships.

[37] The methodology proposed in the present vulnerability study has similar principles with Marine Strategy Framework Directive, inasmuch as it uses features overlapping with the MSFD descriptors and list of pressures and impacts. However it is not fully in compliance with the methodology/approach currently being developed in the context of the MSFD. In the absence of a reliable and straightforward methodology covering all relevant MSFD descriptors, the proposed methodology, which is based on two projects implemented in the Northeast Atlantic and the Baltic (BRISK and BEAWARE), is used for convenience for the purposes of complementing the analysis of environmental impacts of various policy options amending the PRF Directive. For more explanation on the methodology applied, see Annex 4

[38] The numbers in the table present the sum of the individual vulnerability scores, see annex 4 for an explanation of the methodology

[39] The scoring defines the relative environmental vulnerability towards a unit load (e.g. 1 ton per year) of a specific waste type. E.g.: score value of 1 for feature A and a score value of 2 for feature B means that feature B is twice as vulnerable to the specific waste type as feature

2.1.2. Main problem 2: Administrative burden associated with the implementation of the PRF Directive

The inefficiency of the EU system on port reception facilities was also among the key findings of the ex-post evaluation[40], which concluded that: "*Even though the costs associated with the implementation of the Directive are generally outweighed by the (environmental) benefits generated, the costs are not always proportionate to what is being gained from complying with the Directive".*

The implementation of the Directive creates a substantial administrative burden for ports, port users and relevant competent authorities, part of which can be considered as *disproportionate*, as outlined below[41].

- **Development, assessment and monitoring of the Waste Reception and Handling Plans**; the Directive requires Member States to evaluate and approve the Waste Reception and Handling Plan, monitor its implementation and ensure re-approval at least every three years and after significant changes in the port. The assessment of the plan will be done against the criteria in Annex I to the Directive, and will normally require a site visit[42]. The process of assessment, approval and monitoring implies effective communication between the Competent Authorities and the ports. For transparency purposes, certain key information from the plans should be made available to all port users, either through publication of (part of) the plan on the website, or through leaflets/brochures[43]. *Smaller ports feel that these procedures create a disproportionate administrative burden. The cost for developing and annually updating a Waste Reception and Handling Plan for a small port has been reported to be as much as 9,000 euro (approximately 5,500 euro for developing the plan and 3,500 euro for updating the plan). However, this cost is defined by the level of detail in the plan, which depends on the port's size, geographical location, and the type of traffic coming into the port, thus providing some leeway to smaller ports in the development of the waste plan (see chapter 5.2, "discarded policy measures").*

- **Exemptions for ships in regular and scheduled traffic**
  If a ship wants to be exempted from the obligation of the advance waste notification, delivery of waste, and the payment of the fee in a specific port (based on the conditions for ships in regular and scheduled traffic), it has to submit an application to the Competent Authorities of the Member State, in which that port is located. The administrative cost for the ship to apply for an exemption is estimated at 2,128 euro. The Competent Authorities will assess the application against the criteria laid down in the Directive (which includes a document check on whether there is an arrangement in place for delivery and payment of the fee in a port along the ship's route). If the result of this assessment is positive, the authorities will grant the exemption clearly stipulating its conditions and monitor the situation. The cost for assessing and granting an exemption is estimated at 5,275 euro. The Member States also have to inform the Commission on a regular basis of the exemptions granted. Since June 2015, this is also possible by reporting the exemptions electronically into SafeSeaNet[44]. *Due to different*

[40] Ex-post evaluation (Panteia, 2015), chapter 9 on Efficiency
[41] For the estimates of the costs provided in this section, see Annex 9 providing detailed calculations of the administrative burden
[42] EMSA Technical Recommendations for the implementation of Directive 2000/59/EC (25/11/2016), Annex II, p.35
[43] As defined in Annex I to the PRF Directive and in the EMSA Technical Recommendations, chapter 3.5.2.3, p.11
[44] The Union Maritime Information and Exchange System (SafeSeaNet), established by Directive 2002/59/EC, is a European Platform for maritime data sharing, hosted and operated by EMSA

criteria for granting an exemption, application procedures are different for each and every port, and ships spend a lot of time preparing the applications, which could be avoided if the procedures were standardised. Also, due to a lack of exchange of information on exemptions, ports spend extra time checking whether the conditions for granting an exemption have been fulfilled, as well as monitoring exemptions, which could be made easier if the necessary information was made (electronically) available.

- **Advance Waste Notification**
  Before calling in a port, a ship needs to submit an Advance Waste Notification to the Competent Authorities of the Member State where that port is located, specifying the volumes and types of waste it intends to deliver, the storage capacity on board, and the waste that will be retained on board until the next port of delivery[45]. The costs for reporting the Advance Waste Notification are estimated at an average of 40.43 euro per port call representing 89.9 million euro annually. The port, or the appropriate waste management authority in the port, should on receipt of the Advance Waste Notification facilitate the waste delivery process (where appropriate), examine the information notified and report any inconsistencies, including absence of notification or possible non-compliance with the Directive's mandatory delivery requirement to the authority charged with inspections.
  Currently the EU Advance Waste Notification is not aligned with the international form (IMO Circular 834) due to the differences in definitions between the EU Directive and MARPOL. Therefore, ships calling at EU ports need to complete and report a different form than the one applicable internationally (MARPOL). The time for reporting could be shortened significantly if those forms were fully aligned. At the shore side, time and resources are lost due to parallel systems in place for the exchange of information between the authorities and/or the lack of electronic monitoring and reporting. Considering the number of port calls, potential gains in administrative burden reduction are substantial.

- **Monitoring and exchange of information**
  The Directive requires Member States to monitor implementation of the requirements, including the identification of ships, which have not delivered their waste in accordance with the Directive, and exchange information to allow for effective enforcement cooperation. To this end a Common Monitoring and Information System should have been developed. In the absence of a unified system, however, Member States have developed their own reporting and monitoring systems in the course of years.
  Only in recent years has an EU-based electronic system been employed to support monitoring and implementation of the Directive (largely based on SafeSeanet – for reporting and exchange of information - and THETIS EU - for reporting the results of inspections).
  As a consequence, electronic systems are operating in parallel at EU and national level. The case studies have confirmed these findings and have indicated that data is not systematically exchanged between ports or Member States.

- **Setting up and operating Cost Recovery Systems**
  Member States have to set up a cost recovery system that respects the principles and requirements laid down in the Directive, of which the most important is the obligation

[45] Since June 2015 Member States need to provide for electronic reporting of the waste information in accordance with the requirements of Directive 2010/65/EU on reporting formalities for ships arriving in and/or departing from ports of the Member States

of the indirect fee, i.e. the part of the fee that is charged irrespective of delivery of waste by the ship. According to a separate statement from the Commission this part shall represent at least 30% of all of the costs of reception and handling of the waste[46]. Depending on the type of system established, this will imply either close involvement of the port authorities in the waste process and close connections to the PRF operating in the port, or limited involvement, where ships may have to deal directly with the operators with very limited intervention from the port authority. Competent authorities have to ensure that the fees are fair, transparent, non-discriminatory and reflect the costs of the facilities and services. For this, the amount of the fees, and the basis on which they have been calculated, should be made clear for the port users.
Lack of transparency hampers a ship's waste planning process and may lead to unnecessary delays. Considering that there are over 2.2 million of port calls per year, even minimal delays can represent a significant burden for the sector as a whole. Depending on the CRS in place, ports may also spend excessive time in operating the system, which could be avoided if the calculation of the indirect fee was simplified.

- **Inspections of the mandatory delivery obligation**
  Irrespective of the type of inspection framework applied, the Directive requires that a 25% minimum inspection target is applied[47]. In other words, 25% of all individual ships calling annually in the port of a Member State shall be the subject to an inspection in order to verify whether the ship has complied with the delivery requirements of the Directive. This corresponds to 19,550 inspections annually[48]. The port side will not be considered in the context of "administrative burden" (as this falls under the enforcement obligations of the MS), but on the ship's side, the crew on board also has to collaborate in these inspections by answering the questions, showing the required documentation, etc. The inspectors, upon completion of the inspection process, are required to document and report the results. Since 2016, the reporting may be done electronically in THETIS-EU, an inspection database that has been developed by EMSA to facilitate the reporting of PRF inspections, as well as the subsequent exchange of information between the relevant authorities. *Being involved in two parallel inspection regimes, one checking MARPOL compliance (through Port State Control) and one purely checking compliance with the Directive, creates an unnecessary burden on the crew that could be substantially reduced if the inspections were fully integrated.*

Based on an update of the figures from the ex-post evaluation (Panteia, 2015), as well as the inclusion of additional categories of administrative costs, the financial burden for complying with the information obligations in the Directive is estimated at **127 million €.** A detailed breakdown is presented in the Table below[49], highlighting the contributions from the different obligations in the Directive that have an impact on the administrative burden for both ports, port users, and competent authorities.

[46] Article 8 par.2 (a) •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 (OJ L332, 28.12.2000, P. 0081 – 0089) and 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 - Commission declaration (OJ L 332 , 28.12.2000 P. 0090)

[47] This target is derived from the former Port State Control Directive: Directive 95/21/EC concerning the enforcement, in respect of shipping using Community ports and sailing in the waters under the jurisdiction of the Member States, of international standards for ship safety, pollution prevention and shipboard living and working conditions (port State control)

[48] See Annex 7: EMSA assessment of the enforcement options, annex II provides a breakdown of the number of inspections per Member State

[49] Ex-post Evaluation (Panteia, 2015), p.76 Table 6 Costs and benefits

Table 5: Annual administrative costs caused by the Directive (million €)[50]

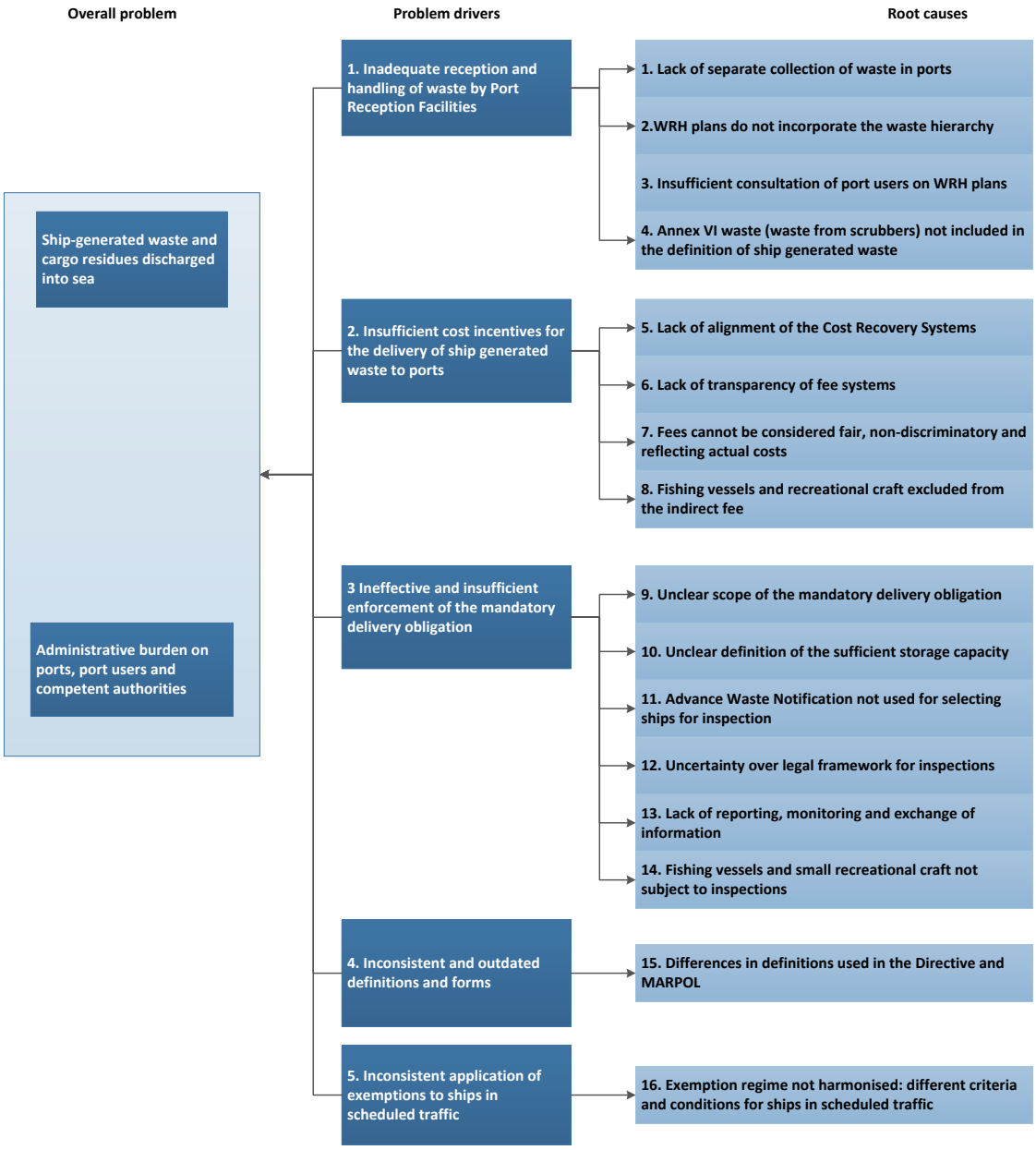
Administrative costs	Stakeholder	Annual costs
Costs for Member States to approve WRH plans	Competent authorities	4.1
Application for an exemption	Port users	5.0
Assessment and granting exemptions	Competent authorities	12.3
Advance waste notification – reporting	Port users	89.9
Advance waste notification – assessment	Ports / competent authorities	7.8
Inspection – providing documentation and collaboration	Port users	0.5
Inspection – reporting results from inspections	Competent Authorities	0.4
Total		**127**

These costs can be considered a problem, to the extent that they are partly unnecessary and due to inefficiencies in the system. As noted in the ex-post evaluation, a significant part of the administrative burden could be avoided by having a more harmonised and consistent implementation of the Directive and/or by addressing the legal inconsistencies between MARPOL and the Directive. These specific problems will be explained in more detail in the description of the drivers below. Only after the analysis of the problem drivers of the administrative burden has been completed, can an estimate of cost savings be provided.

2.2. The underlying problem drivers

The problem drivers and underlying root causes are presented in the graphic below.

[50] See Annex 9 for a detailed quantification of the administrative burden, based on a re-calculation of the figures provided in the ex-post evaluation based on statistical data from Eurostat on average hourly wage cost in the public sector (21.98€) as well as for the maritime sector (26,60€), taking 2015 as a reference year



2.2.1. Problem driver 1: Inadequate reception and handling of waste by Port Reception Facilities

Adequate port reception facilities are a precondition for increasing the delivery of waste onshore and reducing discharges at sea. The Directive describes "adequacy" of reception facilities as being "*capable of receiving the types and quantities of ship-generated waste and cargo residues from ships normally using a port*". However, questions remain around the exact meaning and interpretation of this concept, as well as problems in terms of the reception and handling of waste. In particular, the following issues pose a challenge to ensuring the adequacy of waste facilities in ports:

1. **EU Waste Hierarchy not fully implemented in the context of ship-generated waste; no separate collection of ship-generated waste in ports** (root causes 1 and 2)

The majority of the Waste Reception and Handling Plans do not include the basic principles of the waste hierarchy. This is a missed opportunity as the waste plans, in which both ports and port users are involved, provide a strong base for connecting the waste flows at the ship-port interface. This was also pointed out by a majority of respondents (47[51] out of 79 respondents, i.e. 60%) in the Open Public Consultation. The lack of implementation of the waste hierarchy in the delivery and processing of ship-generated waste on land also discourages port users from applying the principles of environmentally sound management of waste on board of ships. However, it should be noted that more than half of the respondents coming from the port sector (15 out of 26) did not consider the implementation of the waste hierarchy important, while, almost all of the port users that responded to the survey (12 out of 13) and most of the PRF operators (7 out of 10) considered this an important issue.

In the context of the implementation of the waste hierarchy, the problem of a lack of separate collection of waste from ships in ports has come to the foreground. Under the Waste Framework Directive, Member States may still deviate from the general obligation to provide for separate collection at local/municipal level if the segregation is not considered "economically/financially viable"[52]. As a result, many ports do not provide for separate collection in ports, and collect garbage in one container for further disposal. In particular for smaller ports, and thus in remote locations, setting up separate collection systems may pose significant challenges, as also shown in a recent study in relation to the separate collection of solid waste at municipal level[53]. It should be taken into account that the majority of respondents in the targeted survey (22 out of 33 who responded to the question, mainly consisting of port authorities and ship operators) believed that reinforcing the waste hierarchy would result in an increase of the administrative burden, whereas more than half of the respondents (17 out of 30, mostly port authorities and PRF-operators) thought that this would increase their operational costs.

The lack of separation of waste on shore hinders the proper handling of waste on board, including the willingness and motivation of the crew on board[54]. This issue has been mentioned at various occasions by representatives from the shipping sector during stakeholder consultations meetings where the revision of the Directive was discussed[55]. The lack of separate collection also hinders further reuse and recycling of the waste, based on its residual value, as required by the waste legislation, especially the EU Waste Framework Directive. The waste hierarchy, which gives preference to recycling and reuse over incineration and landfill, is often not properly reflected in the waste reception and handling plans of the ports[56].

An additional problem is posed by the application of the Animal By-Products Regulation (Regulation 1069/2009), which requires catering waste from ships operating internationally,

[51] Among which: 11 out of the 26 ports, 12 out of the 13 ports users, 5 out of the 11 Member States authorities, 7 out of the 10 PRF operators/associations, and all 4 NGOs responding to the Open Pubic Consultation. Of the remaining respondents, 17 were neutral or had no firm opinion about the question (20%) and 17 said that this is not an important issue (20%)

[52] Article 10 par.2 Directive 2008/98/EC states: 'Where necessary to comply with paragraph 1 and to facilitate or improve recovery, waste shall be collected separately if technically, environmentally and economically practicable and shall not be mixed with other waste or other material with different properties.'

[53] Only 19% of generated municipal waste is collected separately in EU-28 capitals: in other words, 80% of the waste still ends up in the residual waste bin (European Commission, DG ENV, (2015), 'Assessment of separate collection schemes in the 28 capitals of the EU', page unnumbered). See also in the same report 'Table: Headline scoreboard including results from 28 EU-Capitals', page 17

[54] As also established by the ex-post Evaluation (Panteia, 2015, p.103)

[55] Meetings of the ESSF PRF Subgroup, as well as more recently the TIA Workshop organised by DG REGIO on 17 March.

[56] This is also a reflection of the overall problem of MS to achieve the general targets for re-use and recycling set in the Waste Framework Directive: Out of 32 European countries, 'the majority… will need to make an extraordinary effort in order to achieve the target of 50% recycling by 2020', as defined under Article 11 Waste Framework Directive 2008/98/EC. (EEA Report no. 2/2013 'Managing municipal solid waste – a review of achievements in 32 European countries', p.6)

to be incinerated, in particular when this catering waste has been in contact with animal by-products (food waste). This includes plastic bottles and other packaging waste with a high potential for recycling, and will especially affect those ports with a high level of international traffic[57].

2. **Port users are not properly consulted in the development and re-assessment of the Waste Reception and Handling Plans** (root cause 3)

Although the Directive expressly requires consultation of the relevant parties at the stage of development of a new plan, it is less clear on consultations at the stage of evaluation and re-approval. The lack of consultation contributes to inadequacies in port reception facilities, as it will be more difficult to align the facilities with the needs of the port users, when these needs have not been sufficiently heard and defined during the consultation process. The targeted survey has indicated that port users generally do not feel that they are properly consulted in the development, implementation and revision of the Waste Reception and Handling Plans[58]. Smaller ports in particular claim that they miss the capacity to properly draft plans and include port users in this process.

According to the EMSA horizontal assessment report (2010), especially fishing and recreational ports, often did not have a Waste Reception and Handling Plans in place and if they did then these plans were poorly monitored. The relevant authorities had either failed to require and/or verify that these ports drafted a waste plan, or had exempted smaller recreational ports from this requirement.[59] The ex-post evaluation of the PRF Directive found that among the WRH plans developed by fishing ports, only 48% included an assessment on the need for port reception facilities[60].

3. **MARPOL Annex VI waste not included in the scope of the Directive** (root cause 4)

Exhaust gas cleaning systems, also referred to as "scrubbers", are installed on board of ships as a way to meet the new sulphur emission limits to reduce air pollution from ships, as introduced by the latest amendment of Directive 1999/32/EC on the sulphur content of marine fuels[61]. These systems produce waste in the way of sludge and bleed off water, which is not allowed to be discharged under MARPOL and has to be delivered to waste facilities in ports. Given the chemical composition, the waste requires special reception and treatment on shore.

However, since MARPOL Annex VI waste is not included in the scope of the Directive, there is no EU obligation for the provision of facilities adequate for the reception and handling of this type of waste, nor a mandatory delivery requirement. As a consequence, currently few ports in Member States today provide facilities that are capable of handling the waste from scrubbers, whereas in other ports the scrubber sludge is reported and collected as oily waste[62].

Annex VI waste is particularly relevant for vessels operating exclusively or primarily in (Sulphur) Emission Control Areas, notably the Baltic Sea and the North Sea area[63], and it may

[57] This issue was discussed in detail with DG SANCO in the context of the 5th meeting of the ESSF PRF Subgroup (25/5/2016); reflected in Points 50-53 of the Minutes of the meeting

[58] 49 respondents (i.e. 60%) to the Open Public Consultation were of the opinion that the insufficient consultation of port users is an important or very important factor contributing to the inadequacy of PRF. Among them are 10 ports (out of 26 responding), 12 port users (out of 13), 7 MS authorities (out of 11), 6 PRF operators/associations (out of 10), and all 4 NGOs responding to the Open Public Consultation

[59] EMSA Horizontal Assessment Report – Port Reception Facilities (Directive 2000/59/EC), 2010, p.10

[60] Ex-post evaluation (Panteia, 2015), p.46

[61] Directive 1999/32/EC was amended by Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012

[62] For estimates on sludge and bleed off generation from scrubbers, please refer to section 2.1.1 and Annex 5

[63] The Baltic Sea and the North Sea were designated as Sulphur Emission Control Areas under MARPOL Annex VI

be expected that in the future more sea basins will be designated as special emission zones under MARPOL. By extension, the IMO has recently decided[64] that a global low sulphur cap will be introduced in 2020, resulting in a growing pressure to comply with overall sulphur emission norms through application of scrubber technology on board.

For the Member States bordering Emission Control Areas, scrubber waste only significantly affects some segments of the shipping industry. Most of these segments already have agreements in place with waste operators for delivering their scrubber waste. However, It is has been noted in interviews and sector publications[65] that, due to relatively low fuel prices over the past two years, many ship owners have opted for using low sulphur fuel instead of investing in scrubber technology. As a consequence, volumes of scrubber waste have remained low. However, this trend could be reversed by an increase in fuel prices.

In the targeted survey, the majority of the respondents[66] indicated that they expected an increase in the amount of scrubber waste delivered to ports from broadening the scope of the Directive by including MARPOL Annex VI waste. However, the ports that were assessed as part of the case studies undertaken in the context of the Impact Assessment support study concluded that: (i) there is a high degree of uncertainty about the delivery of future scrubber waste volumes; and (ii) required investments and operational costs are strongly dependent on current facilities and systems in place. The interviewees indicated that, so far, they have seen little or no demand for scrubber waste delivery, and stated that it is highly uncertain if this will increase in the near future.

2.2.2. Problem driver 2: Insufficient cost incentives for the delivery of ship generated waste

The Directive requires that the costs of port reception facilities for ship-generated waste, including the treatment and disposal of the waste, are covered through the collection of a fee from ships. This obligation is based on the "polluter pays principle", in that the costs should be borne by the port users, as opposed to any other stakeholder. In order to ensure that the cost recovery systems provide no incentive for ships to discharge their waste into the sea, the Directive requires that all ships "contribute significantly" to the costs of the facilities, irrespective of their actual use of the facility (the indirect fee component)[67]. At the same time, ports have the possibility to differentiate the fee on basis of the category, type and size of the ship, as well as on the basis of the environmental performance and operation.

1. Lack of harmonisation of cost recovery systems in EU ports (root cause 5)

The significant contribution has been interpreted widely and has resulted in different models of Cost Recovery Systems being applied in EU ports: some ports apply systems based on a 100 % indirect fee (with variations), whereas others operate systems where the indirect fee is only partially implemented (only covering some of the waste types) or applied through a reimbursement or penalty in case of non-delivery. There are also still a number of ports with 100% direct fee systems in place, where the ship pays on basis of volumes delivered, although these systems do not meet the significant contribution requirement in the Directive[68]. Fees for

[64] MEPC 70, October 2016
[65] See http://www.platts.com/latest-news/shipping/houston/oil-price-collapse-hits-sales-of-exhaust-gas-2601602
[66] 30 respondents (73% of the 35 expressing an opinion)
[67] The Commission specified in a separate Declaration annexed to the Directive that the significant contribution should be understood as " a figure of the order of at least 30 % of the costs referred to in article 8(1); O.J. L 332/90, 28.12.2000
[68] A detailed description of cost recovery systems in in Member State ports is provided by an EMSA study from 2005 (Carl Bro, p.9) and updates of this assessment have been reported in the ex post evaluation (Panteia, 2015)

garbage are typically of an indirect nature, while fees for sewage and oily waste are of a direct nature.

The variations in Cost Recovery Systems can partly be explained by the differences in strategy and administration of ports across the EU, in particular whether the port is publicly owned and operated private or privately owned/operated.

Table 6: Cost Recovery Systems in EU ports[69]

1. 100% Indirect Fee System: these charge ships a waste handling fee, irrespective of their use of facilities (this model is also referred to as a **"No Special Fee Systems"**); **2. Administrative Waste Fee Systems:** these charge ships a fee, which is partly based on the amount of waste, delivered, and an additional fixed fee, which is refundable on delivery of waste; **3. 100% Direct Fee Systems**: charge port users based on the volumes of waste discharged, without an additional standard fee.

As a consequence, the level of the incentives to deliver the waste on land is not the same for all EU ports (from 100% incentive to no incentive at all). This has been confirmed by stakeholders in response to the Open Public Consultation: 51[70] out of 79 respondents (63%) indicated that this lack of alignment leads to insufficient incentives for delivery. In addition, the lack of alignment between the Cost Recovery Systems in EU ports creates unnecessary administrative costs particularly for the shipping sector, and does not provide for a level playing field, where all operators can compete under equal conditions.

In the case studies undertaken as part of the Impact Assessment support study, one port highlighted frustrations among stakeholders due to the different practices applied for defining "sufficient storage capacity", as well as the fact that sometimes the ships have to pay the waste fee, despite of only delivering small volumes of waste ("application of the indirect fee").

2. Lack of transparency as regards the fee structure and the basis for calculation (root causes 6 and 7)

Irrespective of the type of cost recovery system in place, the Directive requires that the fees, and the basis on which they have been calculated should be made clear to the port users. To this end, the Waste Reception and Handling Plan shall include a description of the charging system, which is listed also among the information to be made available to all port users[71].

However, ports do not always provide information on their fee system for waste handling, including basic fee levels to the port users, and if they do, the relationship between the fees charged and the costs of the waste handling process is often not clear. This was among the key findings of the EMSA Horizontal Assessment (2010), which reported 14 out of 22

[69] Following the categorization as stated in EMSA (2010), Horizontal Assessment Report - Port Reception Facilities (Directive 2000/59/EC), page 18-19

[70] Among which: 13 out of the 26 ports, all 13 port users, 6 out of the 11 MS authorities, 8 out of the 10 PRF operators/associations and 2 out of the 4 NGOs responding to the OPC. Of the remaining respondents, 22 were neutral or had no firm opinion about the question (27%) and 8 said that this is not an important issue (10%)

[71] Annex I to Directive 2000/59/EC; this obligation is in line with Article 12 of Regulation (EU) 2017/352 of the European Parliament and of the Council of 15 February 2017, establishing a framework for the provision of port services and common rules on the financial transparency of ports

Member States failing to do so[72]. The lack of transparency was also considered a major issue by stakeholders in the open public consultation: a majority of respondents (55[73] out of 79, i.e. 69%) acknowledged that the relationship between fees and the actual costs of the reception facilities is unclear. The port users unanimously supported this view, but not all the port respondents agreed to this, with only 65% of ports (15 out of the 26) sharing the same opinion.

One of the reasons for this is that many ports have outsourced the service of providing port reception facilities to external waste operators and therefore do not have the detailed economic overview of the costs associated with the waste handling process. They may only have the negotiated price from the waste operator based on the services provided. However, there are also ports that intervene actively in the process and manage all the payments between the ship and waste operators. The availability of a transparent **overview of the cost/fee structure** thus depends on the design and operation of the port's Cost Recovery System (see problem driver 1), which reflects the diversity of EU ports as regards governance structure and administrative set up. With regard to the **calculation of the waste fee**, some ports charge the costs from the waste operator directly to the ship, while others include different types of cost in the waste fee, such as administrative costs. It is currently left to the individual port to determine the payment flow for waste handling services and the level of the waste fee. As a consequence, there is **no harmonised method for the calculation of the fee** and many different payment and invoicing systems are being implemented.
This is also true when it comes to the application of a reduction in the waste fee to a ship that can demonstrate that it produces reduced quantities of ship-generated waste ("a green ship in the context of article 8(2) of the Directive). The lack of common criteria or minimum requirements for green ships ultimately leads to distortion of competition[74].

A level playing field is considered of crucial importance for both the shipping sector and port sector. Fair competition requires equal application of regulations across these sectors. In this context, the *ex- post* evaluation concluded that due to the lack of harmonisation, the fees are not always considered "fair, transparent, non-discriminatory and reflecting the costs of the facilities".

3. Fishing vessels and small recreational craft not included in the indirect fee (root cause 8)

Fishing vessels and recreational vessels carrying less than 12 passengers are exempt from the mandatory 'indirect' fee provided for in the Directive. However, the delivery of waste by such vessels is still mandatory, and fishing vessels and small recreational crafts may have to pay (direct) fees based on the volume of waste they deliver. This does not provide a sufficient incentive for these vessels to deliver waste to port reception facilities.

The provision of appropriate reception facilities is a preventative measure that can reduce the likelihood that fishermen discharge their waste at sea, but the accessibility of the reception facilities and the cost of their use discourage delivery by these vessels. The respondents to the targeted survey confirmed that costs are one of the major deterrents to deliver waste: 9

[72] As also confirmed in the 2015 ex-post evaluation (Panteia, 2015)
[73] Among which: 15 out of the 26 ports, all 13 port users, 8 out of the 11 MS authorities, 8 out of the 10 PRF operators/associations and 2 out of the 4 NGOs responding to the OPC. Of the remaining respondents, 19 were neutral or had no firm opinion about the question (23%) and 7 said that this is not an important issue (8%)
[74] This was concluded during the second stakeholder conference (January 2016) in the context of the DG MOVE Study on differentiated port infrastructure charges to promote environmentally friendly maritime transport activities and sustainable transportation (Cogea, 2017)

respondents (50%) indicated that costs for waste disposal discourage the delivery of waste, in particular garbage (including household waste).

A specific issue in this context is the waste made up of **abandoned, lost or otherwise discarded fishing gear**. Stakeholders from the fishing sector confirmed that it is often difficult or costly to dispose of end-of life-nets in ports (8 out of the 11 respondents who expressed an opinion about this topic in the targeted survey). Furthermore, literature confirms that economic incentives play an important role in addressing the problem. For example, the 2016 GHOST Manual[75] found that economic incentives are potentially important in solving the problem, provided that they are used in the framework of an integrated strategy. The 2009 FAO Study on Abandoned, lost or otherwise discarded fishing gear[76] found that a fee-for-service approach (i.e. direct fees) can be a barrier to the use of port reception facilities since vessel operators may not wish to pay for such fees and, instead, may opt to illegally dispose of their garbage at sea at no immediate direct cost. A general (i.e. indirect) fee, requiring that all vessels using a port pay a standard fee, was believed to be more effective.

In addition, economic incentives to deliver **passively fished waste** are also lacking. Passively fished waste constitutes the waste that is caught in nets during fishing operations, but which does not form part of the operational or household waste of the vessel itself. Half of the respondents to the fisheries survey indicated that costs discourage the delivery of waste collected in nets and garbage (including household garbage) to port reception facilities, while at the same time the majority (14 out of 18, i.e. 78%) were in favour of the introduction of the possibility to deliver waste caught in nets or deliberately retrieved from sea free of charge.

Similarly, although less acute, economic incentives are also lacking for small recreational craft. As explained in chapter 2.2.2 this sector, due to the large number of vessels, is also responsible for a significant share of garbage (19%) found at sea.

2.2.3. Problem driver 3: Ineffective and insufficient enforcement of the mandatory delivery obligation

1. **Confusion over the scope of the mandatory delivery requirement for ship generated waste and the application of the exception based on sufficient storage capacity (root causes 9 and 10)**

The relationship between the Directive's mandatory delivery requirement, which applies to "all" ship generated waste, and the MARPOL discharge norms, in particular when the next port of call is a non-EU port, remains unclear. As explained above, MARPOL still allows for operational discharges to be made at sea under strict conditions. Although the Directive is based on the international norms contained in MARPOL, the Directive has a number of provisions that lay down a more ambitious objective, namely to prohibit all discharges at sea by imposing a strict delivery obligation applicable to all waste, except when the ship has sufficient storage capacity on board until the next port of delivery (article 7). As regards cargo residues, the Directive follows a different approach by requiring the delivery to port reception facilities in accordance with provisions of MARPOL.

[75]GHOST Hands-on Manual to prevent and reduce abandoned fishing gears at sea, 2016; http://www.ghostgear.org/sites/default/files/attachments/gggi_best_practice_framework_part_2.pdf

[76]Abandoned, lost or otherwise discarded fishing gear, United Nations Environment Programme (UNEP), Food and Agriculture Organization of the United Nations (FAO), 2009, p. 80

However, uncertainty remains around the definition of *all* waste, in particular in the light of footnote 1 in Annex II (Waste Notification), which specifically refers for the possibility to legally discharge sewage under MARPOL Annex IV, and specifies that in such a case the waste does not need to be notified before entry into port. This legal ambiguity in the provisions has resulted in confusion among Member States and stakeholders on the scope of the mandatory delivery obligation and the application of the sufficient storage capacity exception. Since there is no clear definition of "sufficient storage capacity" in the Directive, Member States apply different interpretations and thresholds. This lack of harmonisation has created inefficiencies in the waste delivery process, as confirmed by a majority of respondents to the Open Public Consultation[77].

2. Insufficient use of the waste notification forms

Under the Directive, each ship bound for an EU port - with the exemption of fishing vessels and recreational crafts carrying no more than 12 passengers - has to notify the authority at least 24h prior to its arrival. The master of the ship is required to truly and accurately fill in the form as presented in Annex II of the Directive. This form, and the information contained therein, should provide the basis for the selection of ships for inspection.

However, in the Open Public Consultation, the majority of the respondents (46 out of 74) indicated that the insufficient use and inspection of the waste notification forms lead to insufficient enforcement. The ex-post evaluation of the Port Reception Facilities Directive also concluded that ports and inspection authorities make insufficient use of the forms for the purpose of monitoring and inspection.

Since Member State authorities do not always use the information notified for this purpose, or do not share the information with the enforcement authorities, it becomes difficult to select ships for inspection based on the criteria laid down in the Directive.

3. Legal uncertainty over the appropriate framework and basis for inspections (root cause 12)

Although the Directive provides for the possibility that inspections may be conducted within the framework of the Port State Control Directive[78], an inspection to verify compliance with the Directive's mandatory delivery requirement for ship generated waste, has a different scope and objective than a Port State Control inspection, which focuses on compliance the international requirements and certificates. This has created legal uncertainties and explains why in reality less inspections are conducted than required by the Directive (25%); most of the inspections conducted in the framework of port state control do not verify compliance with the Directive's requirements, but only check compliance with MARPOL. At the same time, it should be noted that the 25% inspection target stems from the repealed Port State Control Directive. This Directive has been replaced by Directive 2009/16/EU, which has introduced a new approach to inspections based on the effective targeting of vessels in view of their risk profile.

[77]More than 60% of the respondents to the OPC noted the following contributing factors to the problem of enforcement: (i) the inconsistency between mandatory discharge requirement (for 'all' ship-generated waste) and the MARPOL discharge norms (52 respondents), (ii) the insufficient use and inspection of waste notification forms by the relevant authorities, and the insufficient reporting on quantities and types of waste delivered to EU ports (46 responses), and (iii) the insufficient exchange of information (49 responses)". 70 % of the respondents (56 stakeholders) considered the unclear definition of sufficient storage capacity to be an important contributor to the problem of insufficient and ineffective enforcement of the mandatory delivery requirement

[78] Directive 2009/16/EC of the European Parliament and of the Council on port State control (OJ L 131, 28.5.2009, p. 57)

4. Insufficient monitoring and exchange of information (root cause 13)

Not all port authorities keep track of the specific amounts of waste delivered to their port over time, as the electronic means for doing so are generally not in place and there is no legal requirement to have an on-site waste accounting system. Ports that collect this information act on the basis of their own data needs, using their own units of measurement, which complicates the monitoring of compliance and progress within the overall objectives and requirements of the Directive. The lack of data on waste streams, in terms of the amounts and types of waste delivered to port reception facilities, hampers the effective monitoring of the effectiveness of the Directive, in particular its mandatory delivery. In addition, the port case studies have indicated that information on the results of inspections, as well as on the exemptions granted to ships in scheduled traffic, is not systematically reported and exchanged between Member States, so as to allow for cross-border cooperation in enforcement.

5. Fishing vessels and small recreational craft not included in the enforcement framework conditions/criteria (root cause 14)

The Directive obliges Member States to establish control procedures, *to the extent required*, for fishing vessels and recreational craft below 12 passengers to ensure compliance with the Directive. At the same time, these vessels are exempt from the specific inspection requirements and control procedures laid down in the Directive. This has resulted in a situation in which control procedures for fishing vessels and small recreational craft in general are lacking[79]. In addition, fishing vessels and small recreational craft are not obliged to notify the port of the waste they intend to deliver and the storage capacity on board, as they are also exempted from the advance waste notification. As a consequence, key information on waste disposal from these vessels is missing, which also stands in the way of any meaningful inspection or effective monitoring. In view of the significant contribution of these vessels to the problem of marine litter, the lack of enforcement is problematic and constitutes a significant legal gap in the system[80].

In the targeted survey for fisheries the majority of the respondents (9 out of 18) considered the introduction of a measure requiring fishing vessels to notify ports in advance of the waste they are bringing ashore as negative. However, as regards the introduction of a measure to include fishing vessels in the specific inspection requirements, the majority (9 out of 18 respondents) believed that this would have a positive impact.

2.2.4. Problem driver 4: Inconsistent and outdated definitions and forms

There are important differences between the definitions used in the Directive and those employed in the MARPOL Convention. This is particularly the case for the definition of "ship-generated waste" in the Directive, which only covers certain categories of waste contained in MARPOL (those defined in Annexes I, IV and V), and the definition of "cargo residues" which apart from the MARPOL Annex V cargo residues also covers the remnants of cargo material after cleaning operations, and thus also tank washings falling under MARPOL Annex I and II.

[79] EMSA Horizontal Assessment Report (2010) on Directive 2000/59/EC, p.12
[80] As also concluded by Eunomia (2016), p.144

The current misalignment between the Directive and MARPOL creates confusion among the different actors in implementing the Directive, while at the same time complicates compliance with the MARPOL norms and requirements. For example, the differences in definitions hinder full alignment with the IMO circular for the waste notification, as there are significant differences in the different categories of waste and cargo residues. This creates an unnecessary administrative burden for port users being confronted with different forms and reporting requirements, depending at which port they call[81].

In addition, the case studies conducted have indicated that a lack of electronic exchange of information, and/or the existence of parallel systems, results in additional administrative burden, as information exchange is more complicated and not well streamlined. Taking away those barriers would reduce administrative burden for different stakeholder groups, e.g. ship operators, ports and port reception facility operators.

2.2.5. Problem driver 5: Inconsistent application of exemptions for ships in scheduled traffic

Different procedures and criteria are employed to evaluate exemption requests across the EU, which creates unnecessary administrative burden on port users, while limiting the potential for relevant authorities in different Member States to cooperate in the process.

The parameters for granting exemptions under article 9 of the Directive are not well defined and leave room for different interpretation and application by Member States. As a consequence, different criteria and procedures are employed to evaluate exemption requests in the ports across the EU, which leads to a disproportionate administrative burden on port users, while limiting the potential for relevant competent authorities in different Member States to coordinate the exemptions granted to vessels. Coordination between Member States is necessary for assessing whether the conditions for granting an exemption are fulfilled. Poor coordination is also due to insufficient reporting of exemptions and limited exchange of information between competent authorities in Member States. The inconsistent application and the lack of information exchange result in multiple inefficiencies for ports, port users and competent authorities[82].

The relationship between the two main problems and the defined problem drivers is summarised in the table below.

Table 7: Relationship between main problems and problem drivers

Problem driver	Relation to waste discharges	Relation to administrative burden
Adequacy	Inadequate port reception facilities are a disincentive to deliver waste.	Facilities are not adequate to the needs of port users, which may lead to undue delay in ports and complicated administrative procedures.
Incentives	Proper (cost) incentives promote delivery of waste on shore.	Lack of harmonisation of the fee systems, and lack of transparency

[81] This was confirmed by 57 out of 79 respondents to the to the Open Public Consultation (70%) indicating that differences in definitions constitute an important contributor to the problem of administrative burden, whereas 65% of respondents indicated that reporting forms which are no longer up to date are also an important factor adding to administrative burden

[82] 55 (i.e.68%) of the respondents to the Open Public Consultation were of the opinion that the inconsistent application of exemptions leads to an excessive administrative burden. Among them are 14 ports (out of 26 responding), 11 port users (out of 13), 10 MS authorities (out of 11), 8 PRF operators/associations (out of 10), and 2 out of the 4 NGOs responding. This problem was also noted in the 2011 EMSA report on PRF exemptions, as well as in the ex-post evaluation study (Panteia, 2015), p.68

Problem driver	Relation to waste discharges	Relation to administrative burden
		cause administrative burden for port users.
Enforcement	Enforcement is needed to prevent / monitor discharges into sea. In practice, less inspections undertaken than required.	Unclear rules on enforcement (e.g. definition of sufficient storage capacity, mandatory delivery requirements and MARPOL discharge norms) lead to administrative burden.
Definitions and forms	Complicated reporting procedures may trigger waste discharges at sea rather than compliance with the Directive.	Inconsistencies between EU Waste Notification and the IMO Circular create administrative burden for ports and port users. In addition, there is a lack of electronic exchange of information and/or parallel systems are in place.
Exemptions	Invalid issuing of exemptions may open the door to illegal discharges into sea	Unclear and inconsistent application of exemption criteria causes administrative burden for port users.

The analysis of the different problem drivers and the underlying root-causes shows that approximately one third of the drivers relates directly to the problem of (unnecessary) administrative burden, whereas approximately two thirds are related to waste being discharged at sea.

2.3. Most affected stakeholders

The Directive evenly distributes responsibilities across the different stakeholders involved in the process of waste delivery and management. It should be noted that the Directive has a very wide scope of application: it covers all type of sea-going vessels, from small fishing boats to large container vessels, and all ports receiving sea going vessels, from small marinas to large commercial ports. Hence, the group of affected stakeholders is substantial.

Ports are among the key players, as they have to ensure that adequate facilities are provided to receive the waste from ships. They must also develop Waste Reception and Handling Plans and organise the necessary consultations with the port users to better understand operational needs. Furthermore they have to operate the fee systems to recover the cost from ships and deal with exemption requests. Depending on the administrative set up of the port and its size, tasks may be divided between the harbour master and the port authority. Ports often share the monitoring and enforcement responsibilities with the Member State competent authorities, e.g. in the area of assessing exemption requests, waste notification and inspections. Member State authorities are either vested in the maritime transport departments or the environmental departments at national or regional level.

The other key actors are the actual operators of the port reception facilities, which also include the terminal operators, which normally operate under a concession or licence in the port. They normally relate directly with the ships' agents and the port authorities with regard to the amounts of waste delivered and payment of the fees. They are mostly private companies, of which some can be qualified as small and medium sized enterprises (SMEs).

In parallel, ship owners bear the responsibility for the delivery of their waste to PRF and for compliance with the advance waste notification. As the producers of the waste they have to pay the indirect fee charged for the reception and handing of the waste, under "the polluter pays principle". An important segment of the shipping industry is the cruise sector, which - given their increasing size and the number of passengers their vessels transport - produce significant amounts of waste to be delivered in accordance with the Directive.

Improvement of the marine environment resulting from a reduction of waste discharges will also benefit EU citizens, in particular those living in coastal regions and near ports. Better waste management makes those areas more attractive for tourism and wider habitation, and has beneficial effects in terms of air and water quality. In addition, protection of the marine ecosystem should also result in an improvement of fish stocks, thus also affecting the fishing and aquaculture industries. These interest groups are often represented by Non-Governmental Organisations and Regional bodies (such as the regional sea conventions and Fishery Advisory Councils).

Most of these stakeholders have been participating in the Port Reception Facilities Subgroup that was established under the European Sustainable Shipping Forum, which has been consulted by the Commission on a regular basis on issues related to the implementation and the planned revision of the Directive.

2.4. Evolution of the situation without EU legislative intervention (baseline scenario)

The baseline scenario builds on the application of the provisions in the current PRF Directive, complemented by initiatives that have already been adopted and are currently being implemented. It will furthermore be defined by economic and technological developments in the shipping sector, which are defined below.

2.4.1. Legal/policy developments

During the last two years, the Commission has been developing different initiatives in order to improve the implementation of the Directive in the short to medium term.

In November 2015, the Commission adopted a Directive for amending Annex II to the PRF Directive[83]. The amendments concerned the incorporation of the new garbage categories in MARPOL (Annex V), as introduced by the IMO in 2013, which should allow for further alignment with the IMO waste notification form. In addition, the Commission introduced a requirement for ships to report on the types and quantities of waste delivered in the previous port of call through the Advance Waste Notification, in order to improve the information reported on waste streams in ports. To reflect these changes in the electronic reporting systems of MS, which should allow for the information to be reported into the National Single Window and further exchanged through SafeSeaNet, the existing waste business rules were amended[84], which also allowed for the information to be stored at central level, so that the data can be more easily exchanged with other electronic databases (such as THETIS, the inspection database). These measures are fundamental for the further development of the Common Monitoring and Information System set up under article 12(3) of the PRF Directive, and to move towards a system of more targeted inspections (where ships can be selected for inspection on basis of the information reported). To this end, apart from the necessary

[83] Commission Directive 2015/2087/EU adopted on 18 November 2015, O.J. L 302/99, 19.11.2015
[84] The new Waste Business Rules were endorsed by the SSN High Level Steering Group in October 2016

changes to SafeSeaNet (both at central and MS level), EMSA has set up a specific reporting module for PRF inspections in the THETIS database, referred to as THETIS-EU, which is linked to Safe Sea Net. This module allows for the results from PRF inspections to be electronically reported and exchanged between MS, thus supporting MS in the inspection tasks.

To support a more harmonised implementation of the main provisions of the Directive, the Commission adopted Interpretative Guidelines in March 2016[85]. In these Guidelines, the Commission presents its interpretation of certain key concepts in the Directive, i.e., the adequacy of Port Reception Facilities, the adoption and consultation of the Waste Reception and Handling Plans, the scope of the mandatory delivery obligation, the advance waste notification, inspections, and the exemption regime for ships in scheduled traffic. Building on the Interpretive Guidelines as well as good practice identified in the Member States, EMSA published a set of Technical Recommendations in November 2016[86], which provides advice on how best to implement the Directive. In addition, EMSA has developed Guidance for Inspections[87], aiming to facilitate ship inspections to enforce the mandatory delivery obligation in the Directive.

The impact of these initiatives, in particular the Amendment of Annex II of the Directive (advance waste notification form), the Interpretative Guidelines, the EMSA Technical guidelines, and the Common information and monitoring system, is still premature[88]. While these initiatives are aimed at increasing waste delivery (and as a result lower the waste gap or discharges at sea), quantitative estimates of their impact are not yet available and will need to be assessed going forward.

In the baseline scenario, the current legal inconsistencies between the Directive and MARPOL will continue to exist, or even increase:

1. The scope of the mandatory delivery obligation is implemented by a majority of Member States *in accordance with MARPOL*, i.e. not applied to the delivery of **sewage** in port (which can - to a large extent - be discharged under MARPOL). This is not supported by the legal provisions of the Directive, which clearly state that sewage is included in the definition of Ship Generated Waste in the Directive and also require that all waste be delivered before departure except when the ship has sufficient storage capacity on board[89]. This is also reflected in the application of the Cost Recovery Systems in the Member States, which in most cases do not include sewage in the indirect fee part of the fee system. Implementation of the key concepts in the Directive will continue to vary between the Member States, as guidance on how to interpret and implement the Directive will only be provided through soft law, which is not legally binding on Member States.

2. The Directive will not be considered "up to date" with the international framework, as legal amendments to MARPOL are not incorporated in the European legal framework. This concerns in particular: 1. changes to Annex V (garbage, including a new

[85] Commission Notice 2016/C 115/05 of 31 March 2016, O.J. C 115/5, 1/4/2016

[86] http://www.emsa.europa.eu/emsa-documents/latest/item/2875-technical-recommendations-on-the-implementation-of-directive-2000-59-ec-on-port-reception-facilities.html

[87] Published in November 2016

[88] Generally, members of the ESSF PRF sub-group interviewed indicate benefits of these actions, although their magnitude varies between ports, depending on current and past practices (already in line with guidelines or not). Open Public Consultation responses suggest that these initiatives will contribute to an increase of waste delivery by some 5%, thus reducing discharges into sea.

[89] For the Commission's view on the mandatory delivery obligation, see the Interpretive Guidelines provided in Commission Notice 2016/C 115/05, O.J. C 115/5, 31.3.2016

definition of cargo residues), 2. the introduction of Annex VI, including a new category of waste (waste from exhaust gas cleaning systems and ozone depleting substances), which is not included in the Directive, and 3. changes to Annex IV (sewage), including special area provisions. As a consequence of these inconsistencies, parallel legal systems at EU and international level are created, resulting in inefficiencies and hampering effectiveness of the system. Similarly, the problems around enforcement will continue to exist, so long as these issues are not resolved and the relationship to the Port State Control Directive is not settled.

2.4.2. Economic and technological developments

How the scenario and problems in relation to waste from ships will develop depends on economic and technological developments in the sector. The following assumptions have been made:

- The **expected growth of shipping**, driven by global economic and trade growth. Growth predictions range from 2.5% to 6% volume growth per year.[90] [91] For the cruise sector, a growth of 4.5% per year is considered, based on historic data from CLIA.[92] For the fisheries fleet, a 6% decline per year has been observed over the past year and taken as a proxy for the near future, while for the recreational boating sector, an annual growth of 3% is considered;
- The generation of **sewage and garbage** from ships is expected to increase along with the growth of shipping.
- **Ship size developments**, which will create a cushioning effect on waste generation, as larger ships generate lower amounts relative to their volume of cargo carried. Growth of ship size is most visible in the container segment, with an average ship size increase of about 5%[93] [94], and in the cruise segment, with an annual increase of about 4%.[95] [96] For other ship types, sizes are not expected to increase much.
- **Technology developments** vis-à-vis particular specific waste categories, notably:
  - Changes in the fuel mix leading to less oily sludge production. With an increased use of Liquefied Natural Gas and Marine Gas Oil as opposed to Heavy Fuel Oil, and an upcoming global cap on sulphur contents in Heavy Fuel Oil (as of 2020)[97], a significant reduction of oily sludge may be expected;
  - The uptake of scrubbers, resulting in the generation of scrubber sludge and bleed-off water from these systems. So far, only about 400 scrubbers have been installed[98], and no distinction between data for closed and open loop scrubbers is available[99]. This number appears relatively small, especially given the recent entry into force of the Sulphur Emission Control Areas in the Baltic and North Sea, and may be explained by low fuel prices, making the alternative of shifting to low sulphur fuels more attractive than investing in after treatment equipment. This may change in the future if fuel prices increase. Moreover, an extension of low sulphur

[90] Panteia (2015), 'Study on the Analysis and Evolution of International and EU Shipping', p. 59, regarding worldwide GDP growth differs substantially in the lower fragmented scenario
[91] OECD (2011), 'Strategic Transport Infrastructure Needs to 2030', p. 9, regarding maritime container traffic
[92] CLIA (2015), 'Cruise industry outlook 2016'
[93] Based on UNCTAD shipping statistics
[94] https://www.statista.com
[95] ISL (2016) 'Shipping statistics and market review 2016, volume 60 - No. 8'
[96] http://www.cruiseindustrynews.com/cruise-industry-analysis/orderbook-data.html.
[97] Resolution MEPC 281.(70)
[98] Report from ESSF sub-group on Exhaust Gas Cleaning Systems (2016) (2.1.36 Response by CR OCEAN ENGINEERING)
[99] The distinction between open loop and closed loop systems is important, as the former generate wash waters that can be discharged at sea in accordance with pre-defined conditions defined in the corresponding IMO Guidelines, while the latter produce scrubber sludge and bleed-off water that is not allowed to be discharged under MARPOL and need to be delivered to port reception facilities. See Annex 6 (MARPOL discharge norms)

regimes could further increase the uptake of scrubbers. The scenarios are however uncertain, ranging from 25% uptake by the shipping sector by 2020 [100] to 60% by 2025, [101] without a clear scope of the relevant market;[102]

- In addition, ongoing technological advancements may contribute to lower amounts of ship-generated waste per unit of shipping. In this respect, new legislation promotes technical advancement in the sector more strongly than efficiency considerations[103].
- To summarise, it is expected that waste generation will increase for almost all waste categories, while delivery is also expected to improve due to recent initiatives. Which of these two forces will be overriding is uncertain, but it seems likely that the autonomous growth of the shipping industry and waste generation will be in orders of magnitude above and beyond 5%. This would call for a need for further EU intervention to promote good waste management practices on board.

With no EU intervention, it may be expected that the problems that exist under the current regime will persist and may increase in the future due to potential developments in the sector outlined above: 1. more waste will be discharged at sea, and 2. the administrative burden is expected to increase.

3. WHY SHOULD THE EU ACT?

Shipping is an international sector, operating in different EU and international waters, being serviced by ports around the globe. Therefore, it has by nature a strong cross border dimension. In order to avoid a litany of different port policies, and to ensure a level playing field for both ports and port users, harmonisation at EU level will be necessary. A more harmonised implementation of the different provisions in the Directive will improve the competiveness and economic efficiency of the shipping sector, while ensuring basic conditions in ports to avoid adverse effects such as "PRF shopping", where ships keep their waste on board until delivery in the port where this is economically most advantageous. Another example of inefficient functioning of the market is provided by the exemption regime, whereby the conditions for granting an exemption to a ship in scheduled and regular traffic are different in each and every port along the ship's route, causing inefficiencies for the ship and at the port side.

This is also reflected in the Directive's legal basis, provided in Article 100(2) TFEU, which includes the adoption of common rules for international (sea) transport to or from the territory of a Member State as a fundamental part of the EU transport market. Although the Directive has a transport legal basis, it should be noted that its main objective is the protection of the marine environment, which has been a guiding principle in this Impact Assessment. Likewise, the Directive also incorporates some of the fundamental principles of EU environmental law, such as the "polluter pays" principle. This dual approach is also fully reflected in the overall objectives of the revision. With the revision of the Directive the Commission seeks to reconcile the interests and principles of both EU transport and environmental policy.

[100] DNV-GL (2013), 'An outlook for the maritime industry towards 2020 – future development in maritime shipping'
[101] Ensys Energy & Navigistics consulting (2016), 'Marine Fuels Outlook Under MARPOL ANNEX VI'
[102] The Report from the ESSF sub-group on Exhaust Gas Cleaning Systems (2016) also mentions that the introduction of the global sulphur cap of 0.5% may provide a stronger case for installation of EGCS, but that some EGCS may be marketed as being 0.5% equivalent instead of 0.1%, and in doing so greatly reduce size, cost and wash water requirements. The IMO has also provided scenarios for the uptake of scrubbers in its official fuel availability assessment (MEPC 70/INF.6)
[103] EMSA study on waste generated on board, CE Delft 2016

At the same time, subsidiarity should apply at the level of implementation of common rules and principles. Member State authorities are best placed to define the level of the fees to be charged for the reception and handling of ship generated waste, as well as to determine the level of detail and regional coverage of the Waste Reception and Handling Plans.

The revision should also facilitate the enforcement of the mandatory delivery obligation in a more harmonised way. As was shown in the problem definition, the multiplicity of enforcement practices in EU ports has made the regime generally ineffective and has undermined its deterrent effect. The public consultation revealed that most stakeholders (including ports, port users, operators and NGOs) in general support action at EU level[104]. By extension, the Territorial Impact Assessment indicated that generally stakeholders prioritised further harmonisation at EU level over regional differentiation.

For these reasons, it is concluded that only EU wide norms will provide a consistent regulatory framework that provides the necessary safeguards against the problems identified in this report.

4. OBJECTIVES: WHAT SHOULD BE ACHIEVED?

The proposed revision of the PRF Directive aims to resolve two main problems:

1. Ship-generated waste and cargo residues discharged at sea

Significant parts of marine litter originate from sea-based sources, which continue to discharge their waste at sea in contravention with existing discharge norms/prohibitions and the EU delivery obligation. This is also the case for other waste streams, such as oily waste and sewage.

2. Administrative burden/costs caused by the implementation of the PRF Directive

The PRF Directive causes substantial administrative cost, notably related to advance notification, the development of Waste Reception and Handling Plans and Inspections; a significant part of this cost is unnecessary and due to inefficiencies in the system.

Therefore, the objectives of the proposed revision have been defined as follows:

- Protection of the marine environment through a reduction of discharges of ship-generated waste at sea;
- Facilitation of maritime operations through a reduction of the administrative burden on ports, port users and competent authorities.

Given that the first objective also aligns with the main aim of the Directive ("to reduce discharges of waste at sea") and the associated costs from discharges of waste at sea outweigh the costs associated with the administrative burden, as was shown in chapter two, the first objective of the **reduction of waste discharges**, should be considered the primary objective of the revision of the Directive, and the **reduction of the administrative burden** as a secondary objective.

In addition, the revision seeks to contribute to the wider objectives of the circular economy by contributing to an improvement of the waste handling process, as well as reduction of marine litter from sea-based sources.

[104] The majority of the respondents to the Open Public Consultation (77 out of 81) considered that the issues addressed by the PRF Directive continue to require some form of action at EU level

To achieve these general objectives, five specific objectives have been defined:

SO-1: To ensure the availability of adequate facilities;
SO-2: To provide effective (cost) incentives to deliver waste to port reception facilities;
SO-3: To remove barriers to enforcement;
SO-4: To harmonise and update definitions and forms;
SO-5: To harmonise the rules for exemptions.

5. POLICY OPTIONS

5.1. Description of the retained policy measures

A set of measures has been defined and grouped according to the above-mentioned specific objectives. The policy measures are also linked to underlying root causes, as illustrated in the Table below.

Table 8:

Objective	Policy measure	Description	Soft law option[105]	Related root cause no.[106]
SO-1 Adequacy	PM-1A	**Broaden the scope of the PRF Directive to include MARPOL Annex VI waste** (residues/sludge and bleed-off water from exhaust gas cleaning systems). Ports will be obliged to provide for port reception facilities capable of receiving this type of waste and include the relevant references in the WRH Plan. Ships will have to include this waste in their advance waste notification to ports, and will be obliged to pay a fee for the delivery. PRF inspections will also need to check that the Annex VI waste has been delivered on shore and not retained on board if storage capacity is insufficient. It should be noted that, although Annex VI also covers ozone depleting substances, these will not be included, as these are as normally handled by the repair yards. Wash waters from scrubbers will also not be included as these can be discharged in accordance with the relevant MARPOL Guidelines and should not be considered as waste in the sense of the Directive[107].	SL (waste business rules)	**4** (scrubber waste not included in definition of SGW) **15** (differences in definitions)
	PM-1B	**Reinforce the waste hierarchy as laid down in the Waste Framework Directive**. This should be done by incorporating the principles of the waste hierarchy in the process of waste processing in ports (description in the Waste Reception and Handling Plan), and more specifically by setting up systems of separate	SL	**1** (lack of separate collection) **2** (waste plans not reflecting the Waste

[105] This column refers to the possibility of development of (additional) soft law guidance/recommendations; it does not refer to soft law already existing (Interpretive Guidelines, EMSA Technical Recommendations and Inspection Guidance; see baseline scenario)
[106] This column refers to the numbering used in the graph on page 16
[107] EMSA technical assessment for the IA (January, 2017, p. 17) and Report from the ESSF Scrubber Subgroup, September 2016

Objective	Policy measure	Description	Soft law option[105]	Related root cause no.[106]
		collection to facilitate subsequent re-use and recycling of waste collected in ports.		Hierarchy)
	PM-1C	**Strengthen the requirements for consultation of port users,** by clarifying in the Directive that consultation should take place in the development, as well as the monitoring and re-assessment, of the Waste Reception and Handling Plans.		**3** (insufficient consultation of port users)
	PM-1D	**Clarify the definition of 'adequacy' of PRF**, by defining the main elements of this concept in the Directive in line with international and EU Guidelines and practice.		**1, 2 ,3, 4**
SO-2 Incentives	PM-2A	**Introduce the use of a shared methodology to establish the indirect fee part of the Cost Recovery System in ports**. This measure aims to streamline the underlying principles of the indirect fee, including the relationship between fees and costs, and the "right to deliver", without prescribing one specific system for all ports, as this would not take account of the differences in geographic location, size and administrative set up of ports in the EU. This should also increase the transparency of the CRS, in particular as regards the basis for the calculation of the fees, which should also be included in the information of the WRH Plans to be communicated to port users.	SL	**5** (lack of alignment CRS), **6** (lack of transparency), **7** (fees not considered fair, non-discriminatory and reflecting costs), **8** (fishing vessels and recreational craft excluded from indirect fee)
	PM-2B	**Introduce a 100% indirect fee for garbage (MARPOL Annex V).** This measure builds on PM 2A, but will specify that for garbage the indirect part shall be 100%, so that it should be possible that this waste can be delivered without any additional direct charges, so that a maximum incentive is provided for delivering this waste to PRF instead of discharging at sea.		**5** (lack of alignment CRS)
	PM-2C	**Provide for a list of conditions that can be used to certify a ship as "green" in the context of the Directive (article 8(2c)),** i.e. a ship whose design, equipment and operation are such that it produces reduced quantities of ship generated waste. This should facilitate the operation of certification schemes in ports to give reductions in the waste fee for such ships (already provided for in the Directive) and should promote the uptake of new technologies on board of ships to generate less waste.	SL	**5, 6 ,7, 8**
	PM-2D	**Include fishing vessels and small recreational craft in the indirect fee regime**. This measure builds on PM 2A and will require these vessels to pay a fee irrespective of delivery, so as to provide an incentive for delivery similar to the incentive given to other vessels.		**8**(fishing vessels and recreational craft excluded from indirect fee)

Objective	Policy measure	Description	Soft law option[105]	Related root cause no.[106]
	PM-2E	**Include "passively fished waste"** in the scope of the Directive and include this waste stream in the 100% indirect fee for garbage. This measure addresses the waste that fishermen catch in their nets during normal fishing operations, and which doesn't form part of the operational waste of the vessel itself. Given the current scope of the Directive, which is limited to ship generated waste as defined in the MARPOL annexes (which do not cover passively fished waste), the inclusion of this waste in the Directive will thus require extending its scope beyond MARPOL. By applying this measure in combination with PM 2B and 2D, the passively fished waste should be included in the indirect fee so that it can be delivered to port without having to pay additional direct charges. This measure would also facilitate the operation of existing "fishing for litter" schemes in the EU	SL	**8**
SO-3 Enfor-cement	PM-3A	**Clarify the scope of the mandatory waste delivery obligation in article 7**, two variants:		
	PM-3A.1	Align the delivery obligation with the MARPOL discharge norms; under this variant the mandatory delivery requirement would apply to the waste that cannot be discharged under MARPOL. The delivery obligation would thus reflect the discharge norms and provide for full complementarity.		**9** (unclear scope of the mandatory delivery obligation)
	PM-3A.2	Strengthen the current mandatory delivery obligation for all ship-generated waste, beyond the MARPOL discharge norms. The delivery of all waste will be strengthened by making clear in the legal text that this also includes the waste that can in principle be discharged under MARPOL. It should be noted, however, that a delivery obligation does not equal a discharge ban and that a strict delivery obligation does not regulate operations at sea (which will continue to be governed by MARPOL) but rather focuses on what happens in port.		**9** (unclear scope of the mandatory delivery obligation)
	PM-3B	**Introduce a requirement for a waste receipt.** The PRF operator will be required to issue a waste receipt to a ship upon delivery, stating the amounts and types of waste delivered. This receipt shall be communicated to the port authority which will be reporting its information electronically into the Common Monitoring and Information System (SafeSeaNet) for further exchange with Member States, as well as for statistical purposes to ensure better insights on waste streams in port. Small unmanned facilities shall be exempted from the requirement of issuing a	SL	**13** (insufficient reporting, monitoring and exchange of information)

Objective	Policy measure	Description	Soft law option[105]	Related root cause no.[106]
		waste receipt. Two variants:		
	PM-3B.1	**Waste Receipt in line with IMO Circular 834** (based on the same definitions and categories of ship generated waste and cargo residues as used in MARPOL)		**13**
	PM-3B.2	**EU Waste receipt** (based on different definitions and categories of ship generated waste and cargo residues than those used in MARPOL)		**13**
	PM-3C	**Clarify the definition of 'Sufficient Storage Capacity'** (the main exception to the mandatory delivery obligation, "SSC"); two variants:		**10** (unclear definition of sufficient storage capacity)
	PM-3C.1	**Flexible variant:** calculation of SSC on board taking into account discharges that can be made in accordance with MARPOL after the ship has left the port.	SL	**10**
	PM-3C.2	**Strict variant:** calculations shall be made of the SSC until the next port of call/delivery and the exception shall not be allowed in situations in which the next port of call is located outside the EU or unknown (outside the port to port reporting and monitoring system and no certainty that adequate PRF will be available in the next port).	SL	**10**
	PM-3D	**Strengthen the inspection regime, by replacing the 25% minimum inspection requirement with a risk-based approach**. Two variants:		**11** (AWN not used for selecting ships for inspection) **12** (uncertainty over legal framework for inspections)
	PM-3D.1	**Incorporate the PRF inspections into the PSC Regime**. To achieve this variant, the Port State Control Directive (Directive 2009/16/EC) will have to be amended to allow for PRF inspections to be combined with PSC inspections and to use the same risk-based selection system of ships for inspection. Results of the inspections will be reported in the PSC database (THETIS). This approach will allow for the enforcement of the PRF Directive in parallel to MARPOL enforcement. However, in addition to the PSC regime, a separate obligation will have to be provided in the Directive for inspection of **domestic vessels** (10% annual inspection target), as these do not fall under PSC, but should not be left out of the		**11, 12**

Objective	Policy measure	Description	Soft law option[105]	Related root cause no.[106]
		scope of PRF enforcement.		
	PM-3D.2	**Provide for a dedicated PRF inspection regime.** Under this variant, a specific PRF targeting mechanism will be provided, as well as a system to calculate the annual PRF inspection commitment per MS. The results of inspections shall be recorded in a separate EU module of the PSC database (THETIS-EU), which will also support the targeting mechanism and calculation of the commitment.		**11, 12**
	PM-3E	**Strengthening the enforcement regime for fishing vessels and small recreational craft**, by introducing a 10% annual inspection target for these vessels. Only the larger vessels will be included, i.e. those over 100 GT, as this is the MARPOL threshold for carrying a garbage management plan on board, which will be the key data source for checking whether waste delivery obligations have been met.		**14** (fishing vessels and small recreational craft not subject to inspections)
	PM-3F	**Extend/adapt the electronic Monitoring and Information System**, based on THETIS-EU and SSN, to ensure better electronic reporting and exchange of information. Under both inspection variants above, adaptations will be necessary to THETIS/ THETIS EU, as well as adaptations of SSN (at central and MS level).	SL	**13** (insufficient reporting, monitoring and exchange of information)
SO-4 Definitions	PM-4A	**Align the definition of ship generated waste with the Annexes of MARPOL**, by including MARPOL Annex VI (see also measure 1A), as well as incorporating the definition of cargo residues within the overall scope of ship-generated waste, in order to fully align with the definitions used in the MARPOL Annexes. This will also bring Annexes I and II wash waters, which under the current Directive are considered as "cargo residues", into the scope of SGW, and the definition of cargo residues will be limited to MARPOL Annex V cargo residues. This measure builds on PM 3A (variant 1); the rationale for a deviant definition of cargo residues in the Directive has been to exclude it from the current strict delivery obligation for all waste and instead have it covered by the more flexible delivery obligation in article 10 (delivery in accordance with MARPOL). With PM 3A (1) there will be no further need for this distinction, thus opening the door for alignment of the definitions.		**15** (differences in definitions)
	PM-4B	**Update the waste notification form(s) to fully reflect the IMO standard** (IMO MEPC.1/Circ.834), including its definitions and waste categorisation. This policy measure builds on PM 4A above.		**15**
SO-5	PM-5A	**Include common criteria for the granting of**		**16** (exemption

Objective	Policy measure	Description	Soft law option[105]	Related root cause no.[106]
Exemptions		**exemptions to ships in scheduled traffic**. This will involve the clarification of the terms already provided in article 9 in line with the Commission's Interpretive Guidelines, so that a truly common exemption regime is provided. A standardised exemption certificate will be included in an additional annex to the Directive, which should also be reported into the Common Monitoring and Information System (SSN) for subsequent exchange between MS.		regime not harmonised) **13** (insufficient reporting, monitoring and exchange of information)
	PM-5B	Clarify in the Directive that **vessels operating exclusively within one port** (tug vessels, pilot vessels, etc.) can also be exempted under the same conditions, in line with the Commission's Interpretive Guidelines.		**16**

Some of the measures proposed as part of the revision of the PRF Directive can also be implemented through soft law. In general, however, this tends to result in a reduced overall impact, while potentially lowering costs. The soft law approach has been assessed for the relevant measures.

5.2. Discarded Policy measures

5.2.1. Introduction of an EU discharge prohibition

As explained above (chapter 1.1, EU legal context), the PRF Directive focuses on delivery in port, compared to MARPOL which regulates discharges at sea. Although the delivery obligation bears a strong connection to discharge operations at sea, it is certainly not equivalent to a discharge prohibition. To effectively address the discharges of waste in European waters, it has therefore been considered to introduce a discharge prohibition in the Directive. This would effectively assign "special area status" to EU waters for all categories of waste and cargo residues, especially having an effect on sewage discharges from passenger ships, not least because MARPOL still leaves considerable scope for sewage discharges, especially beyond the 12 nm zone (see MARPOL discharge norms, Annex 6). However, for the following reasons such a measure is not considered feasible and should be discarded:

The MARPOL regulatory regime has evolved over time to formulate an adequate and functional framework for international shipping. This has also been acknowledged by the EU with the adoption of Directive 2005/35/EU (as amended) on ship source pollution, which incorporates the MARPOL international standards for ship source pollution into EU law. The international standards included are the discharge norms contained in MARPOL Annexes I and II. The Directive requires that the illegal discharge of polluting substances (as defined in MARPOL Annexes I and II) be considered a criminal offence (under the conditions laid down in Directive 2009/123) and that criminal penalties be imposed on the polluter. Although this Directive does not cover all of the Annexes of MARPOL, introducing a discharge ban for all EU waters would deviate from the approach taken by this Directive to incorporate the MARPOL norms, and would introduce further inconsistencies between the EU and the international legal framework. Given that shipping is an international sector, operating both in European and international waters, deviations between discharge standards should be avoided. In addition, a discharge ban in EU waters would be very difficult to enforce and control, as it will be difficult to prove illegal discharges, due to a lack of evidence in open seas, and the fact

that the document proof (certificates and documents held on board) is completed in accordance with the MARPOL requirements, and would not correspond to the EU needs and requirements. Taking into account the specific situation of sewage discharges, it should also be noted that a general discharge prohibition would have an impact on the operational pattern of ships as additional sewage treatment plants and storage capacity would need to be installed on board of ships, affecting their design, construction and equipment, making it difficult to have a flag-neutral implementation in EU waters.

5.2.2. Full alignment with the MARPOL Convention

Full compliance with MARPOL would mean repealing those specific measures which have made the MARPOL regime more effective through the application of EU law.

MARPOL only provides for a general obligation to provide adequate PRF in the relevant annexes. However, while the Directive builds on this general obligation, it goes further by addressing in detail the legal, financial and practical responsibilities. In particular, the Directive has provided for:

1. Adoption of the waste reception and handling plans, which is a fundamental instrument to ensure adequacy of PRF;
2. Requiring mandatory delivery of all waste before departure, in order to ensure that ships actually use the facilities set up in the ports;
3. Requiring the establishment of Cost Recovery Systems to ensure that the costs of port reception facilities are covered through a fee from ships;
4. Requiring ships to report the advance waste notification;
5. A system of compliance control (monitoring and enforcement).

The REFIT Evaluation has also shown that overall the Directive has been relevant, effective and efficient, although the regime can be further improved. Repealing the specific obligations imposed by the Directive has never been advocated by any of the stakeholders. Full alignment and abandoning the EU's port approach and obligations would have a serious negative impact on the delivery of waste to port and lead to more waste being discharged at sea.

5.2.3. Provide for a delivery exception in case port reception facilities are (temporarily) unavailable

The current Directive does not provide for situations where port reception facilities are (temporarily) unavailable, which may result in a ship leaving the port without having delivered in accordance with the Directive. This has been raised in particular in the context of passengers ships with significant volumes of sewage on board calling at ports where adequate facilities for dealing with the quantity or quality of the waste are not available, or in cases where due to natural disasters or serious problems with the infrastructure ships are not in a position to deliver their waste. Having to wait in the port until the situation has been resolved may generate long delays resulting in high costs for the ship, and may be difficult due to itinerary planning. For these reasons, it has been considered to introduce a provision that addresses these situations and would allow the ship to depart with waste still on board for delivery in the nearest port on its route for immediate delivery. This would further build on the regional approach already embedded in article 5 of the Directive, which allows Member States to develop the waste reception and handling plans in a regional context, with the

appropriate involvement of each port, specifying the availability of waste facilities on a regional basis.

This policy measure has been discarded in the Impact Assessment, as it risks introducing a loophole to the main obligations (provision of adequate port reception facilities and mandatory delivery), which would undermine the overall objective of the Directive. Even with a more detailed description of what should be considered adequate in terms of the facilities in line with international and EU Guidance (see policy measure 1D), some degree of uncertainty will remain on when this exception could be invoked, as this concept is strongly dependent on local conditions and the type of traffic to the port. This argument has also been discussed in the IMO's Marine Environment Protection Committee, in the context of a request for an amendment of MARPOL[108]. The fact that the issue is still being discussed at the international level provides an important reason for not considering such a measure in the context of the revision of the PRF Directive.

Finally, it should be mentioned that practical measures to address the issue are already available under the current Directive: the advance waste notification allows for timely arrangements to be made in case adequate facilities may not be available for the waste reported to be delivered. In addition, the waste reception and handling plan provides a key instrument in planning the waste delivery process, as it provides the basic information to the port users, including information on the reception facilities available in the port, and can include contingency planning and arrangements covering situations of force majeure.

5.2.4. Exempt smaller ports and marinas from the obligation to develop a Waste Reception and Handling Plan

The Waste Reception and Handling Plans are fundamental for ensuring that adequate port reception facilities are provided. For this reason, the Directive requires that such an appropriate plan is developed for each port, including small fishing ports and marinas. It has been argued by stakeholders that the requirement for developing a WRH Plan places an unreasonable burden on smaller ports, only servicing a limited number of ships.

However, this policy measure has been discarded, as the current provisions in the Directive leave a sufficient degree of flexibility for Member State authorities as regards the development and monitoring of the WRH Plans, with due consideration being given to the type of port as well as its size and location.

This has been confirmed in the Commission's Guidelines for the interpretation of the Directive[109], which explain that the plans may vary significantly in detail and coverage and some of the items in Annex I to the Directive (setting out the requirements for the Waste Reception and Handling Plans) may be only partially applicable to smaller ports. The Guidelines note that what is considered to be an "appropriate" plan depends on the size, geographic location and type of port, which would also determine the level of detail required. Furthermore, the Guidelines also point to the possibility provided in article 5(2) of the Directive of adopting a regional Waste Reception and Handling Plan, which combines the essential elements into one plan covering several ports in the same region, in order to facilitate port waste management planning.

[108] Submission from CLIA to MEPC 70, October 2016
[109] Commission Notice 2016/C 115/05, adopted on 31.03.2016

The EMSA Technical Recommendations have also reflected this flexibility in the development of the plans, by presenting an overview of the different types and formats that can be developed, showing large variety in coverage and detail depending on the size and geographic location of the port(s), as well as the waste streams normally delivered.

Another reason for not considering an exemption for "smaller" ports from having to develop a Waste Plan, is that part of the focus of the revision is on the reduction of marine litter, including the litter generated by fishing vessels and recreational craft, which are the vessels most likely to be calling at smaller harbours and marinas. Having a basic waste management plan in place for the smaller ports, and also communicating information about available waste facilities to port users, will increase the likelihood of these vessels delivering their waste on shore.

5.2.5. Require fishing vessels and small recreational craft to submit an advance waste notification

The Directive exempts fishing vessels as well as small recreational craft (carrying less than 12 passengers on board) from the obligation to notify the port of entry of the information contained in Annex II (advance waste notification). In order to collect the relevant data from the amounts of waste carried on board by these vessels, their storage capacity, and whether or not they have delivered in the previous port, it has been considered to include these vessels in the scope of the advance waste notification requirement. This should also support the enforcement of the mandatory delivery requirement, as well as facilitate the waste management process.

However, it should be noted that most of these vessels operate from and to the same port. Furthermore, the majority will not be equipped to electronically notify the required information. Requiring fishing vessels and small recreational craft to report waste information would thus induce considerable administrative cost to the operators of such vessels, as well as to national authorities for having to process the information. Even if a threshold is applied (only ships over 100 GT or 45 mtr in length overall[110]) it would still imply a considerable burden on the vessels concerned, given that they would be required to submit the advance waste notification every time they call in port. In addition, the measure would require both Member States and EMSA to upgrade their electronic reporting systems (SafeSeaNet and the National Single Window) to cater for the additional notifications.

5.3. Description of the Policy options

The policy options have been constructed in such a way as to provide clearly identifiable packages of policy measures focusing on the objectives outlined above.

In the development of these policy options, three main guiding principles have been considered, as presented below:

- **The scope of the revision**. Policy option 2 concentrates on a minimum legislative revision, focusing mainly on adequacy and incentives measures to be included in the revised Directive (while other areas are to be covered through parallel soft law measures). The other policy options focus on a more extensive legislative revision of the Directive, addressing the different operational objectives;

[110] In line with the thresholds applicable under Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC

- **The scope of the mandatory delivery of waste** in ports (article 7). The interpretation and enforcement of the delivery requirement define the main differences between Policy options 3 and 4. Policy option 3 seeks to align the delivery requirement with the discharge norms laid down in MARPOL, i.e. explicitly requiring that the waste which cannot be discharged under MARPOL has to be delivered to a facility on land. This will also reflect on other aspects, as elaborated below. Policy option 4 aims to have all waste delivered at ports, including the waste that can be legally discharged at sea in accordance with MARPOL. This position will also reflect on other aspects, such as the application of the Cost Recovery Systems, and the type of inspection regime in place;
- The potential for addressing the specific problem of **marine litter (garbage)** from ships. Policy options 3 and 4 both have two variant options; one with and one without focus on marine litter, as described below.
- The potential for reducing **administrative burden and simplification** of the regime has been considered for all the options presented.

5.3.1. Policy option 1: Baseline scenario

Policy option 1 provides the baseline scenario as described in section 2.4 above. Ambiguities in the application of the Directive would continue to exist, as no legal clarity would be provided on the relationship between the delivery obligation in the Directive and the discharge norms under MARPOL, as well as the concept of adequacy of port reception facilities. Soft Law measures that have been developed by the Commission and EMSA in the past can help provide further guidance on the main concepts of the Directive, but Member States will not be legally required to apply the recommendations. Through effective reporting and exchange of information of waste information through the Common Monitoring and Information System, enforcement of the mandatory delivery requirement can be supported, provided that the National Single Window is properly set up and implemented in all EU Member States. EMSA Guidance on enforcement will also help inspection authorities to conduct proper inspections under the Directive.

5.3.2. Policy option 2: Minimum legislative revision of the PRF Directive

Policy option 2 builds on the baseline scenario, including targeted initiatives that have already been prepared and planned (as described in section 2.4 above), complemented by concise legal adjustments to the Directive, as well as development of soft law measures on certain aspects that need further clarification. As such policy option 2 would contain all the measures which would be necessary *as a minimum* to ensure effective continuation of the regime.

More specifically, the minimum legislative changes to be made include basic alignment with recent changes in MARPOL, such as the inclusion of MARPOL Annex VI waste (scrubber waste) into the scope of the Directive, as well as updating legal references in the PRF Directive which are no longer valid. The Directive contains old references to EU legislation which has meanwhile been amended, such as the Waste Framework Directive and the Port State Control Directive. Furthermore, the "adequacy" concept could be further clarified in the text of the Directive in line with the interpretation provided in the Commission Guidelines[111].

In addition, Policy option 2 would also envisage a number of the proposed policy measures to be developed through soft law, providing further guidance on their implementation. The

[111] Commission Notice 2016/C 115/05, Guidelines for the interpretation of Directive 2000/59/EC

following policy measures ("PM"), which seek to provide for better incentives for the delivery of waste, would qualify for further development through soft law:

- PM-2A: Introduce a shared methodology to calculate the indirect fee and the 'right to deliver';
- PM-2C: Incentivise measures that reduce the amount of waste produced on-board. For this the current provisions for green ships should be further improved;
- PM-2E: Development of "fishing for litter" schemes to effectively deal with passively fished waste from fishing vessels.

5.3.3. Policy option 3: MARPOL alignment

Policy option 3 is referred to as "MARPOL alignment" as it seeks **further approximation** to the MARPOL Convention, in particular the MARPOL Annexes. At the same time, **it does not mean a full alignment with MARPOL** either, as this would require abandoning existing requirements in the Directive, such as the development of Waste Reception and Handling Plans and the development of cost recovery systems, which are important features of the PRF regime that should remain and even be further strengthened in order to fully respond to the concerns identified in the ex-post evaluation.

In the first place, the MARPOL alignment option defines the **scope of the mandatory delivery** requirement in article 7 in relation to MARPOL: the delivery obligation will reflect the MARPOL discharge prohibition, i.e.: what cannot be discharged under MARPOL shall be delivered to PRF by ships calling in EU ports. This should also be reflected in the interpretation of the sufficient storage capacity exception in article 7.2, which in turn should be more flexible and take account of MARPOL legal discharges until the next port of delivery.

In addition, Policy option 3 aims to **fully align the definition of ship-generated waste (article 2 of the Directive) with the Annexes of MARPOL**. This would involve including a reference to MARPOL Annex VI, as well as the cargo residues which are currently defined as a separate category of waste under the Directive (including MARPOL Annexes I and II wash waters, as well as MARPOL Annex V cargo residues).

By extension, this would allow for the **waste notification form to be aligned with the IMO Circular** MEPC.1/Circ. 834, notably for the same categories of waste to be reflected. The same would be the case for the waste receipt to be introduced under this option, which would also fully reflect the waste receipt included in IMO Circular 834.

Policy option 3 will also bring the Directive's **inspections fully under the Port State Control** Regime, which provides for a risk-based selection system of ships for inspection. This would imply that every initial Port State Control inspection also checks compliance with the Directive, in particular the mandatory delivery of ship-generated waste. This will require the Port State Control Directive to be amended to incorporate these inspections, as well as new priority criteria[112] to be incorporated in Annex I to the Port State Control Directive. Combining PRF inspections with Port State Control inspections **would allow for checking MARPOL and compliance with the Directive simultaneously.**

As mentioned before, Policy option 3 also includes measures for improving the adequacy of port reception facilities (defined in accordance with IMO Guidelines), which address both the

[112] Additional overriding factors and/or unexpected factors; EMSA assessment of the enforcement options for the revision (see Annex 7)

operational conditions of the facilities through a more refined definition of "adequacy", as well as the environmental operation of the facilities in accordance with EU waste legislation. In addition, it contains measures for improving the incentives for delivery, such as further streamlining the underlying principles of the Cost Recovery Systems, in particular with regard to the requirement for an indirect fee, and providing rebates for ships that reduce waste generation on board ("green ships").

5.3.4. Policy option 4: EU PRF Regime beyond MARPOL

This option seeks to further strengthen the EU regime for the delivery of all ship-generated waste to port: the mandatory delivery applies to all waste from ships, and this will include an express reference to the waste that can be legally discharged under MARPOL. As demonstrated by the overview of the MARPOL discharge norms, this would mostly have an effect on the delivery of small quantities of oily waste and sewage, which under strict operational conditions can be discharged at sea.

As it was not deemed appropriate to include a discharge prohibition in the Directive (see chapter 5.2 above), the effectiveness of this option depends on a strict enforcement of the mandatory delivery requirement in each EU port. It also depends on a restrictive interpretation of the exception of sufficient storage capacity, backed up by an electronic monitoring and information system[113], where the information from the advance waste notification as well as the waste receipt will be reported and exchanged between Member States. Policy option 4 would thus require the introduction of a dedicated targeting mechanism, defining the priorities for inspection (to be determined by alerts created on basis of the information notified/reported), as well as an inspection commitment for Member States to check compliance.

Policy option 4 implies keeping the distinction between ship-generated waste and cargo residues[114], as there are no valid reasons for subjecting the latter to the stricter EU regime, given their specific nature and the fact that they are mostly handled by the terminals, which is different from the ship-generated waste. The cargo residues would thus continue to be delivered in accordance with MARPOL, as is the case under the current Directive.

As a consequence, the forms to be used (waste notification and waste receipt) cannot be fully aligned with IMO Circular 834 either, as MARPOL applies different definitions for cargo residues as reflected in the Circular. Option 4 would only allow for the forms to be aligned with the Circular *to the extent possible*, which has already been the approach adopted so far by the waste expert group for implementing Annex II to the Directive[115].

This option includes the adequacy measures which build on the definition of adequacy in the IMO Guidelines and the principles of EU waste law. It also includes the measures for improving the incentives for delivery, including the introduction of harmonised criteria for considering a ship to be a “green ship” in the context of the Directive, i.e. that it reduces its waste generation on board, and may thus qualify for a reduction in the waste fees charged by the port[116].

[113] Building on the new version of SafeSeaNet, taking account of the latest changes to Annex II PRF Directive, as well as the dedicated module in THETIS-EU (available since April 2016)

[114] The definition of cargo residues in the Directive includes wash waters, as well as solid/liquid cargo residues, which is different from MARPOL, which only refers to cargo residues in the context of MARPOL Annex V

[115] To implement the changes to Annex II (waste notification) for the electronic reporting of the waste information in the National Single Window, new waste business rules were developed by a group of experts set up under the High Level Steering Group, which were adopted in July 2016 and endorsed by the HLSG in October 2016

[116] Article 8(2)c of the Port Reception Facilities Directive, also referred to as the “Green Ship concept”

5.3.5. Policy option variants 3b and 4b: additional focus on marine litter

An option variant has been defined to specifically address the issue of marine litter from ships (mostly covered by MARPOL Annex V waste). This option variant will group all the measures that can effectively make a contribution to reaching the overall reduction target set in the circular economy. The following two approaches are proposed:

1. **Approach based on incentives**: to provide for a maximum incentive not to discharge at sea but instead deliver the waste to a facility on land, the indirect part of the fee is set at 100%. Furthermore, as has been shown in the analysis, fishing vessels and small recreational craft can be held accountable for a significant part of the marine litter from sea-based sources. Therefore, in this approach fishing vessels and small recreational craft have been included in the indirect fee regime of the Directive. In addition, passively fished waste would also be brought under the scope of the Directive, and arrangements put in place so that this type of waste can be delivered on shore without fishing vessels having to pay additional charges.
2. **Approach based on enforcement and incentives** (more stringent variant): this approach includes the incentive part mentioned above, but also addresses the enforcement of the waste delivery obligation for fishing vessels and recreational craft. The current regime can be strengthened by including specific targets for these vessels in the Directive, including reporting on the results from inspections in the monitoring and information system (THETIS-EU module). For the enforcement part, a differentiated approach is adopted for fishing vessels and recreational craft, based on GT: Fishing vessels and recreational craft over 100 GT will be targeted, as these vessels according to MARPOL need to carry a garbage management plan on board[117], which constitutes a crucial document to be checked in the inspection.

This option variant (3b and 4b) will include the adequacy measures, as well as the measures for improving the incentives for delivery, including the Green Ship concept.

The Table below presents an overview of the policy measures per policy option. Please note that all options are scored against the baseline scenario (Policy option 1), which has scores of "0", and also refers to the relevant Guidance already available (Interpretive Guidelines-IG, Technical Recommendations-TR, and/or Inspection Guidance-IG[118]).

[117] MARPOL Annex V, Regulation 10 reads: "the garbage management plan shall provide written procedures for minimizing, collecting, storing, processing and disposing of garbage, including the use of the equipment on board. It shall also designate the person or persons in charge of carrying out the plan. Such a plan shall be based on the guidelines developed by the Organization and written in the working language of the crew"

[118] "IG" refers to Interpretive Guidelines (Commission Notice 2016/C 115/05 providing Guidelines for the Interpretation of Directive 2000/59/EC), TR refers to the Technical Recommendations developed by EMSA (Technical Recommendations for the implementation of the PRF Directive, 2016) and "GI" to Guidance for Inspections (EMSA, 2016)

Table 9: Policy measures and policy options

	PO-1: Baseline scenario	PO-2: Minimum Revision	PO-3A: MARPOL alignment	PO-3B: MARPOL alignment - - special focus on marine litter	PO-4A Stringent PRF regime - no special focus on marine	PO-4B: Stringent PRF regime - - special focus on
PM-1A: Broaden the scope of the PRF Directive to include MARPOL Annex VI waste (residues from exhaust gas cleaning systems).	0	✓	✓	✓	✓	✓
PM-1B: Reinforce the waste hierarchy as laid down in the Waste Framework Directive, promoting separate collection in view of reuse and recycling of ship-generated waste.	IG		✓	✓	✓	✓
PM-1C: Strengthen the requirements for systematic consultation of stakeholders in the development and updating of waste reception and handling (WRH) plans.	IG	✓	✓	✓	✓	✓
PM-1D: Provide a better definition of 'adequacy' in line with international guidance.	IG	✓	✓	✓	✓	✓
PM-2A: Introduce a shared methodology to calculate the indirect fee, including higher levels of transparency on the various elements of costs charged to port users for the use of PRFs, and introduce the "right to deliver".	0	SL	✓	✓	✓	✓
PM-2B: Introduce a 100% indirect fee for garbage.	0			✓		✓
PM-2C: Incentivise measures that reduce the amount of waste produced on-board. For this, the current provisions for green ships should be further improved.	0	SL	✓	✓	✓	✓
PM-2D: Incentivise the delivery of all waste from fishing vessels and small recreational craft to port reception facilities by including them in the indirect fee regime.	0			✓		✓
PM-2E: Fishing for litter: include passively fished waste into the scope of the Directive and in the indirect fee						
PM-3A.1: Clarify the position of the PRF Directive related to delivery of ship-generated waste. *Variant 1*: Align the scope of mandatory delivery with the MARPOL discharge norms	0		✓	✓		
PM-3A.2: Clarify the position of the PRF Directive related to delivery of ship-generated waste. *Variant 2*: Strengthen / emphasize the current Article 7 provision on delivery of all ship-generated waste, beyond the MARPOL discharge norms.	0				✓	✓
PM-3B: Introduce requirement for a waste receipt	0		✓	✓	✓	✓

	PO-1: Baseline scenario	PO-2: Minimum Revision	PO-3A: MARPOL alignment	PO-3B: MARPOL alignment - - special focus on marine litter	PO-4A Stringent PRF regime - no special focus on marine	PO-4B: Stringent PRF regime - - special focus on
to be issued upon delivery (*Variant 1*: fully aligned with IMO Circular 834, *Variant 2*: EU waste receipt based on IMO Circular).						
PM-3C.1: Clarify the definition of 'sufficient storage capacity' *Variant 1*: Sufficient Storage Capacity exception takes account of MARPOL legal discharges	0		✓	✓		
PM-3C.2: Clarify the definition of 'sufficient storage capacity' *Variant 2*: Sufficient Storage Capacity exception does not take account of MARPOL legal discharges, and is not allowed when the next port of call is located outside the EU.	TR				✓	✓
PM-3D.1: Replace the 25% minimum inspection requirement with a risk-based approach. Variant 1: Incorporate the inspections into the Port State Control Regime (amending Directive 2009/16/EC)	0		✓	✓		
PM-3D.2: Replace the 25% minimum inspection requirement with a risk based approach. Variant 2 Dedicated targeting mechanism.	IG, GI				✓	✓
PM-3E: Provide an annual inspection target for fishing vessels and small recreational craft	0			✓		✓
PM-3F: Extend the electronic Monitoring and Information System, based on THETIS (EU) and SSN, to ensure better reporting and exchange of information, including the essential information from the Waste Reception and Handling Plans.	0		✓	✓	✓	✓
PM-4A: Align the definitions of "cargo residues" and "ship-generated waste" with the definitions used in MARPOL	0		✓	✓		
PM-4B: Align and update the forms to reflect the IMO standard (IMO MEPC.1/Circ.834)	0		✓	✓		
PM-5A: Develop common criteria to be applied for the application and approval of exemptions, including the introduction of a standardised exemption certificate, while also setting minimal requirements on information exchange between relevant authorities.	IG, TR		✓	✓	✓	✓
PM-5B: Clarify in the legal text of the Directive that vessels which are operating exclusively within one	IG		✓	✓	✓	✓

	PO-1: Baseline scenario	PO-2: Minimum Revision	PO-3A: MARPOL alignment	PO-3B: MARPOL alignment - - special focus on marine litter	PO-4A Stringent PRF regime - no special focus on marine	PO-4B: Stringent PRF regime - - special focus on
port can also be exempted, provided they comply with the relevant conditions.						

As was explained at the beginning of this section, the approximation with the MARPOL convention has been a determining factor in designing the policy options. The degree of alignment with MARPOL differs between the options and is depicted in the Table below.

Table 10: policy options- degree of alignment with MARPOL

Policy options	**Scope (Ship Generated Waste – MARPOL Annexes)**	**Definitions (Ship Generated Waste , Cargo Residues)**	**Delivery obligation vs MARPOL discharge norms**	**Inspections (PRF vs PSC)**
PO-2	+ inclusion Annex VI waste	- distinction between SGW and CR maintained	- delivery beyond MARPOL discharge norms	- PRF inspection regime
PO-3	++ inclusion Annex VI waste, and delete distinction SGW and CR)	++ alignment definitions and forms	+ delivery in accordance with MARPOL discharge norms	+ PSC inspections (of the PRF delivery obligation)
PO-3b (ML variant)	+ inclusion Annex VI waste; - inclusion passively fished waste, and small fishing vessels and recreational craft in CRS	++ alignment definitions and forms	+ delivery in accordance with MARPOL discharge norms	+ PSC inspections (of the PRF delivery obligation, including for fishing vessels and recreational craft > 100GT)
PO-4	+ inclusion Annex VI waste	- distinction between SGW and CR maintained	- delivery beyond MARPOL discharge norms	- PRF inspection regime
PO-4b (ML variant)	+ inclusion Annex VI waste; - inclusion passively fished waste, and small fishing vessels and recreational craft in CRS	- distinction between SGW and CR maintained	- delivery beyond MARPOL discharge norms	- PRF inspection regime

It should also be noted that the measures addressing the **fishing vessels and small recreational** craft in option variants 3b and 4b as outlined above, constitute an add-on to the current regime, which already covers these vessels, but excludes them from the indirect fee, waste notification and the application of enforcement conditions and criteria. The following table provides an overview of the changes envisaged for these vessels under variant options 3b and 4b compared to their current position under the Directive.

Table 11: position of fishing vessels and recreational craft

Scope/obligation	Current regime	Option variants 3b and 4b
Overall scope	**All ships**, **including fishing vessels and recreational craft**, irrespective of their flag, calling at a port of a Member State	**All ships**, **including fishing vessels and recreational craft**, irrespective of their flag, calling at a port of a MS
Payment of the indirect fee	Principles of the indirect fee to apply to ships ***other than fishing vessels and recreational craft*** **authorised to carry no more than 12 passengers.**	Principles of the indirect fee (including 100% indirect fee for garbage) to apply to **all ships,** ***including fishing vessels and recreational craft.***
Inspections	Any ship may be subject to an inspection. The criteria and procedures for selecting ships for inspection do not apply to **fishing vessels and recreational craft authorised to carry no more than 12 passengers.** Control procedures to be developed for inspections, *to the extent required,* for **fishing vessels and for recreational craft authorised to carry no more than 12 passengers**	Any ship may be subject to an inspection. **20%** of the total of number of **fishing vessels** of **100 GT and above** calling in the MS annually; **20%** of the total of number of **recreational craft** of **100 GT and above** calling in the MS annually Procedures for inspections to be established for fishing vessels and recreational craft **below 100 GT**

6. ANALYSIS OF IMPACTS

6.1. Environmental impacts

Environmental impacts, in particular those defined as an increase in waste delivery to port reception facilities and a decrease in waste discharged at sea, are described below per policy option. The impact on the circular economy, which was introduced as an additional objective, has also been included in the assessment of expected environmental impacts of the different policy options.

6.1.1. Volume of waste discharged at sea and/or delivered in ports

Policy Options 2, 3, 4 and variants 3b and 4b all envisage the inclusion of MARPOL Annex VI waste in the scope of the Directive (PM-1A), which will require the provision of additional capacity in ports for the reception of this type of waste. Although MARPOL does not allow this waste to be discharged at sea, and requires reception facilities to be provided in ports, the current Directive does not include the corresponding provisions for this type of waste. It can be expected that inclusion of this waste in the Directive will improve enforcement of the MARPOL discharge prohibition and result in more deliveries of Annex VI waste in port[119]. However, this increase in delivery will highly depend on the uptake of Exhaust Gas Cleaning Systems (scrubbers) by the shipping market, which has been estimated at approximately 24,000m3 of sludge, and 360,000m3 bleed-off annually[120].

Also included in all policy options is the strengthened requirement for consultation (PM 1-C), which should improve the adequacy of PRFs as better tailored to the needs of port users. Improved consultation is expected to result in jointly agreed procedures and principles, as recorded in the Waste Reception and Handling Plans, as well as more commitment from port users to the proper management of their waste, including delivery, and more clarity on the operational aspects of the waste delivery and handling process. This should result in more waste being delivered in port.

Besides these, the relatively small number of policy measures in **Policy Option 2** (minimum revision) has a limited combined impact on waste delivery. Through soft law measures, additional waste impact can be generated if Member States wish to adhere to the policy lines recommended.

Policy Options 3 and 4 both contain additional measures which improve the adequacy of port reception facilities, incentives for delivery of the waste to those facilities, and the exemption regime for ships in scheduled and regular traffic. The measures with the greatest potential for generating increased waste delivery are described below.

As confirmed by the results of the Open Public Consultation[121], inefficient cost incentives are an important reason for the illegal discharge of waste at sea. By streamlining the indirect fee, and making the link between fees and costs more transparent – while clarifying that the payment of the fee also provides a right to deliver the waste – the incentive regime will be more harmonised, in particular as regards *the level* of the financial incentive provided. A stronger incentive through harmonisation of the indirect fee is expected to lead to more deliveries of the different waste types in specific ports, which before introduction of the measure applied a lower indirect fee. However, it has been questioned whether this will result in an overall increase of volumes of waste delivered at the EU aggregate level[122].

[119] As also confirmed by stakeholders to the targeted surveys: 30 respondents (i.e.73% of the 41 who replied to this specific question) in the targeted survey indicated an expected increase in the amount of scrubber waste delivered to ports from the introduction of this measure, accompanied by a decrease of discharges of this waste at sea, as expected by 15 out of 27 respondents (i.e. 56%).

[120] See Annex 5, waste analysis

[121] 59 of the 79 (75%) respondents to the Open Public Consultation considered that inefficient incentives are an important or very important contributing factor to the (illegal) discharge of ship-generated waste and cargo residues at sea. This makes it the first contributing factor according to the responses to the OPC. Respondents were mostly composed of port authorities and their associations, port users, PRF operators and their associations, and Member States authorities

[122] There was general agreement among respondents to the targeted survey that the introduction of a shared methodology to calculate the indirect fees would lead to a higher level of incentive for delivery in port. However, 13 out of 20 respondents on this question (65%) did not expect a significant increase in volumes of waste to be delivered at the aggregated EU level. This was also confirmed by the ESSF PRF Subgroup, which assessed the impacts of the recommendations for streamlining the cost recovery systems as developed by the Correspondence Group

The main differences between Options 3 and 4 in terms of waste delivery will come from the proposed enforcement measures, which are different for the two Policy Options. Generally it can be expected that improved inspections will result in more waste being delivered.

Policy Option 3 (MARPOL alignment) relies on the inclusion of the inspections in the Port State Control regime. Compared to the baseline scenario, where 25% of all individual ships calling annually need to be inspected, the incorporation of inspections into the Port State Control regime, and the subsequent scope for applying a risk-based approach, will result in a considerable decrease of inspections to be undertaken. At the same time, the system will be more effective than the current regime, as it also allows for checking compliance with the Directive's delivery obligation and the MARPOL requirements through the same procedures, which overall is expected to result in better compliance and implementation than is currently the case[123]. A more effective inspection regime will also have a deterrent effect on ships visiting EU ports, and it is to be expected to result in more waste being delivered, as was also confirmed by 42 % of the respondents to the targeted survey (mainly PRF operators and port authorities).

Policy Option variant 3b (MARPOL alignment, with special focus on marine litter) would lead to even more waste to be delivered to port, in particular from the fishing sector. This would result mainly from the following additional measures: PM-2B (100% indirect fee for garbage) is expected to contribute to the delivery of garbage waste, as it should allow the ship, after having paid the indirect fee, to deliver all its garbage to the port without having to pay any additional direct charges[124]. The inclusion of fishing vessels and small recreational craft in the indirect fee obligation would also provide a better incentive for these vessels to deliver their waste to port instead of discharging at sea[125]. This can be further strengthened by more effective enforcement of larger fishing vessels and pleasure craft (over 100GT), which according to MARPOL rules are obliged to carry a garbage management book on board. An additional increase in waste delivered in ports is to be expected from PM-2E (incentivising the delivery of passively fished waste by fishing vessels to port reception facilities through the fishing for litter programmes). This would bring passively fished waste into the scope of the Directive, as well as the indirect fee, allowing fishing vessels to deliver this waste to port without having to pay additional direct charges. A majority of respondents to the targeted survey for the fishing sector (14 out of the 18 who expressed an opinion, i.e. 78%) were in favour of the introduction of the possibility to deliver the waste caught in nets or deliberately retrieved from sea under the indirect fee.

Policy Option 4 (EU PRF regime, without additional focus on marine litter) is expected to result in more waste being delivered to port reception facilities than policy option 3 (MARPOL alignment), as this policy option would also target the waste that could otherwise be kept on board for subsequent discharge under the MARPOL norms. This would be particularly relevant for sewage, in particular the sewage that has been generated in the port, as well as small quantities of oily waste. As a result, the discharge of these categories of waste at sea is expected to be reduced. However, it should be noted that having a strict delivery obligation in place is not the same as a discharge prohibition (which has been discarded as a policy measure; see chapter 5.2). A delivery obligation will not directly regulate the ship's

[123] As explained in the baseline scenario and problem definition, MS currently do not meet the 25% inspection requirement set out in the Directive and insufficient PRF inspections are undertaken

[124] 47% of the respondents to the targeted survey confirmed that the application of the 100% indirect fee system for garbage will have a positive impact on waste delivery in ports

[125] However, it should be acknowledged that currently in most fee systems in EU ports, fishing vessels already pay a monthly or yearly fee (as part of the port dues), which should cover their household and operational waste, as reported at the 6th meeting of the PRF Subgroup under the ESSF, panel discussion on waste from the fishing sector (4 October, 2016)

operations at sea, but may at most reduce *the need* for the ship to discharge, in particular through a strict application of the exception of sufficient storage capacity on board until the next port of call. If the application of this exception does not take into account potential legal (MARPOL) discharges at sea but requires the storage capacity to be sufficient until the next port, then the ships will have less operational needs to discharge *en route*. Therefore, limited additional waste deliveries may be expected, but will be difficult to estimate due to the fact that this depends on the ship's operations at sea.

In **Policy Option 4b** (EU PRF regime, with special focus on marine litter), additional delivery of garbage waste can be expected, in line with the description of the impacts for Policy option 3b, as explained above.

In **Policy Options 3 and 4** (both variants), a significant contribution to all illegal waste discharges could be provided. While it is not possible to provide an exact quantification of the expected increase in waste deliveries, it is important to note the substantial marginal effects of every 1%-increase in terms of reduction of the waste gap. Taking into account the estimates of the waste gap provided in chapter 2, every 1%-increase in deliveries in all waste categories would result in: 11,900 m^3 of additional oily waste delivered (waste gap reduced by 40%), 12,300 m^3 of additional sewage delivered (waste gap reduced by 9%) and 5,800-8,200 tonnes of additional garbage delivered (waste gap reduced by 2-14%).
This indicates that even slight changes in delivery would have substantial environmental impacts. As regards Policy options 3b and 4b, additional delivery of garbage may be expected in comparison to options 3a and 4a.

The significance of the potential environmental benefits can be illustrated by looking at the example of **garbage** discharges and their potential environmental costs. Every **1% increase** of discharges of garbage at sea, corresponding to between 5,800 to 8,200 tonnes of garbage delivered on-shore, may result in:

- 1.6 to 2.3 M€ beach clean-up costs;
- 1.2 to 1.6 M€ damage for the fishing sector (based on studies mentioned in section 2.1);
- Costs to the marine ecosystems which cannot be monetized, but have been described by marine biologists, as also shown in the environmental vulnerability analysis (annex 8).

These figures also include the garbage waste from fishing vessels and recreational craft, which - considering the share of these vessels in the total annual on-board generation of garbage (30% and 19% respectively, corresponding to 437,000 tonnes of garbage) - contribute significantly to the problem of marine litter and the associated costs. This justifies including specific measures for these vessels in Options 3b and 4b in order to maximise the potential for garbage delivery on shore.

Therefore, even focusing on garbage alone and on those impacts which can be monetised, a 1% increase in delivery of waste to port reception facilities will generate environmental impacts high enough to outweigh the regulatory costs. Indeed, for all the options considered, the order of magnitude of costs does not exceed hundreds of thousands of euros, as opposed to millions of euros as regards the expected environmental benefits.

Table 12: Waste potentially discharged at sea in the baseline scenario (as absolute value and as percentage of total waste to be delivered)

Oily waste	Sewage	Garbage (*including fishing vessels and small recreational craft)	Annex VI waste
31,000 m^3 (2.5%)	136,000 m^3 (10%)	60,000-300,000 tonnes (7-34%)	Unknown

The results of the environmental vulnerability analysis indicate that, for a given volume of waste delivered to port reception facilities, avoidable negative environmental impacts are not equal for all types of waste. It appears, for example, that negative effects are higher for garbage in all sea basins. Therefore the potential for additional garbage to be delivered should be assigned a higher weighting factor when considering the actual environmental impacts. Furthermore, for oily waste and sewage, the environmental impacts are different per sea basin. Taking into account the outcomes from the vulnerability analysis, it may be concluded that Policy Options 3b and 4b will generate the highest environmental benefits, as these are the options that are the most effective in reducing garbage.

6.1.2. Circular economy

In addition to increasing waste delivery in ports, the options have the potential to contribute to the circular economy, in particular by improving waste management practices in ports as well as on board vessels. This is mostly the case through PM 1B and 1D, which seek to reinforce the waste hierarchy in EU law, in particular through separate collection of waste[126], and a better definition of adequacy, which should also cover the environmental operation of port reception facilities. In addition, PM 1C seeks to improve consultation of stakeholders in the process, which also allows for the principles of the circular economy to be better implemented[127]. Providing for harmonised criteria for green ships will promote the uptake of sustainable waste practices on board, including segregation and waste minimisation, thus also contributing to the circular economy.

Policy Option 2 (minimum revision), which includes measures 1C (consultation with port users) and 1D (adequacy definition) as part of a minimum legislative revision, is thus expected to generate a positive impact on the circular economy. However, the important measure of separate collection is not included, limiting this potential contribution. Encouraging incentive schemes to promote better waste practices on board ("green ship award schemes") can be fostered and aligned through soft law guidance.

Both **Policy Option 3** (MARPOL alignment) and **Policy Option 4** (EU PRF regime) provide for measures 1B (waste hierarch), 1C (consultation with port users), as well as 1D (adequacy definition), thus including the main elements that will generate positive effects for the circular economy. In addition, both policy options include PM–3B (waste receipt), which may produce additional benefits from increased monitoring of waste streams delivered in ports.

[126] A recent study conducted for DG ENV on separate collection concluded that 'Separate collection of waste fractions leads to higher recycling levels, as the fractions collected separately are usually sent to recovery operations, in particular to recycling' (p.18), http://ec.europa.eu/environment/waste/studies/pdf/Separate%20collection_Final%20Report.pdf

[127] Stakeholder involvement may lead to better recycling results as was shown in a recent study carried out by La Sapienza University on door-to door collection schemes in three communities in Italy; https://www.uclgcisdp.org/sites/default/files/Capannori_2010_en_FINAL.pdf.

The policy measures dedicated to marine litter contained in **Policy Options 3b and 4b** are all expected to result in additional deliveries of garbage waste to port reception facilities. This waste, which would also include passively fished waste (i.e. the waste caught in nets during fishing operations) through the application of the fishing for litter schemes, has the potential to be further re-used or recycled. This in turn will generate further revenues for waste operators. These options thus score even higher in terms of their contribution to the circular economy.

Table 13: Synthesis of environmental impacts

	Waste delivered	Circular economy
	Potential:	
Option 2	+ for oily waste + for sewage + for garbage	+
Option 3a	++ for oily waste ++ for sewage ++ for garbage	++
Option 3b	++ for oily waste ++ for sewage +++ for garbage	+++
Option 4a	++ for oily waste +++ for sewage ++ for garbage Additional potential for waste treated/legally discharged	+++
Option 4b	++ for oily waste +++ for sewage +++ for garbage (additional potential for treated / legally discharged waste)	++++

6.2. Economic impacts

6.2.1. Enforcement costs

The enforcement costs comprise all costs borne by the authorities to enforce legislation. These costs are expected mainly as a consequence of the inspection requirements to be included in the revised Directive[128].

In **Policy Option 2**, no new enforcement requirements are introduced in the revision of the Directive, so there are no additional enforcement costs to be borne.

In **Policy Options 3 (both variants)**, the inspections are incorporated in the PSC Regime (by amending Directive 2009/16/EC). The main benefit from this approach in comparison with the baseline is that through the Port State Control regime the selection of ships will be made

[128] The estimates of inspection costs in this section are based on the EMSA assessment of the enforcement option in **Annex 7.** The calculations depart from the premise that under the PSC regime 15186 inspections are conducted, against 17222 inspections under the current Directive based on the 25% inspection target. Inspection costs under option 3 are based on 15min additional time, whereas under option 4 a 2hr inspection time for a dedicated PRF inspection is assumed, at 21,95 € average wage cost p/hr. For detailed calculations see **Annex 9**

on a risk basis, focused on those ships posing the highest risk. Furthermore, this approach entails clear follow-up procedures in the context of the Port State Control Directive, as well as recording of all inspections in a database (THETIS).

Annually, 15,186 inspections are conducted in EU Member States under the Port State Control Regime. Using the opportunity of these inspections to also check whether the ship has delivered its waste in accordance with the Directive, or whether it has sufficient capacity on board for delivery in the next port, is estimated to cost 85,500€ per year. In order to retain domestic vessels in the scope of the inspections, a separate regime will have to complement the inspections under Port State Control. Checking 20% of all domestic vessels each year (ca. 600 inspections) would cost around 26,000€ on a yearly basis.

In **Policy Option 3b**, in addition to the costs incurred under option 3A, fishing vessels and small recreational craft would also be brought into the scope of the inspection regime. If the target is set at the inspection of 20% of fishing vessels over 100GT and 20% of small recreational vessels over 100GT, the *additional* costs of inspections under these variant options have been estimated at 34,000€ per year (for around 770 vessels).

The total **inspection costs** for **Policy Option 3a** are therefore estimated at 110,000€ per year (for approximately 16,000 inspections) and the total inspection costs for **Option 3b** are estimated at 144,000€ per year (for approximately 17,000 inspections).

In **Policy Option 4 (both variants)**, a dedicated EU PRF regime would need to be developed, with a PRF targeting mechanism allowing for ships to be selected for inspection. The implementation of this dedicated regime would result in a total of 17,000 inspections per year, for which the costs have been estimated to be around 757,000€.

In **Policy Option 4b**, the same additional costs as in **Policy Option 3b** are incurred from bringing fishing vessels and small recreational crafts into the scope of PRF inspections (PM-3E), i.e. with the same inspection target of 20%, resulting in an *additional* cost for inspection of 34,000€ per year (covering 800 vessels).

Thus, the total inspection costs for **Policy Option 4a** are estimated at 757,000€ per year (for 17,000 inspections) and the total estimated costs for **Policy Option 4b** at 791,000€ per year (for approximately 18,000 inspections).

These costs have been compared with the inspection costs from full compliance with the requirements in the current Directive, imposing a 25% minimum yearly inspection target. Based on available data on the number of vessels, this target would translate into 19,500 inspections per year in EU Member States. As the Directive stipulates, it is possible for Member States to conduct the PRF inspections within the framework of Port State Control. The associated inspection costs are estimated to be around 429,000€ per year.

6.2.2. Compliance costs

Compliance costs, including the investment and operational costs incurred from complying with the proposed measures, will mostly fall on ports and Member State competent authorities, in particular:

- Ports may have to invest in new facilities or upgrade existing facilities as a result of bringing MARPOL Annex VI waste into the scope of the Directive (PM 1A). The measure is expected to give rise to additional costs for providing adequate storage,

reception and treatment for this type of waste. However, Member States – as contracting parties to IMO – already need to comply with the requirements under MARPOL to provide for adequate port reception facilities, and to deliver this waste on land, as discharge at sea is prohibited under Annex VI. Therefore, it is assumed that basic infrastructure for receiving this waste is already in place in those ports that are regularly visited by ships with scrubbers on board, and compliance costs will therefore be limited[129].

- In addition, a number of other policy measures (incentive measures PM 2B and PM 2D, enforcement measures PM 3A and PM 3D) are expected to result in more waste, in particular garbage, being delivered to ports as a consequence of better incentives and enforcement. This will require the development of additional capacity for the reception and treatment of the extra waste delivered. On the other side, the incentive measures, in particular measure 2C ("harmonisation of the green ship concept") should facilitate compliance of the shipping sector and reduce the costs associated with waste delivery.
- Ports and municipal authorities will have to provide for **separate collection of waste** from ships[130] (PM 1B), to adjust their **cost recovery system** to provide for 100% indirect fee for garbage (PM 2B), and to rearrange their inspection regimes (3D.1 and 3D.2). At the same time, separate collection is expected to generate new revenues for the ports that can compensate for the new investments in waste collection[131].

Generally it has been difficult to acquire data from ports as regards the compliance costs (including investment costs) to be expected from the proposed policy measures, as it concerns commercially sensitive data. Although a qualitative description has been provided by stakeholders (see Annex 2 – results from the stakeholder consultation)[132], no exact figures have been provided, except in the case of the costs incurred with the application of the No Special Fee System in ports, as referred to below.

As regards the **separate collection of waste**, initial costs for the establishment of these systems should be distinguished from annual running costs. Although some data on costs for separate collection systems in EU municipalities is available[133], these are not directly applicable to ports, as the data apply to households and are quoted per capita. Some parallels may be drawn to the door to door collection system, where in some ports collection takes place through the employment of barges, whereas in other ports a system of bring points or civic amenity sites is in place. However, given that waste generation and treatment on board differs widely from that by households, a direct comparison between persons per household and passengers on board cannot be drawn. Moreover, ports differ widely, in terms of size, type of traffic and administrative organisation, and infrastructure on waste collection and management in many cases also depend on the municipal set up already in place (as required under EU waste legislation[134]). For these reasons, the available data cannot be applied in the context of waste collection in port.

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[129] This has been confirmed in the 5 case studies conducted for the Impact Assessment support study (Ecorys, 2017), which indicate that only limited technical adjustments to existing facilities would be required at low investment costs

[130] 24 respondents (68%) to the targeted survey expect an increase in investment costs

[131] As concluded in the Impact Assessment for the revision of the Waste Framework Directive, SWD (2014)207final; part 2/6, and the Eunomia study in support of the waste targets review. This was confirmed by 60% of respondents to the targeted survey who expect separate collection to generate new business for PRF operators

[132] A description of expected impacts from streamlining the principles of the Cost Recovery Systems in article 8 of the Directive was provided by the Correspondence Group set up under the ESSF PRF Subgroup; interim report October 2016

[133] DG ENV study on " **Assessment of separate collection schemes in the 28 capitals in the EU);** http://ec.europa.eu/environment/waste/studies/pdf/Separate%20collection_Final%20Report.pdf); the average costs for the door-to door separate collection system as well as the bring points have been considered in this study. The establishment costs for door-to-door collection systems have been estimated at 3 euro/cap, whereas annual running costs have been estimated at 11 euro/cap. For the bring points, costs are estimated at 5 euro/cap for setting up this system, and 5 euro/cap for running the system

[134] According to article 10 and 11 of the Waste Framework Directive Member States are required to set up separate collection of waste to promote recovery and recycling, where this is technically, environmentally and economically practicable

Concerning the transition to the **No Special Fee System** in ports for the reception and handling of **garbage**, limited data is available. However, the Correspondence Group under the ESSF has reported that the operation of this system in one of the larger ports in the Mediterranean has resulted in a 700,000 euro deficit in 2016, while some of the large ports claimed that the introduction of such a fee system could result in a doubling of the waste fee to cover all the costs related to collection and handling of garbage from ships, including the hazardous waste, which can be very expensive to manage. Acknowledging that this cost is highly dependent on other factors, such as the port's administrative set up, type and number of ships calling and type of waste being delivered, it can serve as an illustration of costs that could be incurred from setting in place and operating the No Special Fee System in a port. At the same time it should be noted that the transition cost for the EU as a whole will be limited, as the majority of ports already has some form of No Special Fee system in place with respect to garbage from ships[135]., and because funds should be available from EU producer responsibility systems for certain waste streams as required under EU waste legislation[136].

Policy Option 2 (minimum revision) will not require significant additional investments to what is already undertaken in the baseline scenario. However, the inclusion of MARPOL Annex VI waste in the scope of the Directive may require additional investments in waste reception facilities in ports to handle this specific type of waste, with more impacts to be expected for ports bordering the special Emission Control Areas, i.e. the North Sea and the Baltic, where standards for Nitrogen Oxide (Nox) and Sulphur Oxide (Sox) emissions are more stringent. Otherwise, as option 2 mainly consists of concise legal adjustments to the PRF Directive and soft law measures, limited impact is expected in terms of compliance costs.

Under **Policy Options 3 and 4**, in addition to investing in additional capacity of PRF to receive MARPOL Annex VI waste (as described above), additional compliance costs may be expected for ports in relation to setting up separate collection schemes to receive the waste that has already been segregated on board[137]. Although Member States should already have this system and the related infrastructure in place as required under the Waste Framework Directive, a number of Member States do not provide for separate collection at municipal/port level[138]. As such, implementing this requirement for separate collection of waste in ports, should also help improve Member States' compliance with obligations under EU waste legislation, which should be considered positively in the overall assessment of the compliance costs of these options. Operational costs may also be incurred through the creation and implementation of incentive schemes based on harmonised criteria for recognising green ships, which reduce the amount of waste produced on board (PM 2C).

Furthermore, additional compliance costs may be expected for Member State authorities under **Policy Options 3b and 4b** from the transition to the 100% indirect fee system for garbage (PM-2B). This applies in particular to the initial phase when the existing Cost Recovery Systems will have to be re-designed to meet the criteria of the 100% indirect fee

[135] According to an assessment done by EMSA, only 4 out of the 23 Member States with ports, currently do not operate a 100% indirect fee (or No Special Fee) system for garbage, i.e. the Netherlands, Belgium, Greece and Malta

[136] In particular as required by Directive 2008/98/EC (Waste Framework Directive), Directive 2012/19/EU (Waste Electrical and Electronic Equipment) and Directive 2006/66/EC (Batteries)

[137] Under the proposed revision of the Waste Framework Directive 2008/98/EC (chosen scenario 17), recycling collection costs per se denote a cost to society. However, the savings from residual waste collection and treatment outweigh the costs of recycling collection and add up for EU28, over the period 2015-2035, to a financial benefit of €4.93 Billion in 2015 real term prices. The net social costs for EU28 amount to €24.50 Billion over the same period. (see Eunomia, (2015), Support to the Waste Targets Review, Analysis of new Policy options, pages 66, Figure 4-22, and 68. Table 4-10)

[138] Where this is not deemed "technically, environmentally and economically viable" as specified in article 10 and 11 of Directive 2008/98/EC on waste

system. This system requires the indirect fee, which is to be paid irrespective of delivery, to cover all of the costs from the reception and handling of the garbage delivered. As such, payment of the fee should allow the ship to deliver all its garbage without having to pay any additional fees. It should be noted that the majority of MS already have this system in place for receiving garbage from ships[139]. If fishing vessels and small recreational craft are also included in the 100% indirect fee systems (PM-2D), including the waste collected under the "fishing for litter schemes" (PM-2E), compliance costs for ports may increase[140] because of the additional waste being delivered. However, these may be offset by a decrease in waste accounting costs, as passively collected waste will no longer have to be distinguished from the waste generated by the vessel itself[141]. At the ship side, operational costs are expected to increase as a result of additional handling and storage of waste, including passively fished waste, although this cost increase will in principle be limited given the non-mandatory nature of the fishing for litter schemes.

The operational costs for **Policy Option 4** (EU PRF regime) are higher than in Policy Option 3 and are mostly related to the enforcement measures, such as the provision of specific training for inspectors to be able to implement the new/dedicated inspection regime (PM 3.D2), as well as the extension of the electronic monitoring and information system to provide for operational alerts (PM-3F)[142].

6.2.3. Administrative burden and simplification

Administrative burden comprises all costs borne by businesses, citizens or organisations as a result of administrative activities performed to comply with information obligations contained in the legislation. In the context of the Directive, information obligations are primarily borne by ship owners through having to submit the Advance Waste Notifications, and through the provision of information and documents during inspections. Furthermore, ports/competent authorities are facing administrative burden from assessing the Advance Waste Notification, assessing and granting exemptions and reporting/documenting the results from inspections (see chapter 2.2.2). Therefore, the administrative burden is most likely to be affected by the policy measures improving the consistency in **definitions/forms**, as well as the **enforcement** and **exemption regimes**.

Time spent by port users during inspections to demonstrate compliance is also considered as administrative burden from the port user's perspective. Applying the standard cost model, the total time spent in inspections determines the amount of administrative burden borne by the port users. As developed in previous sections, different options provide for different enforcement regimes.

The Territorial Impact Assessment has shown that positive impacts in terms of governance effectiveness may be expected in certain regions in the EU. In particular, the coastal areas in the Eastern part of the Baltic Sea, as well as EU coastal regions bordering the Black Sea, may benefit from the revision of the Directive, especially the measures aimed at simplifying and

[139] From the 23 port states in the EU, 19 MS apply the 100% NSF system for garbage (source: EMSA assessment, January 2017).

[140] 8 out of 19 respondents (43 %) to the fisheries survey expect that this will lead to an increase in investment costs. At the same time, the same percentage of respondents believed that this measure will lead to additional business for PRF operators

[141] The total cost of waste disposal is estimated at €2,750,000 (annual cost per vessel: 172 EUR); this figure is based on the large scale fishing fleet of 16,000 vessels. The total cost of additional waste disposal from incorporating the fishing for litter schemes should be off set against the cost that marine litter to the fishing industry, which is estimated at 300 mio EUR annually (loss of revenue) (source: DG MARE)

[142] These costs are estimated at approximately 70,000 Euro for two training sessions per year, and a sum of 30-50,000 Euro for making the necessary changes to the Port State Control Database (EU module for PRF inspections)

improving transparency (PM-2A), which are closely linked to the reduction of administrative burden.

Policy Option 2 (minimum revision) has some potential for reducing the administration burden by providing a clearer definition of adequacy, as well as (partially) aligning the scope of the Directive with MARPOL by including Annex VI waste, which will also be reflected in the reporting forms used.

Both **Policy Options 3 and 4** are expected to result in administrative burden reduction through the introduction of a shared methodology to calculate the indirect fee, as well as through greater transparency in the relation between fees and costs (PM 2-A). A majority of ports and port users welcome a standard calculation method and clarification of the costs included[143].

Policy Option 3 (MARPOL alignment*)* has the greatest potential for reducing the administrative burden, as this option groups several measures, which all seek to align the PRF system with MARPOL. This alignment also provides significant potential for simplification of the PRF regime, in particular by:

- Aligning the scope of the mandatory delivery obligation with the MARPOL discharge norms (PM 3-A.1), which also allows for mirroring the MARPOL definitions of Ship Generated Waste and Cargo Residues (PM-4A). This in turn will allow for the forms, notably the **advance waste notification**, to be fully aligned with the IMO form (IMO Circular 834) as described in PM4B. Cost savings from this alignment of the waste notification with the IMO Circular are estimated at 2,888,000€[144]. There may be some additional administrative cost from issuing and reporting the waste receipt (PM-3B). However, this is expected to be limited given that in most cases such a receipt is already issued upon delivery [145], and by extension, information on actual delivery in the *previous* port should normally have been reported through the advance waste notification;
- Incorporating **inspections** within the **Port State Control regime** (PM 3D.1). Expected cost savings from this measure for the crew involved in the inspection on board are estimated at: 386,000€[146]. In addition, clarification of the Sufficient Storage Capacity thresholds in accordance with the MARPOL discharge norms should alleviate the administrative burden for ship operators[147]. Improved reporting and exchange of information (PM 3F) are also expected to reduce the administrative burden on competent authorities and inspectorate bodies in charge of monitoring and enforcement.

Both **Policy Options 3 and 4** include the policy measure on harmonising the **exemption procedures** for ships in scheduled and regular traffic (PM 5-A), which will include the

[143] A Correspondence Group was set up by the ESSF PRF Subgroup in October 2015 to assess the scope of further streamlining the fee systems in EU ports, and issued a list of 9 recommendations to the Commission in June 2016, including a method for calculating the "significant contribution" (which defines the indirect fee). The Correspondence Group included ports, port users and MS competent authorities

[144] This estimate of cost savings for port users is based on an assumed 5% time saving for freighters, with 1hr average time for completing the advance waste notification and 1% for passenger ships, with 4hr average time for the waste notification per port call; for cruise vessels the assumed time saving is also 1%, but with an average 8hrs for completing the advance waste notification; see annex 9 for detailed cost calculations

[145] The case studies conducted in the context of the IA support study (Ecorys, 2017) confirmed that it is already common practice to issue a waste receipt to the ship upon delivery of the waste

[146] Based on a yearly number of 15186 vessels being inspected under PSC yearly, with 15 minutes additional time for the PRF inspection, at 26.60 euro p/hr average wage cost in the maritime sector (Eurostat 2016); see Annex 9 for detailed calculations

[147] The application of different thresholds for determining the sufficient storage capacity in the EU ports, was considered one of the main reasons for unnecessary administrative burden by a majority of stakeholders in the pubic consultation

introduction of a standard exemption certificate and electronic exchange of information of the exemptions through SafeSeaNet. This approach should make it easier for competent authorities to assess exemption requests, and monitor the exempted ships. Potential gains in time and cost are estimated at approximately 4,100,000€[148]. Also on the ship's side, this should lead to more clarity on eligibility and documentation to be provided, plus reduced time for obtaining an exemption if all conditions have been complied with.

For **Policy Option 3b** (MARPOL – special focus on marine litter) the policy measures to reduce marine litter may create additional administrative burden for smaller vessels and ports, in particular the proposed inspection regime for fishing vessels and recreational craft > 100GT, which will require additional efforts at the inspection as well as the ship's side. At the operational side of the ship, a limited increase of administrative burden on the ship's crew involved in the inspection may be expected, which is estimated at 41 000€ annually[149]. Consequently, policy option 3b is likely to increase the administrative burden to some extent compared to policy option 3A. On the other hand, it is expected that the 100% indirect fee system for garbage will be easier to operate than other systems currently in place, and would result in a reduction of the administrative burden for ports and port users.

For **Policy Option 4** the administrative burden overall has a different outlook. Although administrative costs will be reduced from introducing a more harmonised exemption regime (PM 5-A), the potential for administrative burden reduction of this policy option is limited, as definitions are not aligned with those used in MARPOL, and therefore the reporting forms cannot be standardised with the IMO Circular. The main difference compared to policy option 3 is related to the impact from the enforcement variants under this option: PM-3A.2 (strict mandatory delivery obligation for all waste) may generate an increase in administrative burden, mainly as a result of having a dual system in place with a strong need for inspections. The increase in administrative burden for the crew on board involved in the inspection has been estimated at approximately 400,000 € annually[150]. The introduction of a EU waste receipt (PM-3B.2) that is not fully aligned to the IMO waste receipt is also expected to generate additional administrative burden on port authorities.

The specific policy measures that focus on marine litter included in **Policy Option 4b** may increase the administrative burden even further, to the extent described for option 3b above.

6.2.4. Business for port reception facility operators

An increase in waste delivery will create new business and revenues for port reception facility operators. Consequently, this impact follows the pattern of volumes of waste delivered in ports, as described under the environmental impacts above.

Policy Option 2 will only result in a limited increase of waste delivered, and will thus not generate significant additional business for port reception facility operators.

[148] This estimate is based on the assumption that around 2500 exemptions are granted annually, with a an average of 30 days for assessing and granting the exemption, and an average of 10 days' time reduction expected from the proposed measures; see Annex 9 for detailed calculations. The estimated time gain from having a more harmonised exemption regime was confirmed by the Correspondence Group on Exemptions (set up by at the last meeting of ESSF PRF Subgroup in February 2017, to assess the issue of exemptions and advise the Commission how best to address this in the revision)

[149] Based on an additional 770 inspections, 2hr inspection time and an average hourly wage of 26.60€ (Eurostat, average wage for the maritime sector in 2016); see Annex 9

[150] This estimate is based on the total number 17220 inspections per year under the dedicated PRF inspection regime, with 2hr average time spent by a crew member at 26.60 euro p/hr (average wage cost in the maritime sector in 2016, Eurostat); see Annex 9

Policy Option 3 is expected to result in increased waste deliveries following the incentive measures (PM 2A, 2B) and the measures improving the enforcement regime (PM 3D.1). This impact will be even higher for **policy option 3b** (MARPOL alignment with special focus on marine litter), as the measures focused on marine litter should result in more waste deliveries from the fishing and recreational sector, with a residual value for subsequent recycling/reuse if handled properly.

Policy Option 4 (EU PRF regime*)* could have an even more substantial impact on business for port reception facility operators, as this policy option strengthens the strict delivery obligation in ports (PM 3A.2) supported by a dedicated monitoring and inspection regime (PM 3D.2 and PM 3F), which is expected to result in more waste being delivered to port reception facilities, in particular sewage. Similar to Option 3b, **Policy Option 4b** (EU PRF regime with special focus on marine litter) is expected to provide an additional increase in business for port reception facility operators, mostly from the waste being delivered by the fishing and recreational sectors.

6.2.5. SMEs

The impact on SMEs is mainly linked to three factors: (i) the impact on waste delivered at ports, creating additional business for port reception facilities, (ii) the position of the fishing sector, affected through a number of policy measures that are specifically targeting this sector, and (iii) the benefits for the recreational sector, in particular local tourism, private marinas, and pleasure craft operators. The port reception facility operators hold a relatively small share of SMEs[151]. The fishing industry on the other side contains a relatively high number of SMEs, with an average share of 54%[152], whereas the recreational sector also includes a significant number of SME's. Therefore the measures addressing these shipping segments (notably: PM 2D, 2E and PM 3E) are expected to have a significant impact on SMEs.

Policy Option 2 (minimum revision) will only have a limited impact on SMEs, as it will not include the measures specifically addressing the fishing and recreational sectors. **Policy Option 3** (MARPOL alignment) may have a positive impact on SMEs from the additional business to be expected for port reception facility operators, as described above. This impact is somewhat higher for **Policy Option 4** (EU PRF regime) given the potential for additional waste to be delivered at ports. The most notable impact on SMEs is expected from **Policy Option 3b** and **Policy Option 4b**, given the focus of these variant options on the fishing and recreational sectors by including them in the payment of the indirect fee and the Directive's inspection regime. SMEs are expected to benefit from the proposed incentive measures: encouraging fishing vessels and recreational craft to deliver their waste on land instead of discharging at sea will create more business for the waste operators. Furthermore, the measures are expected to result in a cleaner marine environment, as well as cleaner beaches, which should have a positive effect on the tourism sector in coastal regions (and islands), boosting the local economy. This has also been acknowledged in the Territorial Impact Assessment, which expects the greatest impacts on tourism development in the areas around the Southern Mediterranean and Black Sea.

[151] Euroshore, the International trade association of port reception facility providers in Europe, has indicated that only few of its members can be considered as SME's, and the majority belongs to multinational companies or large national companies. Euroshore includes almost 100% of all PRF operators in Belgium, the Netherlands, Spain, Greece Portugal and Bulgaria

[152] During the period 2008-2014; Eurostat labour force survey of fishermen, 2008-2014

6.2.6. *Innovation and competitiveness*

Innovation and competitiveness would potentially be fostered by policy measures 1B (reinforcing the waste hierarchy in WRH Plans) and 2C (harmonisation of "Green Ship" criteria for ships that reduce their waste production on board). Implementation of the EU Waste hierarchy in the context of waste management in ports would require establishment of systems for the separate collection of waste from ships, to enable the waste to be further re-used or recycled. Innovative and effective collection systems may have to be developed to ensure high capture rates and revenues, while increasing the revenue from further treatment[153]. Similarly, applying sound environmental practices on board in order to ensure reduced waste production will also require ships to be equipped with innovative systems[154]. In turn, a ship's environmental performance, certified in accordance with "green ship" criteria, may improve a ship's competitive position compared to other ship operators in the market.

Conversely, competition between ports may be impacted by PM 2A (shared methodology for calculation of the indirect fee and more transparency between fees and costs), as well as PM 2B (100% indirect fee for garbage) and PM 3A.2 (strict EU mandatory delivery obligation). PM2A envisages more streamlining of the underlying principles of the indirect fee, which should be inherent in every port's Cost Recovery System. In particular, this should provide more transparency as regards the fee charged and the type of costs covered by these fees, so that port users understand what they are paying for as well as the basic cost calculation. This is expected to provide for a better level playing field for both ports and port users, where these actors compete on basis of equal and fair conditions. PM 3A, which requires delivery of waste beyond the MARPOL discharge norms, may impact the competitive position of the EU port sector, although this effect may be limited as ships will be calling at EU ports for a range of considerations other than the port's waste policy and fees[155].

As PM-2C (green ship concept) is included in both **Policy Options 3 and 4**, these options are expected to generate a positive impact on competitiveness and innovation. In addition, both policy options include the PM 2A and 2B, which – as explained above – are expected to create an enhanced level playing field for ports and port users. On the other side, **Policy Option 4** includes PM-3A.2, which may have a negative impact on the EU port sector, making this option less attractive than Policy Option 3 in terms of competitiveness, as reflected in a lower score for option 4.

6.2.7. *Third countries, foreign trade and investment*

Limited impact is expected from the various policy options as regards third countries, foreign trade and investment. The impact is particularly linked to PM-3A.2, which proposes a strict delivery requirement for all ship generated waste, including for the waste that can be discharged under MARPOL. As a result, the rules applied in EU ports will be stricter than elsewhere in the world. This may have a negative impact on ship movements to EU ports, and discourage investments in ports that are in direct competition with non-EU ports (e.g. in the Southern Mediterranean). Generally, it may be expected that the stricter the requirements are in comparison with the applicable international obligations under MARPOL, the bigger the

[153] A recent study conducted by DG ENV on separate collection schemes in the 28 capitals of the EU has assessed the different collection systems, showing the door-to-door collection system and the pay as you throw system to be the most effective. In addition, the Impact Assessment for revision of the Waste Framework Directive has shown that setting up separate collection systems would positively impact competiveness and innovation of the manufacturing and waste management sector (page 9) http://ec.europa.eu/environment/waste/studies/pdf/Separate%20collection_Final%20Report.pdf

[154] 5 out of the 9 respondents who expressed an opinion in the targeted survey think that harmonisation of the green ship concept would lead to increased competitiveness and innovation, in particular in the European manufacturing industry

[155] The waste fees only constitute a small fraction of the overall port dues to be paid

competitive disadvantages will be that EU ports are facing in view of neighbouring non-EU ports with which they are in direct competition.

On the other side it should be acknowledged that regulatory convergence between EU and neighbouring states, as well as higher global standards, may be fostered through regional agreements, such as for example the cooperation among states surrounding the Mediterranean Sea in the context of the Barcelona Convention[156].

As this Policy measure is included in **Policy Options 4a and 4b**, these options are expected to have a negative impact on trade and investment, contrary to **Policy Options 3a and 3b**, which may positively influence trade and investments, through seeking closer alignment with the international rules on shipping.

[156]The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, adopted in 1995; contracting parties include both EU Member States, as well as non EU MS: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, the European Community, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, Turkey

Table 14: Synthesis Econ. Impacts	Enforcement costs	Compliance costs	Administrative burden and simplification	PRF operators [157]	SMEs	Innovation and competitiveness	Third countries, Foreign trade and investment
Option 1 Baseline	19,500 inspections 429,000€ per year[158]						
Option 2	**0** 19,500 inspections 429,000€ per year	**0/+** (Additional PRF capacity to receive Annex VI waste)	**0/+** Improved clarity and coherence	+	+	**0**	**0**
Option 3a	+ 16,000 inspections 110 000€ per year *319,000€ decrease*	- (Additional PRF capacity to receive Annex VI waste Separate collection schemes to be set up)	+++ Improved clarity and coherence - Waste notification: 2,888,000€ decrease - Exemptions: 4,100,000 € *decrease* - Inspections (crew's involvement): 386,000€ *decrease*	++	++	+	+
Option 3b	+ 17,000 inspections 144,000€ per year *285,000€ decrease*	- - (Additional PRF capacity to receive Annex VI waste Separate collection schemes to be set up CRS: 4 MS to shift to NSF for garbage)	++ Improved clarity and coherence - Waste notification: 2,880,000€ decrease - Exemptions: 4,100,000€ *decrease* - Inspections (crew's involvement): 386,000€ *decrease* (freight and passenger ships) 41,000€ *increase* (fishing and recreational craft)	+++	+++	+	+
Option 4a	- 17,000 inspections 757,000€ per year *328,000€ increase*	- - (Additional PRF capacity to receive Annex VI waste Separate collection schemes to be set up)	+ Improved clarity and coherence: - Exemptions: 4,100,000€ *decrease* - Inspections (crew's involvement): 397,000€ *increase* - Waste receipt: not fully aligned to IMO form	+++	+++	-	- (trade and investment
Option 4b	- 18,000 inspections 791,000€ per year *362,000€ increase*	- - (Additional PRF capacity to receive Annex VI waste Separate collection schemes to be set up 4 MS shift to NSF garbage)	+ Improved clarity and coherence: - Exemptions: 4,100,000€ *decrease* - Inspections: 397,000€ *increase* (freight and passenger ships) and 41,000€ *increase* (fishing and recreational craft), - Waste receipt: not fully aligned to IMO form	++++	++++	-	- (trade and investment)

[157] Impacts on PRF operators are assumed to be proportional to waste delivery
[158] Actual situation: low number of inspections and costs (1166 inspections have been recorded in THETIS-EU since it has become operational, corresponding to a total annual inspection cost of 25,629€)

6.3. Social impacts

Few social impacts have been identified from the proposed policy options for the revision of the Directive. The possible impacts considered are described below, in particular: employment in the maritime sector and in coastal tourism; working conditions at sea; and environmental awareness.

6.3.1. Employment

Employment impacts are limited to a number of policy measures, notably those that result in additional volumes of waste to be delivered on land, generating additional business for PRF operators, and those that stimulate the tourism sector through the improvement of the coastal environment. As was shown above, this potential is greatest for **Policy Options 3b and 4b** (with special focus on marine litter), which are expected to generate additional jobs in the area of waste management and nautical tourism. However, for the fishing sector this will depend on the uptake of the fishing for litter schemes in the MS, as participation in those schemes will remain voluntary.

The Territorial Impact Assessment (Annex 8) concluded that in terms of effects on tourism and employment, regional differences are to be expected from the proposed revision: the Black Sea region (Romania and Bulgaria) would benefit the most from the expected growth in tourism, resulting in additional employment in this sector. It was also recognised that the increased quality of the environment could induce a more positive impact on tourism in the Southern Mediterranean coastal regions (Italy and Greece), and reduce out-migration, especially from the islands in this region.

6.3.2. Working conditions at sea

Some of the policy measures will affect the activities that are carried out on board the ship, such as PM-2C (green ship, including segregation of waste on board the ship) or PM-2E (fishing for litter programmes, which require additional storage and handling of passively fished waste on board). This was also acknowledged by stakeholders in the Territorial Impact Assessment, where the involvement of crew in proper waste handling on board was deemed crucial for ensuring waste reduction and delivery of waste to ports. Similar conclusions were reached in the context of stakeholder dialogue around the issue of waste management practices in the fishing sector[159].

At the same time, no significant impacts are expected in terms of working conditions at sea or in ports for the different policy options.

6.3.3. Environmental awareness

The Territorial Impact Assessment concluded that the options for the revision will contribute to more environmental awareness, especially in ports and coastal communities but also among the crew on board ships. This has also been

[159] Workshop on best practices in waste collection and handling in Dutch fishing ports, Urk, the Netherlands. 7 March 2017, which advocated an awareness raising campaign aimed at the crew of fishing vessels to keep all waste on board

acknowledged in a recent report on Marine Litter Management Practices for the Fishing industry[160], which concluded that improved management of waste from fishing vessels raises the awareness around this type of waste as a source of marine litter and also increases the knowledge of sources and pathways of marine litter. Given the special focus of Policy options 3b and 4b on marine litter, these options have the highest potential of raising environmental awareness.

Table 15: Synthesis of social impacts

	Employment	Working conditions at sea	Environmental awareness
Option 2	+	0	++
Option 3a	++	0	++
Option 3b	+++	0	+++
Option 4a	+++	0	++
Option 4b	++++	0	+++

The following table synthesizes the assessment of the policy options in terms of environmental, economic and social impacts.

Table 16: Synthesis of the assessment of the policy options

	PO-1: Baseline scenario	**PO-2:** Minimum Revision	**PO-3A:** MARPOL alignment	**PO-3B:** MARPOL alignment - special focus on marine litter	**PO-4A EU** PRF regime	**PO-4B: EU PRF regime** - special focus on marine litter
Environmental impacts						
Waste discharged at sea	0	+	++	+++	+++	++++
Circular economy	0	+	++	+++	+++	++++
Economic impacts						
Enforcement costs	0	0	+	+	-	-
Compliance costs	0	-	-	- -	- -	- -
Administrative burden	0	+	+++	++	+	+
Business for	0	+	++	+++	++++	++++

[160] Review of Marine Litter Management Practices for the Fishing Industry in the N-East Atlantic Area, Cefas (2017), p. 14-15

PRF operators						
SMEs	0	+	++	+++	++	+++
Innovation and competitiveness	0	0	+	+	-	-
Social impacts						
Employment (Waste management, Fisheries, Tourism)	0	+	++	+++	+++	++++
Environmental awareness	0	0	++	+++	++	+++

7. COMPARISON OF THE POLICY OPTIONS

7.1. Effectiveness, efficiency and coherence of the policy options

PO-2: Minimum revision

The policy option scores relatively low on effectiveness, with only a limited contribution to volumes of waste delivered, reducing the administrative burden and contributing to the circular economy. At the same time, it should be acknowledged that the operational and investment costs of this option are relatively low. The balance between these relatively limited benefits and the minimal operational and investment costs is net positive, making it a policy option that is preferable to the baseline scenario. This policy option is also expected to have a positive effect on coherence: internal coherence will be fostered through clarification of existing rules (mostly in the adequacy cluster) in line with international and EU Guidance, whereas external coherence will benefit from an update of legal references, such as the current PSC Directive and EU waste legislation, as well as the inclusion of MARPOL Annex VI into the scope of the Directive. However, as only few issues can be addressed though a minimum revision of the PRF Directive, this option strongly relies on the development and application of soft law to address the majority of the problems (guidance on adequacy, incentives and enforcement).

PO-3a: MARPOL alignment – without special focus on marine litter

This policy option scores well on **effectiveness**, with positive contributions to waste delivery, administrative burden reduction/simplification and contribution to the circular economy. However, as regards the delivery of garbage waste, the effectiveness is limited, mainly because fishing vessels and recreational craft will not be specifically addressed in the proposed measures. On the other side, the policy option significantly decreases the unnecessary administrative burden, which will be less the case for variant options with special focus on marine litter. Policy option 3A also benefits from **synergetic effects** between defined policy measures. Policy measure 3A.1, i.e. MARPOL alignment, adds to the effectiveness of other measures, such as bringing PRF inspections within the scope of the Port State Control regime (through the amendment of Directive 2009/16/EC) and the improvement of

definitions and forms. The main focus on MARPOL alignment also implies that this policy option scores well on coherence, in particular its external coherence to international regulations, whereas inclusion of the PRF inspections in the PSC framework adds to coherence with related EU policy measures.

Although this option will result in additional operational and investment costs, these should be limited because of the basic administrative framework and operational infrastructure already in place, and should be accompanied by substantial benefits. Therefore, this policy option scores positively on efficiency. Other impacts are expected to be limited and for that reason this option scores lower than its variant option focusing on marine litter.

PO-3b: MARPOL alignment – with special focus on marine litter
MARPOL alignment with a special focus on marine litter scores very well on **effectiveness**. Performance on waste delivery and circular economy is better than in policy option 3A. This policy option also benefits from **synergetic effects** between defined policy measures. Policy measure 3A.1, i.e. MARPOL alignment, adds to the effectiveness of other measures, such as bringing PRF inspections within the scope of the Port State Control regime (though an amendment of Directive 2009/16/EC) and the improvement of definitions and forms. This policy option produces similar benefits for coherence as described for option 3 above, but with even greater potential: through the special focus on the reduction of garbage discharges it directly supports related EU and international initiatives in reducing marine litter, as well as the environmental objectives of the Marine Strategy Framework Directive.

Although investment costs may be higher than for policy option 3a, the increased contribution to the objectives results in a positive score on efficiency. Other impacts outscore the performance of policy option 3a. All in all, this policy option provides a better overall package, based on impacts and costs, as well as synergetic effects between policy measures included in this policy option.

PO-4a: EU regime beyond MARPOL - without special focus on marine litter
Strict operation of the EU regime, based on a strict mandatory delivery obligation (beyond the MARPOL discharge norms) without a specific focus on marine litter, scores better on the waste delivery objective than policy option 3, but since a strict delivery obligation is not the same as a discharge prohibition, potential gains (in terms of waste deliveries) may still be limited. It also scores relatively well in terms of contributing to the circular economy and also has an overall net result in terms of decreasing the administrative burden mostly from the uniform rules on exemptions. However, gains in administrative burden reduction are certainly not as high as under Policy option 3. The (potential) gains in additional waste delivered are offset by the additional enforcement costs created. With aggregated operational and investment costs similar to policy option 3, this policy option scores lower on efficiency. As regards coherence, the option increases the Directive's internal coherence with EU environmental policy, but at the same time reduces its external coherence with the international regulations (MARPOL). Therefore its net effect on coherence will also be lower than under policy option 3.

Overall, this policy option is considered feasible. Although some additional waste may be collected in ports, the efforts in enforcement required in this policy option

outweigh the environmental gains, and result in this policy option being scored lower than policy option 3a.

PO-4b: EU regime beyond MARPOL– with special focus on marine litter
Strict interpretation of the PRF Directive, with special focus on marine litter, scores well on the objectives of increasing waste delivery, as well contributing to the circular economy. However, the increase in administrative burden is even more substantial, again negatively impacting overall effectiveness of this policy option. By extension, the additional waste delivered is offset by the overall additional administrative burden. Aggregated operational and investment costs are higher than Policy Option 3 (both variants), resulting in a lower efficiency score. The additional focus on marine litter will have positive effects on coherence with EU and international initiatives on marine litter, in addition to the environmental benefits already attributed to Policy Option 4a. However, similar to Option 4a the positive effects will be off-set by a decrease in coherence with international regulations (MARPOL). Although this Policy Option is considered feasible, the overall balance is lower than policy measure 3b.

The analysis of the options and the comparison is largely in line with the outcome of the stakeholder consultations (as summarised in Annex 2 – synopsis report).

Stakeholders have generally expressed preference for further alignment with MARPOL as the more efficient option, rather than strengthening the EU regime, which would require significant additional enforcement efforts to be made and result in additional administrative burden. For these reasons, the MARPOL alignment option and its marine litter variant were also considered more proportionate than option 4. This also applies to option 3b, where the measures specifically addressing the problem of marine litter were considered justified, given the particularly harmful effects of garbage on the marine environment. Stakeholders acknowledged the potential of the revision for addressing the sea-based sources of marine litter at various occasions[161], and the need for redefining the position of fishing vessels and recreational craft, given the important contribution of sea-based sources to the problem of marine litter. The issue of Incentives, which is addressed in options 3 and 4, was among the main concerns expressed by stakeholders. Both options envisage the streamlining of the underlying principles of the indirect fee, which is based on a list of recommendations drawn up by the main stakeholders. A number of stakeholders, in particular the ports, have nevertheless expressed concerns over the efficiency of the 100% indirect fee for garbage, as included in option variants 3b and 4b.

7.2. Proportionality of the policy options

The proposed policy options do not go beyond what is needed to achieve the policy objectives. They effectively (to various degrees) reduce discharges of waste at sea and lift unnecessary administrative burden on all stakeholders, as explained below.

[161] In particular in the context of the meetings of the ESSF PRF Subgroup, where the issue of marine litter was a recurrent point on the agenda, with the organisation of a panel discussion with the ports, fishing organisations, operators and regional sea conventions held in October 2016; see Annex 2 - synopsis report of stakeholder consultation

PO-2: minimum revision
As Policy option 2 only envisages the introduction of minimum legislative updates, reflecting changes in EU legislation, as well as in the international legal framework, the impacts of the revision are limited. As regard the other issues to be tackled, the option relies mostly on soft law guidance.

PO-3a: MARPOL alignment – without special focus on marine litter
Policy Option 3 seeks to achieve the objectives mainly by aligning with the international approach (MARPOL), as well as integrating inspections into the Port State Control framework. Further approximation to the international framework generates important efficiency gains, in particular from aligning definitions, forms, and inspection procedures.

PO-3b: MARPOL alignment – with special focus on marine litter
The specific problem of marine litter warrants some additional measures, specifically designed to achieve intended discharge reduction at sea through a combination of both incentive and enforcement measures. As enforcement might be disproportionate as regards the smaller vessels, it has been proposed in Policy Options 3b and 4b to take a differentiated approach and apply these measures only to vessels over 100GT.

PO-4a: EU regime beyond MARPOL - without special focus on marine litter
Policy option 4 provides stricter requirements, but still limits the additional burden compared to the current obligations, and also provides a risk-based approach for enforcement. While going beyond MARPOL discharge norms, in terms of the scope of the delivery obligation, the idea of an EU discharge prohibition has been discarded, as this would go beyond the objectives of the revision (see section 5.2.1).

PO-4b: EU regime beyond MARPOL– with special focus on marine litter
The specific problem of marine litter warrants some additional measures, specifically designed to achieve intended discharge reduction at sea through a combination of both incentive and enforcement measures. As enforcement might be disproportionate as regards the smaller vessels, it has been proposed in Policy Options 3b and 4b to take a differentiated approach and apply these measures only to vessels over 100GT.

As regards the position of **fishing vessels and small recreational craft, i**t should be noted that these vessels are already included in the scope of the current Directive, and are only exempted from certain obligations, in particular the advance waste notification, payment of the indirect fee, and inspection criteria and procedures, although the Directive requires Member States to establish control procedures for fishing vessels and small recreational craft, to the extent required. Stakeholders view the inclusion of fishing vessels in the indirect fee favourably, as they have to pay anyhow for the waste they deliver, and payment of an indirect fee should give the right to these vessels to deliver all of their waste (including passively fished waste) without having to pay additional direct charges. The advance reporting by these vessels has been discarded as this would be a disproportionate measure, and for the inspection part a threshold has been applied (100GT and above), so that only the larger vessels will be targeted in terms of inspections. To address marine litter effectively, it is important to include the fishing vessels and recreational craft more comprehensively in the scope of the Directive, given their relatively high share in the contribution to the marine litter problem at sea. As has been shown in section 2.1.1,

i.e. approximately 30% and 19% respectively of all marine litter from ships (the remainder being attributed to merchant shipping).

Table 17: Comparison of the policy options

	PO-1	PO-2	PO-3a: MARPOL alignment	PO-3b: marine litter variant	PO-4a: EU PRF regime	PO-4b: marine litter variant
Effectiveness	0	+	+++	++++	+++	+++
Efficiency	0	+	++	++	+	+
Coherence	0	+	+++	++++	++	++
Proportionality	0	+	++	++	+	+

7.3. Conclusion

Based on the analysis above, **Policy Option 3b** (**MARPOL alignment, with special focus on marine litter),** scores best on effectiveness, efficiency, coherence and proportionality, as also shown in the Table above. This policy option contributes positively to volumes of waste delivered, thereby reducing discharges of waste at sea. It also contributes to the reduction of the (unnecessary) administrative burden associated with the implementation of the Directive, and will positively support the operation of a circular economy. These positive effects will be realised at relatively limited operational and investment cost. Furthermore, this policy option includes a number of policy measures, in particular those in relation to alignment with the MARPOL Annexes, which have synergetic effects. The policy option, and the measures it entails, can be considered proportionate in relation to the problems addressed.

The preferred option also fully delivers on the REFIT objectives of the revision, in particular simplification of the regulatory framework and administrative burden reduction. By seeking further alignment with MARPOL, inconsistencies between the EU framework and the international regime are removed and parallel reporting can be avoided. Through increased electronic reporting and exchange of information and by integrating the inspections within the Port State Control framework, following a risk-based approach, the burden on ports, port users and authorities in the Member States will be significantly reduced.

8. MONITORING AND EVALUATION

The Commission services will monitor the implementation and effectiveness of this initiative through a set of core indicators listed in the table below that will measure the progress towards achieving the operational objectives. Some of the indicators are of qualitative nature and show if the desired deliverables are being achieved and

implemented, while others are based on data to be collected that will need to be analysed further.

It is foreseen that five years after the end of the implementation date of the proposed legislation, the Commission services will carry out an evaluation to verify whether the objectives of the initiative have been reached. This is intended to determine whether the new measures in place have resulted in an improvement of the situation, both in terms of increased waste deliveries in port, as well as simplification and reduction of the administrative burden. This evaluation shall be carried out based on the below mentioned core progress indicators in line with Commission requirements on evaluation.

The existing data limitations around volumes of waste being delivered to port, exemptions granted, as well as results from the inspections undertaken, should be addressed through the mix of policy measures included in option 3B: these include the introduction of a **waste receipt**, to be reported into SafeSeaNet, which is expected to generate information on types and quantities of waste actually delivered in ports and facilitate monitoring of the mandatory delivery obligation. In addition, the **exemptions** will also be electronically reported and exchanged through SafeSeaNet, based on harmonised criteria and a standard format, which should provide more information on vessels that have been exempted from the main obligations in the Directive. Finally, the results of inspections will have to be reported into Port State Control database (THETIS), which should allow for operational alerts to be developed for monitoring and enforcement purposes.

Table 18: Core progress indicators for monitoring purposes

Operational objectives	Core progress indicators	Source of data
Availability of adequate facilities	Comprehensive WRH Plans; Basic information on Port Reception Facilities publicly available Increase in separate collection systems in port	Website of the ports DG ENV (results from monitoring the new Waste Framework Directive)
Effective (cost) incentives to deliver waste at port reception facilities	Increase in waste deliveries in port	EMSA: SafeSeaNet (waste receipt/Advance Waste Notification) MS reports
Effective and efficient enforcement	Increase in the number of PRF inspections undertaken Information on waste deliveries elctronically reported	EMSA: THETIS (EU) EMSA: SafeSeaNet

Harmonised and updated definitions and forms	Level of alignment with MARPOL forms	Member State Competent Authorities EMSA: SafeSeaNet (waste business rules)
Common rules for exemptions	Electronic reporting and exchange of exemptions	EMSA: SafeSeaNet
Reduction of marine litter from sea-based sources	Fishing gear lost at sea; marine litter found at beaches	Surveys from the Regional Seas Conventions
Reduction of the administrative burden	Amount of time spent in terms of reporting, monitoring and inspections Monetised equivalent of the time spent based on hourly wage costs in the maritime and public administration sector [162]	Surveys from the Competent Authorities and Ship Operators Eurostat data for public administrations Eurostat data for the maritime transport sector

[162] Standard cost model should be applied, ref. tool # 53 (cost model for estimating administrative costs) of the Better Regulation Toolbox (2015); see also Annex 9 to this report (calculation of administrative burden and enforcement costs).