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PART 2/2

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

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

Table of contents

Annex 1 – Procedural information concerning the process to prepare the impact assessment report and the related initiative.....	2
Annex 2 – Synopsis report of stakeholder consultation	10
Annex 3 – Affected stakeholders	24
Annex 4 – Analytical models used in preparing the impact assessment.....	26
Annex 5 – Total waste volumes and illegal discharges	332
Annex 6 – MARPOL discharge norms and relevant amendments	47
Annex 7 – EMSA Assessment of the enforcement options.....	52
Annex 8 – Regional differences	79
Annex 9 – Calculation of administrative burden and enforcement costs	104
Annex 10 – Glossary of terms	114

Annex 1 – Procedural information concerning the process to prepare the impact assessment report and the related initiative

Lead DG: Directorate General Mobility and Transport

Agenda Planning Reference AP N°	Short title	Foreseen adoption
2017/MOVE/1	Revision of Directive on port reception facilities for ship-generated waste and cargo residues	Autumn 2017 (Commission proposal)

Organisation and timing

The Inter Service Steering Group (ISSG) for the Impact Assessment was set up in October 2015 and includes the following DGs and Services: SG, SJ, GROW, ENV, MARE, as well as EMSA (European Maritime Safety Agency).

Five meetings were organised between October 2015 and May 2017. Further consultations with the ISSG were carried out by e-mail.

The ISSG approved the Inception Impact Assessment which was published in December 2015. The ISSG also discussed the main milestones in the process, in particular the consultation strategy and main stakeholder consultation activities, the task specifications to launch the contract for the external IA support study, key deliverables from the support study, and the draft impact assessment report before the submission to the Regulatory Scrutiny Board.

Consultation of the Regulatory Scrutiny Board

The Regulatory Scrutiny Board ("RSB") received the draft version of the present Impact Assessment report on 24 May 2017. Further to the meeting with the RSB on 21 June 2017, the RSB gave a positive opinion with reservations on 23 June 2017. The opinion included recommendations, which have been addressed in the revised IA report as explained in the table below.

Comments from the Regulatory Scrutiny Board		
<i>Main considerations</i>	<i>Further considerations</i>	<i>How these issues have been addressed in the IA Report</i>
1. The report does not sufficiently explain the added value of the Directive compared to the MARPOL Convention.	The report should further explain the context of the Directive and its added value to MARPOL . It should specifically clarify the legal objectives and enforcement regimes of the Directive compared to MARPOL.	Further explanation on the relationship with MARPOL and EU added value of the Directive has been inserted in section 1.1.2 (EU context), together with a table providing for a comparison between the two instruments.
	To understand the problem definition, the report should clarify the EU value added for the last 15 years and the development of the MARPOL Convention and IMO in the period where no amendments	Section 1.1.1 (International context) includes an overview of the relevant amendments to MARPOL in the past 15 years; references to these amendments have also been included in footnote

	<p>have been made to the Directive. It should explain issues relating to enforcement and assess them in more detail. The presentation of the baseline in section 2.4 should use this analysis. The services could consider giving a counter-factual assessment like the cost of non-Europe (a no policy option): this could reinforce the justification for the Directive overall and for future amendments in line with MARPOL and IMO amendments.</p>	<p>2.</p> <p>The EU added value is not only in enforcement, but also in implementation of the main (MARPOL) obligations. Both issues have been explained in more detail in section 1.1.2 and section 2.4.</p> <p>A counter-factual assessment does not seem necessary nor appropriate at this point in time, given that the REFIT Evaluation made a detailed assessment of the Directive, and concluded that the Directive has been relevant, effective and efficient (be it partly) and has had clear EU added value. This is explained in section 1.2, and further references to the outcome of the REFIT Evaluation have been included.</p>
	<p>The problem description should clarify the respective magnitude and order of importance of the two problems (ship-generated waste and administrative burden). The report should reflect this in the hierarchy of objectives.</p>	<p>The respective magnitude and order of importance of 1/ waste being discharged at sea and 2/ administrative burden have been made more explicit in the introduction of section 2.1.</p> <p>Furthermore, in Chapter 4 (objectives), it has been explained why objective 1 ("reduction of discharges of waste at sea") ranks as the primary objective and the reduction of administrative burden as the secondary objective.</p>
	<p>It should also better explain the importance of further reducing waste disposal at sea, given the already good performance on the collection of oily waste and sewage.</p>	<p>Section 2.1.1 (waste discharged at sea) explains why every tonne of waste discharged by ships should be avoided, taking into account adverse effects on the marine environment, with reference to significant costs in relation to beach clean-up, oil recovery operations and damage to the fishing sector. Given the environmental vulnerability of all sea regions to garbage, this is most apparent for garbage, but also applies to the other waste categories.</p>
<p>2. The report lacks a clear description of how far the policy options are in line with, or go beyond, the MARPOL Convention in terms of scope and</p>	<p>The report needs to further develop and explain the content of the policy options. It should specify in how far the policy options are in line with the</p>	<p>The report includes additional explanations in section 5.3., with an additional table comparing the different policy options to MARPOL. As explained in section</p>

<p>content.</p>	<p>MARPOL Convention or deviate from it, i.e. go beyond in scope and content, in particular regarding enforcement. For option 3, the report should explain whether the revision of the Directive would be a mere alignment with the convention, or would add additional aspects not covered by MARPOL.</p>	<p>5.3.3. the MARPOL alignment option does not equal full alignment with the Convention, as this would mean retracting fundamental obligations, such as the WRH Plans, exemption regime and the fee systems, which have proven to be effective and useful (REFIT Evaluation and previous assessments).</p> <p>A discarded policy option has been included in a new section 5.2.2 in the report which is "full alignment with MARPOL", providing the reasons/explanation why this is not considered a viable option.</p>
	<p>Furthermore, the report should explain how, under the various policy options, the Directive will meet its objectives in maritime areas bordered by non-EU countries and how the Directive will interact with MARPOL and with regional agreements.</p>	<p>The Report explains for the different options in section 6.2.7 (third countries) – where relevant – how these may influence the relation with bordering non-EU countries (this is particularly relevant for application of the mandatory delivery obligation, which may play out differently for the options 3 and 4).</p>
<p>3. The impact analysis does not demonstrate the proportionality of the policy options, in particular the extension of fees to fishing and recreational vessels. Moreover, the assessment focuses exclusively on administrative costs, ignoring compliance costs and investment costs.</p>	<p>The impact analysis should clarify the scale of the environmental benefits: this would allow their comparison to the costs of the policy options. [...] In particular, the analysis should show the relation between the costs of the extension of the scope of the Directive to fishing & recreational vessels (option 3b) and the expected environmental benefit of further reducing marine litter.</p>	<p>It has been explained in section 7.1 for each one of the options that they they are proportionate in relation to intended objectives.</p> <p>More elements of a cost-benefit have been introduced in section 6.1 (environmental impacts), showing the order of magnitude of expected benefits from a 1% increase of garbage deliveries to port.</p>
	<p>The report should present orders of magnitude of compliance and investment costs: this would clarify their importance relative to administrative costs. It would also allow a more meaningful comparison with the benefits of the policy options.</p>	<p>Compliance costs, including investment costs/impacts, are described in qualitative terms in the report (section 6.2.2). The same section also explains why these costs are not expected to be significant and how in some cases will even be reduced by the proposed measures. The comparison in table 10 (p. 58) also shows that the enforcement and administrative costs are expected to be the more important than the compliance costs.</p> <p>Additional efforts have been made to gather the relevant quantitative</p>

		<p>data from the ports on setting up separate collection systems and establishing NSF for garbage. However, limited feedback was received, as it concerns commercially sensitive data. Data from DG ENV study on separate waste collection in EU MS has been quoted in section 6.2.2, and it has been explained why these figures cannot be applied (directly) in the context of waste management in ports and for calculating compliance costs from setting up separate collection of waste from ships.</p> <p>At the same time it has been noted that the obligation to provide for separate collection already stems from the Waste Framework Directive (where "technically, environmentally and economically practicable") and compliance costs cannot be (fully) attributed to the proposed revision of the PRF Directive.</p>
<p>4. Other issues</p>	<p>The report should systematically explain stakeholders' views throughout the main text, including crews and port staff, in particular regarding the value-added of the Directive and their views on the policy options.</p>	<p>More references to the stakeholder views have been introduced in the different parts of the report. In relation to working conditions on board (considered in section 6.3.2 – social impacts, working conditions on sea), reference has been made to discussions in the TIA workshop and best practice examples from a recent Workshop on waste in Dutch fishing ports (March 2017) to illustrate how the proposed measures may impact working conditions on board/involvement of crew on board fishing vessels.</p>
	<p>The report should address the data limitations encountered in the evaluation and the impact assessment. It should assess whether the initiative should include additional measures to ensure the adequate data availability for the monitoring and evaluation.</p>	<p>Data limitations have been more clearly explained in section 8 of the report, as well as the way in which these are addressed through option 3b (waste notification, waste receipt, reporting into SSN and reporting of inspection results in THETIS).</p>

Evidence used in the impact assessment

The IA report and the options considered in the IA report were developed based on the following documents and evidence:

Commission documents

- Commission Notice 2016/C 115/05 providing Guidelines for the interpretation of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues (31/3/2016);
- Report from the Commission to the European Parliament and the Council: REFIT Evaluation of Directive 2000/59/EC (31/3/2016), COM(2016)168final;
- Commission Communication COM(2009)8 "Strategic goals and recommendations for the EU's maritime transport policy until 2018";
- Commission Communication "Towards a circular economy: a zero waste programme for Europe", COM(2014)398fin
- European Sustainable Shipping Forum, 5th Meeting of the Sub-group on Port Reception Facilities (25/05/2016), meeting minutes.
- ESSF sub-group on Exhaust Gas Cleaning Systems (2016), report.

Documents from EMSA

- EMSA technical assessment on the list of open issues in the context of the IA for the revision of the PRF Directive (January 2017); supplement on enforcement (March 2017), available upon request;
- EMSA Technical Recommendations for the implementation of Directive 2000/59/EC (25/11/2016), available on <http://www.emsa.europa.eu/news-a-press-centre/external-news/item/2875-technical-recommendations-on-the-implementation-of-directive-2000-59-ec-on-port-reception-facilities.html> ;
- EMSA Guidance for Ship Inspections under the Port Reception Facilities Directive (25/11/2016), available on <http://www.emsa.europa.eu/news-a-press-centre/external-news/item/2876-guidance-for-ship-inspections-under-the-port-reception-facilities-directive-directive-2000-59-ec.html> ;
- EMSA study on the delivery of ship generated waste and cargo residues to port reception facilities in EU ports (Ramboll, August, 2012), available on <http://www.emsa.europa.eu/publications/technical-reports-studies-and-plans/item/1607-study-on-the-delivery-of-ship-generated-waste-and-cargo-residues-to-port-reception-facilities-in-eu-ports.html> ;
- EMSA Note on the inclusion of MARPOL Annex VI in the scope of Directive 2000/59/EC (June 2012), available upon request;
- EMSA note on the revision of MARPOL Annex V and related Guidelines (January 2012), available upon request;
- EMSA working document (2nd draft) on the obligation or granted exception for a ship to deliver its waste (article 7, Directive 2000/59/EC) (October 2011), available upon request;
- EMSA Workshop report on Port Reception Facilities for ship-generated waste and cargo residues (April 2011), available upon request;
- EMSA report of an informal meeting with industry on cargo residues (March 2011), available upon request;
- EMSA horizontal assessment report – Port Reception Facilities (December 2010), <http://ec.europa.eu/transport/modes/maritime/consultations/doc/prf/emsa-report.pdf> ;

- EMSA paper on the identification of ships producing reduced quantities of ship-generated waste (September 2008), <http://www.emsa.europa.eu/implementation-tasks/environment/port-waste-reception-facilities/items.html?cid=147&id=714> ;
- EMSA assessment of international instruments covering cargo residues (June 2008), available upon request;
- EMSA Note on Article 9 on exemptions under Directive 2000/59/EC (January 2008), available upon request;
- EMSA Workshop report on the handling of cargo residues (December 2007), available upon request;
- EMSA Workshop report on the Implementation of Directive 2000/59/EC on Port Reception Facilities for Ship-generated Waste and Cargo Residues (September 2007), available upon request;
- EMSA study on ships producing reduced quantities of ship-generated waste – present situation and future opportunities to encourage the development of cleaner ships (HPTI, ISSUS, October 2007) <http://www.emsa.europa.eu/implementation-tasks/environment/147-port-reception-facilities/714-study-on-the-certification-of-ship-recycling-facilities81.html> ;
- EMSA technical report assessing Waste Reception and Handling Plans adopted in accordance with article 5 of Directive 2000/59/EC (2007), available upon request;
- EMSA Workshop report on the cost recovery systems of Directive 2000/59/EC (March 2006) <http://www.emsa.europa.eu/workshops-a-events/188-workshops/564-the-cost-recovery-systems-of-the-directive-20059ec-on-port-reception-facilities-for-ship-generated-waste.html> ;
- EMSA technical report evaluating the variety of cost recovery systems adopted in accordance with article 8 of Directive 2000/59/EC (2006), available on <http://www.emsa.europa.eu/workshops-a-events/188-workshops/564-the-cost-recovery-systems-of-the-directive-20059ec-on-port-reception-facilities-for-ship-generated-waste.html> ;
- EMSA study on the availability and use of port reception facilities for ship-generated waste (Carlbro, December 2005), <http://www.emsa.europa.eu/publications/technical-reports-studies-and-plans/item/235-a-study-on-the-availability-and-use-of-port-reception-facilities-for-ship-generated-waste-summary.html>

IMO Documents

- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (Marpol 73/78);
- MEPC.1/Circ.671, adopted on 20 July 2009 (Ref. T5/1.01), Guide to good practice for port reception facilities providers and users;
- Circular MEPC.1/circ.834, adopted at the 66th meeting of the Marine Environment Protection Committee, April 2014;
- IMO, 2012, Guidelines for the Implementation of MARPOL Annex V (resolution MEPC.219(63));
- Resolution MEPC.200(62), adopted on 15 July 2011, Amendments to the Annex of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (Special Area Provisions and the Designation of the Baltic Sea as a Special Area under MARPOL Annex IV);

- Resolution MEPC.201(62), adopted on 15 July 2011, Amendments to the Annex of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (Revised MARPOL Annex V);
- Resolution MEPC.281(70) (Adopted on 28 October 2016) Amendments to the 2014 Guidelines on the method of calculation of the attained energy efficiency design index (EEDI) for new ships (Resolution MEPC.245(66), as amended by Resolution MEPC.263 (68))

External studies and literature

- Panteia, PwC, 2015, Ex-post Evaluation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues;
- Eunomia, (2016), report for DG ENV, Study to support the development of measures to combat a range of marine litter sources for DG ENV;
- GHOST, (2016), Hands-on Manual to prevent and reduce abandoned fishing gears at sea, ;
- Abandoned, lost or otherwise discarded fishing gear, (2009) United Nations Environment Programme (UNEP), Food and Agriculture Organization of the United Nations (FAO);
- Panteia (2015), Study on the Analysis and Evolution of International and EU Shipping;
- OECD (2011), Strategic Transport Infrastructure Needs to 2030;
- CLIA (2015), Cruise industry outlook 2016;
- UNCTAD shipping statistics;
- <https://www.statista.com> ;
- Shipping statistics and market review 2016, volume 60 - No. 8, (2016), ISL;
- <http://www.cruiseindustrynews.com/cruise-industry-analysis/orderbook-data.html>;
- Report from ESSF sub-group on Exhaust Gas Cleaning Systems (2016);
- DNV-GL (2013), An outlook for the maritime industry towards 2020 – future development in maritime shipping;
- Ensys Energy & Navigistics consulting (2016), Marine Fuels Outlook Under MARPOL ANNEX VI;
- Eunomia, (2015), Support to the Waste Targets Review, Analysis of new Policy options
- Werner, S., Budziak, A., van Franeker, J., Galgani, F., Hanke, G., Maes, T., Matiddi, M., Nilsson, P., Oosterbaan, L., Priestland, E., Thompson, R., Veiga, J. and Vlachogianni, T.; 2016; Harm caused by Marine Litter. MSFD GES TG Marine Litter - Thematic Report; JRC Technical report; EUR 28317 EN; doi:10.2788/690366;
- Newman, S., Watkins, E., Farmer, A., ten Brinck, P., Schweitzer, J-P., The Economics of Marine Litter, Chapter 14 in (eds.) Bergmann, M., Gutow, L., Klages, M., *Marine Anthropogenic Litter*, (2015), Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Eprint ID 37207, ISBN 978-3-319-16510-3 (eBook), p. 373, referring to Mouat, J., Lozano, R.L. & Bateson, H. (2010), Economic Impacts of marine litter, KIMO International, pp.105.
- UNEP OSPAR (2009). Marine litter in the North-East Atlantic Region: Assessment and priorities for response. London, United Kingdom;
- Unger, A., Harrison, N., Fisheries as a source of marine debris on beaches in the United Kingdom, (2016), Marine Pollution Bulletin, 107, pp.52-58;

- EEA, Report no. 2/2013 'Managing municipal solid waste – a review of achievements in 32 European countries';
- CE Delft (for EMSA), (2016), The Management of Ship-Generated Waste On-board Ships, EMSA/OP/02/2016, Delft, CE Delft, January 2017;
- <http://www.zerowasteurope.eu/downloads/case-study-1-the-story-of-capannori/>
- Cefas, (2017), Review of Marine Litter Management Practices for the Fishing Industry in the N-East Atlantic Area, Cefas

EU Legislation

- 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);
- 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)
- Commission Directive (EU) 2015/2087 amending Annex II to Directive 2000/59/EC (OJ L 302, 19.11.2015, p.99);
- 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 (OJ L 208, 5.8.2002, p.10)
- Directive 2009/16/EC of the European Parliament and of the Council on port State control (OJ L 131, 28.5.2009, p. 57);
- 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);
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, p. 3);
- Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements (OJ L255, 30.9.2005, p. 11);
- Directive 2009/123/EC of the European Parliament and of the Council 21 October 2009 amending Directive 2005/35/EC on ship-source pollution and on the introduction of penalties for infringements (OJ L 280, 27.10.2009, p. 52);
- Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (OJ L 164, 25.6.2008, p. 19);
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1) (Water Framework Directive);
- Directive 2010/65/EU of the European Parliament and of the Council of 20 October 2010 on reporting formalities for ships arriving in and/or departing from ports of the Member States and repealing Directive 2002/6/EC (OJ L 283, 29.10.2010, p.1);
- Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels and amending Directive 93/12/EEC (OJ L 121, 11. 5. 1999, p. 13);
- Directive 2012/33/EU of the European parliament and of the Council of 21 November 2012 amending Council Directive 1999/32/EC as regards the sulphur content of marine fuels (OJ L 327, 27.11.2012, p.1); Directive 2008/98/EC of the European

Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, p.3) (Waste Framework Directive)

External expertise

The Commission sought external expertise through a contract for a support study with Ecorys. From the deliverables of this contract, the IA report used in particular the information provided in the case studies and targeted stakeholder consultation, the calculation of the "waste gap" for the baseline, the environmental vulnerability assessment, as well as the qualitative assessment of impacts. As a complement to this work, DG MOVE carried out further quantification of the potential impacts, with the technical assistance of EMSA and based on the data provided by DG MARE and DG ENV.

1. Introduction

In the context of the Impact Assessment for the revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues ("the PRF Directive"), the European Commission (DG MOVE) has undertaken a number of stakeholder consultation activities. Part of these activities were conducted in the context of the Impact Assessment support study (by Ecorys), which was launched in May 2016 to assist the Commission in the Impact Assessment of the options for the revision of the PRF Directive. This report provides an overview of the different stakeholder groups that were engaged in consultation activities, as well as a summary and analysis of the responses received. All aspects of the Impact Assessment were included in the consultation of stakeholders (problem definition, EU dimension, options/measures and potential impacts). In particular, the consultation activities were instrumental in getting a better view of the extent to which the problem drivers identified in the ex-post evaluation of the PRF Directive (Panteia, 2015) contribute to the main problems, and the extent to which the proposed policy measures are adequate to address these problem drivers.

The following consultation activities have been conducted:

- a) Meetings of the “PRF subgroup”, which was established under the European Sustainable Shipping Forum to assist the Commission with the implementation of the Directive as well as the future revision, bringing together the main stakeholders (ports, port users, PRF operators, MS authorities, NGOs, etc.). The Group has had 7 meetings between February 2015 and February 2017, the last three of which focused primarily on the Impact Assessment.
- b) An Open Public Consultation (OPC), conducted from July to October 2016;
- c) Targeted (impact) surveys addressed to the ports and port users, conducted in the Autumn of 2016;
- d) Interviews with key stakeholders;
- e) Case studies conducted in 5 ports in different EU regions;
- f) An Expert Workshop organised with DG REGIO in March 2017 in the context of a Territorial Impact Assessment.

The outcome of these consultation activities has provided valuable feedback for the Commission’s Impact Assessment report.

2. Consultation methods

2.1. Work of the “PRF subgroup” within the context of ESSF

The PRF subgroup was established in December 2014 to advise the European Commission on issues related to the implementation and operation of Directive 2000/59/EC, as well as on the need and scope of a possible revision of the Directive. The Subgroup has provided a wide stakeholder platform for sharing best practices and experience with the implementation and enforcement of the PRF Directive. In addition, the PRF Sub-group has provided direct input and expertise to the impact assessment process for the options of the planned revision.

ESSF PRF Subgroup

PRF Sub-Group set up under the European Sustainable Shipping Forum brings together the main stakeholders, i.e. representatives from shipping companies, ports, port reception facility operators, terminal operators, Member State competent authorities, NGOs. The following organisations are members of the Subgroup:

Maritime and Coastguard Agency (UK), Department of Transport (UK), Public Waste Agency of Flanders, Transport Safety Agency(FI), Ministry of Shipping, Maritime Affairs & the Aegean of the Hellenic Republic (EL), Ministry of Maritime Affairs, Transport and Infrastructure (HR), Dutch Ministry of Infrastructure and the Environment (NL), Miljøministeriet (DK), Swedish Transport Agency (SE), Ports of Stockholm (SE), Executive Agency "Maritime Administration" (BG), Port services and Ecology Directorate, Bulgarian Ports Infrastructure Company (BG), SHIP-SERVICE SA, Environmental Protection Department (PL), Ministry of Economic Affairs and Communications (EE), Ministry of Transport, Communications and Works(CY), Maritime Ports and Inland Waterway Transport Sub-Directorate, Ministry of Ecology, Sustainable Development and Energy (FR), ESPO Ports of Stockholm, ESPO Port of Amsterdam, ESPO Port of Barcelona, ESPO Port of London Authority, ESPO, Finnish Port Association, Irish Ports Association, Danish Ports Association, Baltic Ports Organization, FEPORT, PORT Deltalinqs, FEPORT Voltri Terminal Europa SpA (Genoa), FEPORT Port of Kiel, ECSA German Shipowners' Association (VDR), ECSA Environmental affairs, Koninklijke Vereniging van Nederlandse Reders (KVNR), ECSA Union of Greek Shipowners (UGS), ECSA Costa Crociere, ECSA, ECSA DFDS A/S, CLIA Europe, CLIA Europe, CIN SNAM SpA, MAERSK, INTERTANKO, Euroshore International, SEAS AT RISK, WASTE FREE OCEANS, EGCSA ,EGCSA the Nord Group, Behörde für Stadtentwicklung und Umwelt Hamburg (BSU), C/O HANSESTADT BREMISCHES HAFENAMT, FEPORT, ECOIMSA-TRADEBE , Veolia Southampton, MAC, Euroshore International, Hellenic Environmental Center, Antipollution S.A.

Seven meetings of the Group were conducted between February 2015 and February 2017; whereas, the first meetings were more focused on the implementation of the Directive and the REFIT Evaluation, the last three meetings focused more on the Impact Assessment for the revision of the Directive. Issues that were discussed in the various meetings of the Group included the following: defining the adequacy of PRF, harmonization of fee systems, the use of existing standards and forms, exemptions for ships in regular and scheduled traffic, the delivery of waste from fishing vessels and the link with marine litter, the enforcement of the mandatory delivery obligation, and the application of the waste hierarchy in the context of ship-generated waste.

The subgroup has also established links to other Subgroups within the ESSF, in particular the Scrubber Subgroup, which produced a report on the issue of waste from exhaust gas cleaning systems to support the Impact Assessment for the PRF revision.

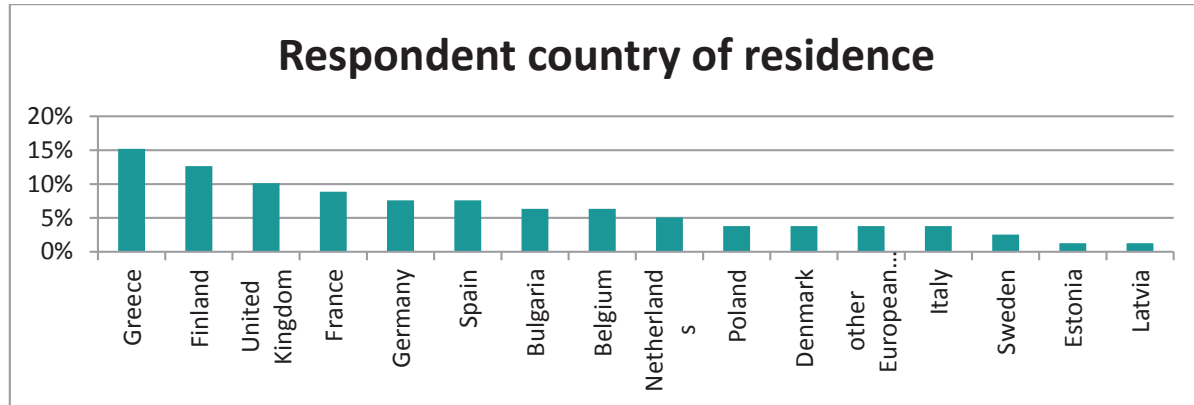
Furthermore, three Correspondence Groups were set up to further develop certain key issues:

1. A Correspondence Group on the Cost Recovery Systems, which produced a list of recommendations to the Commission with an assessment of the expected impacts from the recommended measures;
2. A Correspondence Group on exemptions, which has provided important input to the impact assessment on how to improve the current exemption regime;
3. A Correspondence Group on the issue of Ozone Depleting Substances.

2.2. Open Public Consultation

The Open Public Consultation (OPC) on the Impact Assessment for the revision of the PRF Directive was launched by the European Commission on 13 July 2016 and remained open until 16 October 2016. The main objective of the OPC was to get a better view of the extent to which the identified problem drivers contribute to the illegal discharge of waste at sea and of whether the proposed policy measures are appropriate to address these problems drivers.

The Commission received 79 responses¹. The respondents came from fifteen different Member States as well as from two non-EU countries:



The results of the OPC reflect the views from the stakeholders that are most likely to be affected by a revision of the Directive. The respondents were almost exclusively interested parties with a high level of expertise. Indeed, out of 81 respondents, only 5 filled in the survey under their personal capacity and only 5 of the respondents did not belong to one of the identified key stakeholder groups. In addition, all but 3 of the respondents indicated that they had a good knowledge of the topic of PRF and the issues at stake. However, as with all such open surveys, the results cannot be considered as representative of the opinions all EU stakeholders. One third of the responses were provided by ports (i.e. Port Authorities and Port Associations – 26 respondents), which appear to be the group most interested in the revision of the PRF Directive. The port users also participated in the consultation (i.e. Shipowners and their Associations – 13 respondents), as well as the port reception facilities operators and their associations (10 respondents), Member States authorities (11 respondents) and a number of Non-Governmental Organisations (4 respondents).

Moreover, as part of the public consultation, seven position papers were received from a variety of stakeholders including industry associations and private companies.

Table 1: Classification of stakeholders responding to the public consultation

Stakeholder category	Number of responses	% of responses
European & National shipping Associations	4	5%
Ship-owners/operators	9	11%

¹ Two additional responses were sent in after the submission deadline, and were taken also into account separately, bringing the total number of respondents to 81.

Stakeholder category	Number of responses	% of responses
Port associations	3	5%
Port authorities	23	28%
PRF operators associations	2	2%
PRF/ waste operators	8	10%
Member State (all relevant agencies, including ministries and inspectorates)	11	14%
National government from non-EU Member State (including acceding and candidate countries)	2	2%
Environmental and all other NGOs	4	5%
Other (private sector & industry associations)	10	12%
Personal Capacity	5	6%
Total	81	100%

2.3. Targeted surveys

i. Port Stakeholders

The targeted survey for port stakeholders was launched on 07 October 2016 and remained open until 26 November 2016. There were 78 respondents to the surveys; however, 59% of the questions were only partially completed. Representatives of the port sector made up the biggest group of respondents (34 respondents i.e. 43%); 15 were port-users (19%); 10 respondents represented the PRF operators (13%) and 14 respondents were competent authorities (18%). Stakeholders were asked to assess the expected impacts of each policy measure.

ii. Fisheries

The targeted survey for fisheries was launched on 7 October 2016 and remained open until 09 November 2016. There were 48 respondents to this survey, of which half replied on an individual basis and half on behalf of an organisation. 65% of the questions in the survey were only partially completed.

2.4. Interviews with key stakeholders

5 exploratory interviews were conducted at the beginning of the Impact Assessment Support Study. Subsequently 45 interviews (around half of them in the context of a case study, see next point) have been conducted with stakeholders representing the various sectors affected. The main objective was to obtain their views on the possible measures and their expected impacts. The interviews have provided in depth information and filled data or knowledge gaps left by the surveys.

Stakeholders targeted through surveys and interviews

The targeted surveys and the interviews conducted by the contractors in charge of the Impact Assessment support study aimed at a wide coverage of stakeholder types. The following stakeholders were among the ones contacted:

- Port associations: ESPO, Baltic Ports Organisation, ABP, NAPA
- Individual port authorities, including members of the above associations, covering different segments, locations and size categories
- European associations of port users: ECSA, CLIA, Interferry, Intertanko, Intercargo, EBA, Fonasba
- National associations of port users: EU ship owner associations and selected third countries (flag states)
- Individual ship owners / operators
- Associations of PRF operators: Euroshore (port waste reception operators), Feport (terminal operators), SIGTTO, port specific associations (e.g. Deltalinqs)
- Individual PRF operators: waste reception operators members of Euroshore
- Member States: all MS's relevant agencies (ministries or inspectorates)
- Other organisations: IMO, EMSA, sea basins organisations (HELCOM, OSPAR, Barcelona & Bucharest Conventions), REMPEC (assisting Mediterranean countries implementing MARPOL), UNEP (implementing Barcelona Convention), environmental and other NGOs
- Fisheries sector: Europeche, KIMO
- Marinas and nautical sector: EBA

2.5. Case studies conducted in 5 ports in different EU regions

The following five ports were selected for the case studies to represent ports in the different European Sea Basins:

- Copenhagen (Baltic Sea)
- Antwerp (North Sea)
- Constanta (Black Sea)
- Genoa (Mediterranean)
- Le Havre (Atlantic).

The five selected ports cover both smaller ports (Genoa, Constanta) as well as larger ports (Antwerp, le Havre), as well as different port types ranging from mostly passenger ports (Copenhagen) to ports with a specific focus on cargo (Antwerp). These ports were also selected based on differences in:

- Waste type and volume actually collected;
- Applied waste notification system;
- Applied cost recovery system;
- Role and responsibilities regarding waste handling in the port;
- Ownership and operation;
- Contractual framework;
- Impact of the PRF Directive.

The case studies consisted in a combination of desk research, surveys (with close-ended questions about the current situation and open-ended questions about potential impacts of measures) and interviews with a balanced range of stakeholders.

2.6. Territorial Impact Assessment through an expert Workshop (DG REGIO)

An expert workshop was organised by Directorate General of Regional and Urban Policy (DG REGIO) in collaboration with Directorate General for Mobility and Transport (DG MOVE) on 17 March 2017. This workshop applied the TIA tool of the ESPON 2020 Cooperation Programme and was attended by 17 participants including experts from different regions in the EU. The results of the territorial impact assessment expert workshop on revision of the PRF Directive are summarised in annex 8 of this IA.

Territorial Impact Assessment workshop

Representatives of the following organisations took part in the workshop for the purpose of the Territorial Impact Assessment:

Conference of Peripheral and Maritime Regions of Europe, Neptune Lines Shipping and Managing Enterprises S.A., Union of Greek Ship-owners (EL), Carnival Cruise, Autorità di Sistema Portuale del Mare Tirreno Centro Settentrionale, (IT) ECASBA: Federation of National Associations of Ship Brokers and Agents, Port of Rotterdam Authority (NL), Regional Government of Madeira, Madeira Ports Administration Board (PT), Environmental Investigation Agency (EIA) representing Seas at Risk, Grand Port Maritime du Havre (FR), Port of Harlingen (NL), Commission on the Protection of the Black Sea Against Pollution (Bucharest Convention), KIMO the Netherlands and Belgium, part of the international KIMO network, Department of the Environment – University of the Aegean University (EL), Baltic Ports.

3. Results of consultation activities

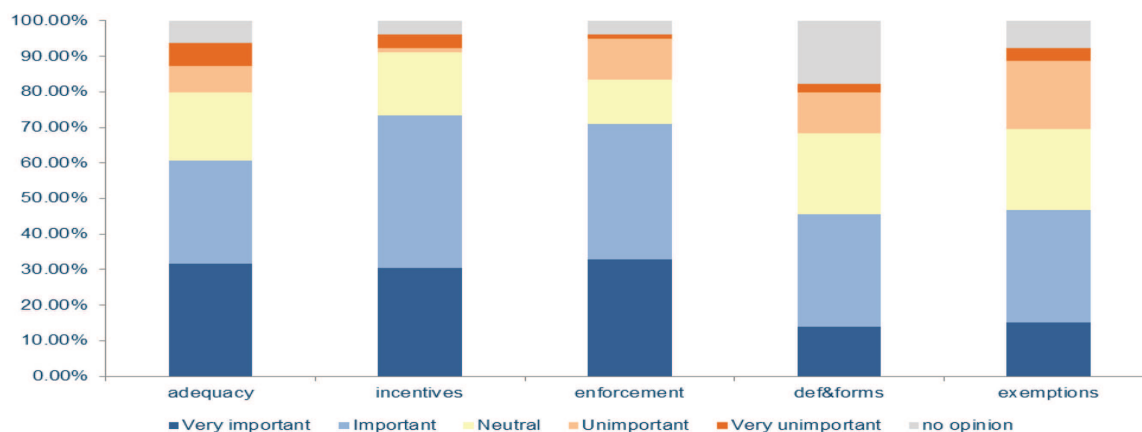
3.1. Stakeholder concerns over the current PRF Regime

The following concerns were raised by stakeholders in all different consultation activities, but predominantly by participants in the ESSF PRF Subgroup:

- Data limitations as regards waste deliveries, waste discharges, adequacy of facilities, and number of inspections undertaken;
- The lack of incentives for ships that minimise their waste on board;
- The waste hierarchy of reduction, reuse, recycling, recovery and disposal not being fully implemented in the ports; lack of separate collection of waste from ships;
- Problems with reporting cargo residues prior to the cargo being landed;
- Competition between ports on waste fees and waste handling processes;
- The lack of transparency in ports, especially on the fee structure and the link between fees and costs;
- The need and feasibility of issuing a waste receipt to ships;
- Difficulties in harmonising the fees structure at EU level;
- Problems in electronic reporting;
- The definition of short sea shipping (SSS) and the administrative burden for ships engaged in SSS from having to comply with the Directive;

- Problems in calculating the Sufficient Storage Capacity on board of a vessel and uncertainty over whether the next port of call has adequate PRF in place.

Both the open public consultation and the targeted consultation confirmed five main problem drivers i.e. **adequacy**, **incentives**, **enforcement**, **definitions** and **exemptions**. The lack of incentives and insufficient enforcement of the mandatory delivery were considered the most important problem drivers, followed by the lack of adequate port reception facilities, and the lack of harmonised exemption criteria. Inconsistent and outdated definitions in the Directive were considered less problematic.



As regards the various policy measures for a possible revision of the PRF Directive, the respondents evaluated five packages of various policy measures (twenty eight in total). The majority of the stakeholders evaluated the policy measures as effective or very effective².

3.2. Summary of the input – basic conclusions as regards the identified problem drivers and expected impacts of the proposed policy measures

In general, the consultation revealed that stakeholders across the board, including ports users, operators and NGOs, widely support action at EU level. However, the views of the respondents vary as regards the preferred action to address the main problems, i.e. waste discharged at sea and the unnecessary administrative burden associated with the implementation of the PRF Directive. With regard to the five main problem drivers the following conclusions have been drawn:

3.2.1 Incentives

The most important driver is the issue of incentives. In this regard, the majority of the stakeholders (55 out of 81, i.e. 69%) acknowledged that the **relationship between fees charged to ships and the actual costs** of port reception facilities is unclear or not sufficiently transparent. In the OPC, the port users unanimously supported this view, as well as the vast majority of the Member States and PRF operators. Furthermore, 65% of the port stakeholders supported this view in the OPC (17 out of 26 Port Authorities and Port Associations).

In addition, 51 respondents to the OPC (63% of the total) indicated that a **lack of alignment in the implementation of cost recovery systems** is an ‘important’ or ‘very important’

² Please refer to the published “Summary of the Open Public consultation” for an analysis of the responses for each policy measure.

contributing factor to the problem of (cost) incentives not being sufficient for users to deliver waste and cargo residues to port reception facilities.

There was also general agreement that the introduction of a **shared methodology to calculate the indirect fees** may lead to fewer variations between ports in terms of the level of incentives provided, as ports would be incentivising delivery of waste in a similar way. A more harmonised application of the indirect fee is also expected to result in a higher level of incentives for delivery in individual ports. However, at an aggregated EU level, no significant changes in volumes of waste discharged at sea were expected. This is confirmed by respondents in the targeted survey: 13 respondents out of the 20 (i.e. 65%) respondents replying to the question expected no impact from this measure. Providing a methodology and guidelines to the ports for calculation of costs related to ship waste management was welcomed by most ports and port users. Respondents to the targeted survey expected this policy measure to be neutral for investment (50%, i.e. 10 out of 20 respondents to the question), operational costs (38%, i.e. 10 out of 26 respondents) and administrative costs (33%, i.e. 9 out of 27 respondents).

Applying a **100% indirect fee system for garbage** is expected to provide positive impact on waste delivered in ports: 14 out of the 23 respondents who expressed an opinion in the targeted survey (i.e. 61%) confirmed that this policy measure may result in increase of deliveries, whereas only 3 of them indicated that it would lead to a decrease of the quantities of garbage delivered in ports. Moreover, providing incentives for reducing the amount of waste produced on board (**green ship concept**) was expected to have a positive impact on the European manufacturing industry. In this regard, 5 out of 9 of the respondents who expressed an opinion in the targeted survey expect an increase of competitiveness and innovation while expecting a neutral impact (10 out of 25, i.e. 40%) or a slight increase (9 out of 25, i.e. 36%) in the administrative burden.

With regard to the calculation of the waste fee, some ports list the cost breakdown provided by the waste operator directly in the WRH plans, while others try to include other types of cost into the fee, e.g. administrative costs. As indicated by the **case studies**, it is up to each port to decide on the payment flow for waste handling services and to calculate the height of the waste fee. Consequently, the picture is unclear due to the many payment and invoicing systems implemented. In this regard, as confirmed by the ports in the case studies, '**PRF shopping**' occurs frequently. It is considered a good idea to provide a methodology and guidelines to the ports for calculation of costs related to ship waste management. It can be very difficult to calculate the costs when external waste operators are involved in some of the waste operations, and the port itself in others, as it has been confirmed by one of the case study ports.

Further to the above, the ESSF/PRF-SG/Correspondence Group (CG) on **Cost Recovery Systems (CRS)** provided eight final recommendations to the Commission for streamlining the underlying principles of the CRS, including: (1) defining the cost elements of PRF; (2) defining the significant contribution referred to in article 8 of the Directive; (3) providing a method to calculate the 30% significant contribution; (4) including the "right to deliver"; (5) improving transparency; (6) harmonising criteria for "green ships"; (7) adding the type of trade as a new differentiation criterion for the application of fees and (8) introducing auditable PRF service levels. Generally, it was stressed that there should not be an aim for full harmonization, i.e. prescribing one particular cost recovery system for all EU ports, as it is necessary to respect regional differences between ports. Nevertheless, it was acknowledged

that there is a need for more alignment on how the different principles of article 8 should be interpreted and applied.

3.2.2 Enforcement

The issue of the enforcement not being effective was considered as the second most important driver. In this regard, the majority of the respondents in the OPC (56 out of the 81 respondents, i.e. 70%) indicated that the unclear definition of ‘**sufficient storage capacity**’ is an important or very important contributor to the problem of ineffective enforcement. More than 60% of the respondents also indicated a number of additional contributing factors, such as the inconsistency between mandatory discharge requirement (for ‘all’ ship-generated waste) and the MARPOL discharge norms, in particular when the next port of call is a non-EU port, as well as the insufficient use of the waste notification forms by the relevant authorities, which causes that this data is not used for selecting ships for inspection. In addition, the insufficient reporting and exchange of information were mentioned.

As regards the requirement for a **waste receipt**, 6 out of the 16 respondents who expressed an opinion in the targeted survey indicated that this would decrease discharges of waste at sea, while the majority expected a moderate increase of waste delivered to port reception facilities. In addition, 11 out of 23 respondents expressing an opinion expected an increase in administrative burden from this measure, while the same number (i.e. 11) expected the measure to have no impact at all. Likewise, most respondents (13 out of 23) expect a neutral effect for operational costs. The case studies confirmed that, most (larger) ports already have implemented this measure, as it is recommended under MARPOL.

As regards **clarifying the definition of 'sufficient storage capacity'** (as the basis of providing an exception to the delivery obligation), 6 out of 18 (i.e. 33%) of the respondents to the targeted survey expected that this would result in a decrease of the volume of waste discharged at sea or not to have any effect at all (8 respondents i.e. 44%). Some of the respondents (6 out of 24, i.e. 24%) expected an increase of administrative burden, while others (3 out of 24, i.e. 12%) expected this to result in a decrease in administrative burden. It is also noted that 5 out of a total of 23, i.e. 22% of respondents thought that this would result in an increase of operational costs. From the case studies it is noted that port authorities monitoring waste notifications do not encounter many cases of storage capacity limits reached. However, as indicated by the ports participating in the case studies, fixed definitions and/or detailed guidelines on how to respond to ships not delivering waste would be welcomed. One port highlighted frustrations among stakeholders because of the different practices applied for defining “sufficient storage capacity”, and because of the fact that sometimes the ship has to pay despite only delivering small volumes of waste ("application of the indirect fee").

As regards the **replacement of the 25% minimum inspection requirement with a risk-based approach**, in total, 8 of the 14 respondents who expressed an opinion in the targeted survey (mainly PRF operators and port authorities) think that this measure would result in less waste discharged at sea. Most of the respondents expect a moderate increase in the delivery of waste to port reception facilities. Although 6 of the respondents indicated that they expect an increase of the administrative burden from this measure, 11 believed that this was not the case. Only 2 of them expect an actual decrease in administrative burden from this approach.

The case studies have indicated that **data is not systematically exchanged between ports or Member States**. In addition, it was mentioned that unnecessary administrative burden is caused by inconsistent or insufficient implementation of the PRF Directive.

3.2.3 Adequacy

The third most important driver is the issue of adequacy of PRF. In this regard, the respondents in the OPC identified a number of contributing factors, in particular: the increased use of exhaust gas cleaning systems, which requires adequate reception of the sludge generated by these systems; the fact that the Waste Reception and Handling (WRH) plans do not properly reflect the waste hierarchy, and the lack of consultation of all port users in the development and implementation of WRH plans.

In the targeted survey, 30 respondents (73% of the 35 expressing an opinion) indicated an expected increase in the amount of scrubber waste delivered to ports from **broadening the scope of the Directive to include MARPOL Annex VI waste**. Similarly, the majority (16 out of the 24 expressing an opinion, i.e. 63%) expected a decrease of discharges of scrubber waste at sea. At the same time, the majority of the respondents also believe that this measure will lead to an increase of the administrative burden³, as well as the operational costs⁴. The vast majority of the respondents expressing an opinion (15 out of 17 respondents, i.e. 88%) expect an increase of business for PRF operators as a result of this policy measure, which would also require the PRF operators to invest in additional reception capacity. However, from the case studies it appears that in the five ports reviewed, it would only require simple adjustments, at low investment costs. The five case studies have underlined two key aspects: (i) uncertainty about the delivery of future scrubber waste volumes; and (ii) required investments and operational costs to be 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.

In case of **reinforcing the waste hierarchy** as laid down in the Waste Framework Directive, it should be noted that the majority of respondents (22, i.e. 66% of the 33 who responded to the question, mainly port authorities and ship operators) in the targeted survey believed that this would result in an increase of the administrative burden, while only 3 expect a decrease. Moreover, about half of the respondents expressing an opinion in the targeted survey (17 out of 30, mainly port authorities and PRF-operators) thought this would increase their operational costs, while 7 (23%) expected a decrease. The same trend is confirmed as regards the investment costs expected from this measure. More than two thirds of the respondents (17 of the 23 who expressed an opinion)⁵ expect an increase of their investment costs, while 6 (26%) expect no change in costs. A positive effect of this measure in terms of an increase of business for the PRF operators is also expected by two thirds of the respondents (12 out of 18). The five case studies underlined the potential of reinforcing the waste hierarchy, although not much impact on waste delivery is expected.

As regards a possible **strengthening of the requirements for systematic consultation of stakeholders in the development and updating of WRH plans**, the potential of resulting in a decrease of waste discharges was questioned by most stakeholders (only 9 out of 22 respondents expressing an opinion, i.e. 41% expect a decrease in waste discharges against 13

³ 23 out of 35 respondents, i.e. 53%, expect an increase in their administrative burden while 31% believe that they will have a neutral effect.

⁴ The respondents (75%) expect an increase in their operational costs as a result of this measure.

⁵ Most respondents to this question are either port authorities or PRF-operators.

i.e. 59% who expect no significant result at all or even an increase). On the other side, it was acknowledged that PRF are considered to be more adequate to meet the needs of the ships visiting the ports, if the port users are actively involved in the process of developing and evaluating the WRH plans. However, the operational costs are expected to be low for most stakeholder groups involved, which is also confirmed by the respondents to the targeted survey (32 in total), of which 15 (i.e. 47%) expect no impact, and 4 (i.e. 13%) mentioned a decrease. Around 9 out of 32 (i.e. 28%) of the respondents still expect an increase in costs from this measure. As regards the impact on administrative burden the respondents, almost half expect an increase of administrative burden (15 out of 32, i.e. 47%). In all five ports of the case studies some form of stakeholder engagement in updating the WRH plans is already applied. Therefore, strengthening the requirements for systematic consultation of stakeholders in the development and updating of WRH plans is not expected to cause significant administrative burden.

In terms of **improving the definition of 'adequacy'** in line with international guidance, the stakeholders evaluated the hypothesis that if port reception facilities become more adequate, especially if they are able to cater for all types of waste, it would become easier for ship operators to deliver their waste to a facility. Almost 35% of the respondents (8 out of a total of 23) to the targeted survey are of the opinion that the volumes discharged at sea will decrease. This view is mainly held by the PRF operators. Another 52% of the respondents, (12 out of a total of 23) mainly consisting of port authorities, as well as ship operators/agents, indicated that volumes discharged at sea will *not* be influenced by this measure. Overall, the majority of the stakeholders indicated that the volumes delivered to PRF (for all waste categories) will neither increase nor decrease from having more adequate facilities in place. On administrative burden, opinions varied, but 45% (14 out of a total of 31) of the respondents did not expect any effect from this measure.

The stakeholders identified the issues of definitions and exemptions as less important drivers resulting in waste being discharged at sea. On the other side, many stakeholders⁶ indicated that these drivers are important contributors to the problem of administrative burden.

3.2.4 Definitions

In total, 57 out of 81 (i.e. 70%) of all respondents in the OPC indicated that differences in definitions are an 'important' or 'very important' contributor to the problem of administrative burden and 53 (i.e. 65%) of the respondents indicated that reporting forms which are no longer up to date also constitute an 'important' or 'very important' factor adding to the administrative burden. However, the targeted survey has not confirmed these results as, according to the majority of the respondents, aligning the definitions with MARPOL will not influence the administrative burden, as the majority of the respondents (12 out of 25, i.e. 48%) do not expect this to have any effect.

As regards a possible **alignment and updating of the waste notification and waste receipt forms**, more than 50% of the respondents in the targeted survey indicated that they do not expect any impact from this measure on volumes delivered to port reception facilities. At the same time, 11 out of 24, (i.e. 46%) of the respondents also do not expect any impact of this measure on administrative burden, against 5 (i.e. 21%) (predominantly port authorities) who expect an increase in the administrative burden and 7 (i.e. 29%) (predominantly ship-owners

⁶ see OPC results.

and operators) a decrease. However, the case studies have indicated a potential reduction of administrative burden due to this measure.

As regards **aligning the definitions for cargo residues and ship-generated waste** used in MARPOL, the case studies also confirmed a potential reduction of administrative burden due to this measure. Four out of the five ports indicated that any alignment between EU legislation and MARPOL is welcomed, as it will result in a reduction of the administrative burden in general and for ships coming from outside the EU in particular.

3.2.5 Exemptions

Inconsistent application of exemptions is considered to have a high impact on administrative burden as indicated by 55 out of 81 (i.e. 68%) of the respondents in the OPC. For the possible development of **common criteria for exemptions** most respondents in the targeted survey (10 out of 18, i.e. 56%) expect a neutral effect on waste discharges, as well as on waste deliveries to port (53%-60% of responses, depending on waste category). With regard to the administrative burden, responses in the targeted survey⁷ were not conclusive; 7 (i.e. 28%) of the respondents expect no impact on administrative burden, whereas 9 (i.e. 36%) expect an increase, and 5 (i.e. 20%) expect a decrease in administrative burden. However, within the same context, the case studies indicated that several ports provide large numbers of exemptions and that exemption criteria are applied differently between ports. It appears that the number of exemptions given can be significant, not only because of the high numbers of scheduled traffic calls (e.g. ferries), but also because of the current (lenient) interpretation of the criteria and conditions provided in the Directive. Furthermore, as regards the possibility of granting exemptions to vessels which are operating exclusively within one port, the five case studies indicated that these vessels are mostly already exempted under the regime of article 9 of the Directive.

3.3. Summary of input for fisheries and recreational crafts

With regard to the issue of waste from fishing vessels and its relevance in the wider context of marine litter, within the context of the ESSF/PRF subgroup an expert panel⁸ discussed the matter, and also commented on the proposed policy measures for improving the delivery of waste from fishing vessels to PRF. Although, generally, there was limited support for bringing fishing vessels into the scope of the notification requirement as well as the PRF inspection regime, there was general agreement on the proposal to apply the **No Special Fee (100% indirect fee) to fishing vessels**, i.e. delivery of all their waste to PRF without having to pay any additional (direct) charges. The port stakeholders responding to the general targeted survey expected an increase of the volume of waste delivered in ports because of the **incentive measures proposed for fishing vessels and small recreational craft**. Many respondents (13 out of 19 expressing an opinion, i.e. 68%) point to an increase of the volume of garbage delivered to port reception facilities. 11 out of 23 (i.e. 48%) of the respondents expressing an opinion to the targeted survey expect the measure to result in an increase of the administrative burden, whereas 7 out of 10 expressing an opinion (i.e. 70%) expect an increase in the investment costs. On the other side, 6 out of 14 (i.e. 43%) of the respondents expressing an opinion expect the measure to lead to additional business for PRF operators.

As regards **bringing fishing vessels and small recreational craft into the PRF inspection regime**, the ports interviewed expressed their doubts about the feasibility of this measure,

⁷ In total, 25 respondents answered this question.

⁸ Including representatives from the port and fishing sector, as well as from a regional sea organisation.

especially concerning the reporting requirement for these vessels. However, it should be noted that the ports interviewed are not fishing ports.

The stakeholders responding to the **targeted survey for fisheries** have highlighted the following:

92% of the respondents⁹ indicated that they regularly deliver waste generated on board and 67% indicated¹⁰ that they regularly deliver waste collected in nets ("passively fished waste"). At the same time, the majority of the respondents noted that all the ports where they are calling regularly, accept their waste but 8 out of 12 respondents (i.e. 67%) of them also indicated that it is sometimes difficult or costly to dispose of end-of-life nets. With regard to the question whether waste fees depend to some extent on the actual volumes delivered the replies were, in general, divided (yes/no), with an equivalent rate of those not being able to reply to this question. Some factors discouraging the delivery of fishing gear from the vessel or the delivery of waste collected in nets (including abandoned or lost fishing gear) were highlighted i.e. the costs, inconvenience, bureaucracy and lack of enforcement. The same factors were highlighted as discouraging the delivery of ship generated waste. However, the responses to the targeted survey are not conclusive as there are equivalent rates of opposite views.

Although there are opposite views on the proposed measures for the fishing sector, the majority of the respondents (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**. The majority of the respondents (9 out of 18, i.e. 50%) consider the introduction of a measure requiring fishing vessels to notify ports in advance of the waste they are bringing ashore as negative while some (5, i.e. 28%) believe that there will be a neutral effect and only a few respondents (3, i.e. 17%) expect a positive effect from the advance waste reporting. However, as regards the introduction of a measure to include fishing vessels in the specific inspection requirements and control procedures to verify the compliance with the delivery obligation, the majority (9 out of 18, i.e. 50%) believe that this will have a positive impact, with 6 (i.e. 33%) of the respondents viewing this negatively.

3.4. Summary of input from the Territorial Impact Assessment

The main conclusions from the Expert Workshop, and the application of the **TIA Quick check**, can be summarised as follows (see also Annex 8):

The experts generally expect positive effects from a revision of the Directive on Port Reception Facilities for Ship Generated Waste and Cargo Residues on territorial development. However, especially in the field of governance, a minority of experts is sceptical about its effective implementation and are afraid of additional administrative burden challenging fisheries, the harbour economy and the ship transport sector.

The positive effects are quite equally distributed to all coastal regions. However, especially some of the Eastern and Southern European coastal regions could benefit more than others from the revision of the Directive:

- The EU regions neighbouring the Black Sea in Romania and Bulgaria are expected to experience a more significant positive impact on economic growth, especially in the tourism sector, as a catching up effect. An efficient implementation of the Directive

⁹ 11 out of a total of 12 respondents to this question.

¹⁰ 8 out of a total of 12 respondents to this question.

could also increase their governance effectiveness due to learning effects also for other fields.

- The increased quality of the environment could especially induce a more positive impact on tourism in Greek and Southern Italian regions in the Mediterranean Sea, also resulting in a higher positive impact on economic growth in Greek coastal regions.
- An effective implementation of the revised PRF Directive could have a positive impact on the governance effectiveness in the Eastern European coastal regions bordering the Baltic Sea. In addition, a higher positive impact on economic growth can be expected.
- The outermost regions could benefit especially in economic terms from the revised Directive: economic growth is expected, in particular from an increase in tourism. These effects could contribute to reduce "out-migration" and "brain-drain".

4. Use of consultation results

The findings from the consultation activities have been used to analyse the problems, define the right policy measures and/or fine-tune the proposed measures, and assess the impacts of these measures.

Input from the stakeholders has facilitated the verification of the information from existing reports, studies and assessments, as well as of the data collected (waste delivery data, data on waste generated on board, data on illegal discharges at sea). The responses have provided DG MOVE with a better view of the extent to which the identified problem drivers contribute to the illegal discharge of waste at sea and allowed for a more detailed assessment of impacts of the policy measures.

In conclusion, the different consultations have provided a useful insights in the functioning of the PRF regime, its main problems and how best to address these through the revision, from those stakeholders with a high level of expertise and knowledge.

Where relevant, references have been made in the Impact Assessment Report to the outcome of the stakeholder consultations.

Annex 3 – Affected stakeholders

Stakeholder	Description	Key interests
Ports	<p>'...a place or a geographical area made up of such improvement works and equipment as to permit, principally, the reception of ships, including fishing vessels and recreational craft.'</p> <p>(Directive 2000/59/EC, art. 2)</p> <p>Port authorities Harbour Masters Port associations</p>	<ul style="list-style-type: none"> • Ensure that reception facilities are provided that are adequate to receive the waste from ships • Develop Waste Reception and Handling Plans • Organise the necessary consultations with the port users to better understand operational needs • Operate the fee systems to recover the cost from ships and deal with exemption requests. Tasks may be divided between the harbour master and the port authority. • 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 competent authorities	<p>Maritime Transport/Environment departments at national or regional level, national Inspection bodies</p>	<p>Implementation and enforcement of the requirements under the Directive 2000/59/EC.</p> <ul style="list-style-type: none"> • Assessment and approval of exemption requests • Assessment and approval of the WRH Plans • Assessment of waste notifications • Conducting inspections
Operators of the port reception facilities, including terminal operators	<p>Companies operating under a concession or licence in the port</p>	<p>Implementation of the waste reception and handling plans (Article 5 Directive 2000/59/EC.)</p>

Ship owners	Shipping companies and their Agents Ship operators (including fishing vessels and pleasure craft)	<ul style="list-style-type: none"> • Harmonisation of PRF Directive definitions and exemptions • Cost-efficient port operations (vis-à-vis time spent at port and financially)
Fishing industry	Fishing companies drawing on EU-water fishing stocks, and their Regional bodies (Advisory Councils)	<ul style="list-style-type: none"> • Improvement of fishing stocks in terms of quality and quantity • Sustainability of the fishing sector resulting from healthy marine ecosystems
EU citizens	EU citizens in coastal regions and islands, often represented by NGOs	<ul style="list-style-type: none"> • Healthy living environments • Marine ecosystem services • Tourism

Annex 4 – Analytical models used in preparing the impact assessment

The Impact Assessment relies on analytical tools for the calculation of its baseline and of the potential impacts of its options. In this annex, these analytical tools are presented, including a description of what they consist in, how they have been developed, and what their strengths and limitations are.

1. MARWAS model

1.1 Purpose

The contractor in charge of the IA support study, Ecorys, has requested the Danish consultancy company Port Environment to run a series of data analyses on ship generated waste, using the dedicated computer program MARWAS.

The main purpose of the MARWAS analyses is to have an indication of the waste (types and volume) which is expected to be delivered to a port and compare it to the actual waste delivery figures obtained directly from the 29 ports that provided such data. The difference between the figures obtained from the MARWAS analysis and by the ports form the waste gap. The waste gap indicates the waste volumes per waste type which might be illegally discharged at sea. MARWAS estimates the waste types and volume generated based on all the voyages to a given port from a previous port of call.

1.2. Principles

The MARWAS model is built on a data base manager, which processes data from the Lloyds Maritime Intelligence Services (LMIS). Using comprehensive data on the parameters influencing waste generation and the number of voyages and ships in a given period, MARWAS predicts the types and calculates the amounts of waste generated on board the ship during the voyage from the last port of call.

The MARWAS model was originally developed to process data obtained from the LMIS. For this study, however, on behalf of the European Commission, ECORYS has requested that data obtained from SafeSeaNet (SSN) and MARINFO be used instead. The SSN & MARINFO data are not directly compatible with MARWAS and some manual adjustments had to be made.

The MARWAS model was subsequently run for the 29 ports¹¹ for which port delivery data was also obtained, so as to allow for an equal comparison between the MARWAS estimates and the waste delivery data from ports regarding ship-generated waste. In order to increase the reliability of the outcomes and to correct for variations over the years, data was aggregated over a 5-year period (2011-2015).

1.3. Assumptions

¹¹ Antwerp, Gent, Zeebrugge, Vama, Burgas, Dubrovnik, Split, Copenhagen, Helsinki, Rauma, Turku, Le Havre, Marseille, Hamburg, Kiel, Cork, Genoa, Ravenna, Ventspils, Riga, Amsterdam, Groningen/Delfzijl, Rotterdam, Szczecin, Swinoujscie, Constantza, Galati, Koper, Algeciras

Before running a MARWAS analysis, a number of assumptions (waste generation factors) have to be entered into the software. These assumptions influence the estimates. As mentioned in the CE Delft study (2016), waste generation factors can vary for different kinds of waste generation and up to several hundred percent depending on a number of issues e.g. maintenance level and ship category. In the MARWAS analysis made by the contractor, different assumptions have been used for 16 ship categories and up to five sizes¹². The MARWAS calculations cover three waste categories (Annex I oily waste, Annex IV sewage and Annex V household garbage).

Formulas and statistics are based on IMO recommendations, literature and consultations with ship masters, engineers, port operators, ship owners etc. However, as the waste generation and the way it is treated on board is a function of human behaviour, there is no precise and fixed relation to calculate them.

1.4. Limitations

Data: Data on ship movements have been provided by EMSA for most EU ports. However, due to differences in the data format between the data provided by EMSA and the data which is normally used in MARWAS (LMIS data), significant data adjustments had to be made, i.e. the consultants determined manually port positions and port ID numbers. Furthermore, there were some data missing from major ports (Bremerhaven, Venice, Tallinn) and a range of inconsistencies in the data provided e.g. missing data on the previous port of call. This information is vital in order to calculate the length of voyage and waste generated. To overcome the missing data and data inconsistencies, comprehensive MARWAS software adjustments were carried out¹³.

MARWAS: MARWAS is designed to process data provided by Lloyds (LMIS) and estimates the waste generation from the previous port of call to the port in question. This means that MARWAS does not take into account the situations where the calling ship accumulates waste on board or keeps the waste on board for delivery in the next port. However, as data is taken into account over 5 years, these differences are anticipated to level out.

For **garbage**, MARWAS estimates only household waste. Other types of waste categorised as garbage are not estimated and included in the MARWAS figures e.g. various types of wood and packaging material, as this type of garbage is very individual from ship to ship. The amount of waste delivered at the port reception facilities is more than twice as large as the amount of household waste generated on board as modelled by MARWAS. Therefore the MARWAS model was insufficient on its own and had to be complemented by other sources in order to properly estimate the waste gap for garbage.

2. Environmental vulnerability analysis

2.1. Purpose

A report, "Environmental vulnerability analysis of ship generated waste in European waters" (2017), was prepared by the contractor Ecorys as a part of the Impact Assessment support

¹² The list of values used in function of the various ship characteristics are detailed in the annex 3 "Method for calculation of waste generation" of the IA support study.

¹³ See Annex 3 of the IA support study for details of the data processing steps.

study. The report develops environmental indices for each waste type and each sea area in order to rank the severity of the environmental impact of a unit (e.g. 1 tonne) of each waste type on each sea area. It represents an environmental weighting of a tonne of waste. A tonne of garbage (including plastics) will cause a different environmental damage than a tonne of sewage, for example.

This analysis is used in combination with the assessment of the volumes of waste potentially discharged at sea ("waste gap"), both in the description of the baseline and in the assessment of environmental impacts. The calculations of the scores per sea basins are detailed in annex 8.

2.2. Principles

The environmental damage of the discharge of a particular waste type from ships is a combination of the amount of waste discharged and the vulnerability of the marine environment to this particular type of waste. The environmental damage can be determined using the following formula: Environmental Damage = Mass flow of waste type x Vulnerability

European Seas are regulated at EU level through the Water Framework Directive (WFD)¹⁴ and the Marine Strategy Framework Directive (MSFD)¹⁵. They constitute the legal framework to protect and restore clean water across Europe and ensure its long-term, sustainable use. Status and goals are defined through assessments and monitoring of a series of quality elements. They describe biological, hydro-morphological, physical and chemical elements and indicators. The fundamental concept of environmental assessment is rooted in the MSFD and WFD as well as in other basic EU and international documents¹⁶.

The same concept is applied in the vulnerability study. The approach of the environmental vulnerability assessment is compatible with EU-wide methodologies for the assessment of the quality of the marine environment. It follows the same concept of selecting a relevant feature (corresponding to receptors in the MSFD) to assess the impact that waste discharge has on the feature and then accumulating the impacts on all features into an overall impact assessment. It applies methods and results that have been developed and agreed upon among several Member States' authorities in earlier EU-funded projects of regional scale (Be AWARE 2015¹⁷, BRISK 2012¹⁸).

¹⁴ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

¹⁵ Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)

¹⁶ USEPA, 2017: US Environmental Protection Agency – *Risk Assessment* website:

<https://www.epa.gov/risk>

EU, 2007: European Commission. Interpretation manual of European Union habitats, EUR July 2007. DG environment. Nature and biodiversity, 2007

¹⁷ The BE-AWARE project was a two year initiative (2012-2014), co-financed by the European Union, which aimed to quantitatively identify the risk and magnitude of mineral oils spills, in the Bonn Agreement area and undertake a qualitative risk assessment for hazardous and noxious substances.

<https://www.bonnagreement.org/be-aware>

¹⁸ The overall aim of the BRISK project (2009-2012) is to increase the preparedness of all Baltic Sea countries to respond to major spills of oil and hazardous substances from shipping. <http://www.brisk.helcom.fi/>

In line with the WFD and the MSFD, the environmental vulnerability study is based on the scientific relation between selected environmental features (descriptors) which represent the marine environment, such as species, habitats and human activities, on the one side, and the impact by the different waste types. The next step in this concept is to describe the way in which the features are affected by the impact of concern – here it is the impact of waste. A scientific and systematic relation between impact and receptors is often not easy to determine and therefore often based on assessments that to a certain degree always include some subjectivity.

The following approach to determine environmental vulnerability is applied:

- Step 1: Identification of vulnerability features.
- Step 2: Scoring of each of the identified sensitive features from low, medium, high to very high vulnerability based on fixed and agreed criteria, see below. The following vulnerability scores were used: Score 4 (= very high), Score 3 (=high), Score 2 (=moderate/medium), Score 1 (= low).
- Step 3: Assessment of total environmental vulnerability of an area by adding all individual scores of the features.

Table 1: Illustration of the steps of the environmental vulnerability analysis

Step 1: Features	Step 2: Environmental scores			Step 3: Total environmental score
	Criterion 1	Criterion 2	Criterion m	
Feature 1	Score (1-4)	Score (1-4)	Score (1-4)	Sum of scores
Feature 2	Score (1-4)	Score (1-4)	Score (1-4)	Sum of scores
Feature n	Score (1-4)	Score (1-4)	Score (1-4)	Sum of scores
Total environmental vulnerability				Grand total

Step 1:

In the former regional projects (Be AWARE 2015 , BRISK 2012), features ('descriptors') comprised biological species, types of protected areas, human activities and different habitat types, in total between 8 and 49 features. They were aggregated into four groups:

- Species (Sensitive populations, life-cycle and life stage aspects)
- Habitats (Shoreline and coastal habitats and open sea habitats)
- Protected areas (Coastal and marine protected areas under, inter alia, the EC Habitats and Birds Directive, RAMSAR Convention and OSPAR Convention)
- Socio-economic effects on human activities (Fisheries, aquaculture, tourism and recreation, coastal communities and heritage site, coastal facilities with water intakes, ports, mineral extraction zones and renewable energy)

In the analysis made for the purpose of this Impact Assessment, the four categories above are identified as environmental features. Sensitivity is determined by taking a wide range of parameters into account. The analysis builds upon the overall results of earlier detailed studies, where available, e.g. for the Baltic Sea and the North Sea Also for the Mediterranean

Sea, maps of environmental sensitive areas are available. For the remaining sea areas, the general findings on correlation between environmental sensitive areas and certain geographical feature (archipelagos, shallow areas, coastal areas) are applied. In order to properly assess sensitivity of a given sea area, it is necessarily to include knowledge on spatial and temporal distribution of sensitive species or habitats. General distribution patterns collected in previous projects are used.

Step 2:

Ecological vulnerability to oil spill and pollutants in general is determined on a scale from 1 to 4: Score 4 (= very high), Score 3 (=high), Score 2 (=moderate/medium), Score 1 (= low). The scoring describes how vulnerable a specific feature identified above is regarding the different waste types. In broad terms, the scoring defines the relative environmental vulnerability towards a unit load (e.g. 1 ton per year) of a specific waste type.

The determination of the environmental score is based on the following criteria:

- ‘Fate of pollutants’: In terms of natural degradation and removal, onshore as well as in open water.
- ‘Impact of pollutants’: In terms of physical and toxic effects, tainting, and population and lifecycle considerations.
- ‘Length of interruption’: Describing socio-economic impact in terms of the length of interruption of a human activity or service.
- ‘Compensation possibility’: Whether or not economic compensation can be sought for a damaged feature.

Step 3:

For each combination of features (e.g. Species) and criteria (e.g. Fate) a score between 1 and 4 is determined. The sum of all scores gives the total environmental score for each sea area (found in the right lower cell in a matrix for all waste types).

Based on an environmental description of the four European sea areas and on a description of how the three waste types affect the environment, the aggregated environmental vulnerability for ship generated waste in four European sea areas are given.

Table 2: Matrix used for the determination of environmental vulnerability towards each specific waste type

	Fate	Impact	Length of interruption	Possible compensation	Sum
Species					
Habitat					
Protected area					
Socio-ec.					
Total environmental vulnerability					Total score

2.3. Assumptions

In short, assumptions are made on:

- The vulnerability of sea areas (based on species and habitats present and their resilience).
- The impact of different types of pollution on these.

The scoring has been made by an expert in marine biology¹⁹. It has been tested and peer-reviewed: a second alternative and independent scoring has been carried out by another marine biologist, who took part in the development of the BRISK and BE AWARE projects but who was not directly involved in the present project.

It resulted that the differences between the assessments carried out by the two experts are minor and have a maximum deviation of 3 points out of 20-30, corresponding to maximum 10-13%. In 50% of the indices, the two experts gave identical values. This indicates that the assessment method is stable enough for the present purpose.

2.4. Limitations

Different views and arguments may exist on the method and scoring used. Some uncertainty concerning score values may arise from this. In order to assess and limit this subjectivity, an alternative and independent set of scores have been elaborated to compare the resulting environmental weight, as explained above.

The method used for the purpose of this vulnerability assessment intends to provide indications in the context of the impact assessment. However it is not in line with the methodologies which are currently being developed in DG ENV in the context of the Marine Strategy Framework Directive.

¹⁹ Full results and details of the 3 steps are available in annex 8.

1. Oily waste (MARPOL Annex I)

Definition

MARPOL Annex I waste covers oily ship generated waste, which includes oily bilge water, oily residues (sludge) and dirty ballast water and oily cargo residues; mostly being tank washings. This type of waste is mostly generated by merchant shipping, as a result of the consumption of heavy fuel oil. Ship engines running on marine diesel or LNG hardly generate any oily waste. Therefore, the fisheries and recreational sector do not contribute much to the generation of this waste category. In addition, oily cargo residues and tank washings are also included under MARPOL Annex I.

MARPOL discharge regime

Under Annex I, the discharge of oily waste is only allowed under very strict conditions (see Table 1 in Annex), for example the oil has to be treated before discharging by filtering equipment which is in line with the requirements laid down in Annex I. Essentially, discharging of oily waste into sea is only allowed when the oily waste is filtered and significantly diluted, so that it cannot cause harm to the marine environment.

Primary waste generation

MARWAS has calculated the amount of primary waste generated would be in the order of 700,000 m³ per year for the 29 ports analysed. When aggregating this to the total EU merchant shipping, at most about 2 mln m³ of primary oily waste is generated.

The generation of oily waste from fisheries vessels and recreational craft is limited as in those segments, diesel is the dominant fuel instead of HFO. Estimates for oily waste generation indicate less than **600 kg** of oil per annum per medium size fishing vessel²⁰ and about **5 kg** oil per average recreational craft *per annum*²¹.

Typically larger sized ships, with higher primary waste generation, have on-board treatment facilities, but there is a limit to the waste reduction potential through treatment of around 30% (for engine sludge) to 40% (for engine bilge). Typically smaller sized ships have no or lower treatment potential. The MARWAS model has applied assumptions for this for 16 vessel types and 5 size classes. For fisheries and recreational boating, as vessels are typically small and volumes of oily waste generated per vessels are very low, in line with MARWAS it is assumed that no on-board treatment is taking place.

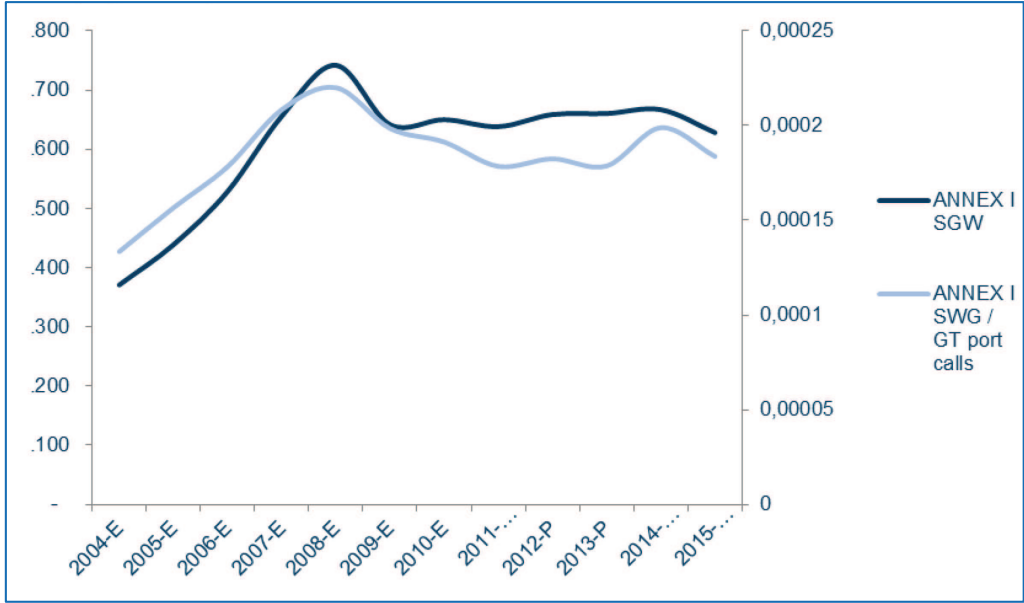
Delivery volumes and waste gap

Regarding the *delivery of oily waste* at PRFs, waste delivery data collected for 29 larger EU ports indicate that volumes of oily waste delivered to port reception facilities have doubled between 2004 and 2008, and have remained stable since, as shown in **Figure 1**.

20 <http://www.engines.man.eu/global/en/marine/engines-for-commercial-shipping/overview/Overview.html> and http://www.mtu-online.com/fileadmin/fm-dam/mtu-usa/mtuinorthamerica/white-papers/WhitePaper_PrevMaintenance_Marine.pdf

21 http://www.yanmarmarine.com/theme/yanmarportal/UploadedFiles/Marine/productDownloads/Pleasure-operation-manual/JH5/JH5_EN_operation-manual.pdf

Figure 1 ANNEX I oily waste SGW delivered in 1000 ton (left axis) and per unit of GT calls (right axis)



Source: delivery data collected by Ecorys from 29 merchant shipping ports

Waste delivery data correlated for the amount and size of ships calling at the ports (measured by Gross Tonnage (GT) of all ships called) shows a similar pattern.

A comparison of net oily waste generated (taking account of treatment and legal discharges) estimates made for merchant shipping using MARWAS with delivery data from ports indicates that the gap between net waste generated and waste delivered at a port reception facilities is about 2.5%, as illustrated in Table 1. This finding is confirmed by interviews with representatives from ports and PRF operators.

Table 1 Volumes of net oily waste generated and delivered in 29 EU ports, in 1,000 m³ (average annual volumes 2011-2015)

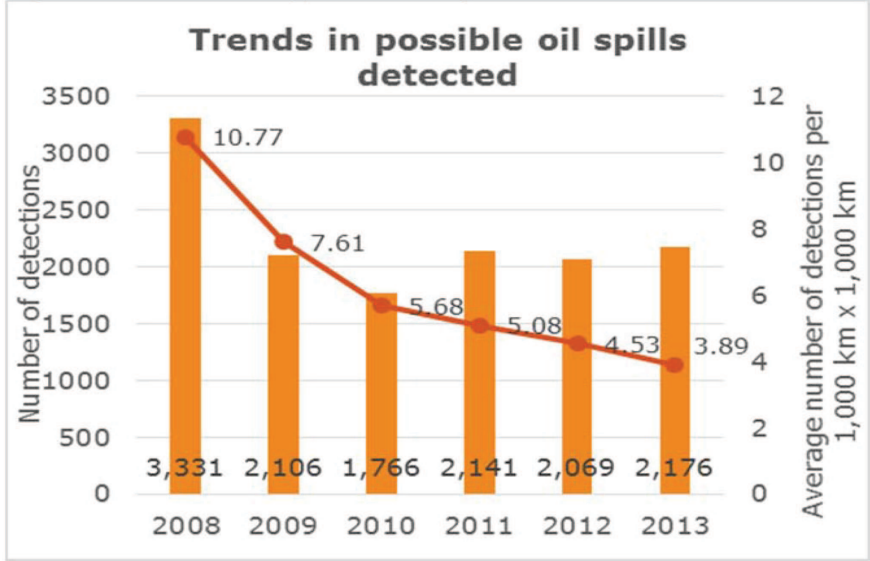
Volume generated	Volume delivered	Delivery gap
1,226	1,195	2.5%

Source: MARWAS calculations (generation), and port delivery data (collected by Ecorys)

For the fisheries and recreational sector, no data on oily waste delivery is available. Therefore, taking into account these sectors, the delivery gap is potentially higher.

Aerial surveillance data on oil spills detected in surface water indicate that the amount of oily waste discharged into sea has significantly decreased since the introduction of the PRF Directive (EMSA (2014), Bonn Agreement (2012)), as illustrated below.

Figure 2 Trends in possible oil spills detected



Source: EMSA (2014), Pollution Preparedness and Response Activities.
 Note that these concern “possible’ oil spills, as not all dark areas on images collected are necessarily oil

Information from PRF operators (Deloitte, 2016) indicates that oily waste, having a commercial value, is typically kept on board to be delivered in a port where market conditions are most favourable (relating to oil prices, demand for oily waste). Such conditions may be found within but possibly also outside the EU.

Conclusion on Annex I waste

Based on a number of sources, it can be concluded that the illegal discharge of oily waste into the sea has substantially decreased over time. Sources include the MARWAS analysis, the CE Delft study on ship-generated waste (2016), a review of delivery data of 29 larger ports, the ex-post evaluation (Panteia, 2015) and validation through case studies and interviews. 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 **2.5%**.

2. Sewage (MARPOL Annex IV)

Definition

Under MARPOL, sewage is defined as drainage and other wastes from any form of toilets and urinals, medical premises, spaces containing living animals, or other waste waters mixed with the above.

Discharge regime

MARPOL Annex IV regulates the discharge of sewage. The regulations in Annex IV prohibit the discharge of sewage into the sea, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system, at a distance of more than three nautical miles from the nearest land. Sewage, which is not comminuted or disinfected, can be discharged at a distance of

more than 12 nautical miles from the nearest land. Specific discharge prohibitions apply to special areas (see Table 2, in attachment).

MARPOL allows for discharging when the ship operates 12 nautical miles away from shore, provided the sewage is treated or comminuted and disinfected, so that the harm to the marine environment is minimised. As the discharges should take place under certain minimum sailing speeds and maximum discharge rates, the sewage will be diluted, further reducing its potential environmental impact.

It is observed that the on-board treatment of sewage is significant and can be up to 100% for the larger sized modern cruise ships (those that generate the largest amount of primary sewage). A calculation using the MARWAS model shows that of all primary sewage generated by merchant ships, typically 80-100% is treated on board and/or legally discharged. As per MARPOL annex IV, these should be approved sewage treatment plants (MEPC(227)64). Besides minimal treatment, more advanced physical, chemical and biological treatment systems are gradually gaining importance.

Sewage generation on board and MARWAS estimates

MARWAS assumes a sewage generation of 80 litres/person/day. CE Delft (2016) estimates a waste production of 10-60 litres /person/day of sewage, based on interviews and a survey on a handful of selected ships. An older source indicates 38 litres/person/day (Lester & Weeden, 2004). Eunomia (2016) refers to estimates by Butt (2007) of 20-40 litres/person/day. An analysis by Helcom (2014) for cruise ships in the Baltic Sea arrives at an estimated 170 litre/person/day (possibly this includes 'grey water' i.e. from showers, galley etc. but the report does not specify this). The support study has estimated total primary (non-treated) sewage generated by EU merchant shipping to be up to approximately 29 mln m³ per year.

Calculations of MARWAS for 29 larger ports provide a volume of sewage to be delivered, **after treatment and legal discharge**, of about **500,000 m³ per year**. Aggregating this to all EU merchant ports would give a volume of approximately **1.5 mio m³**.

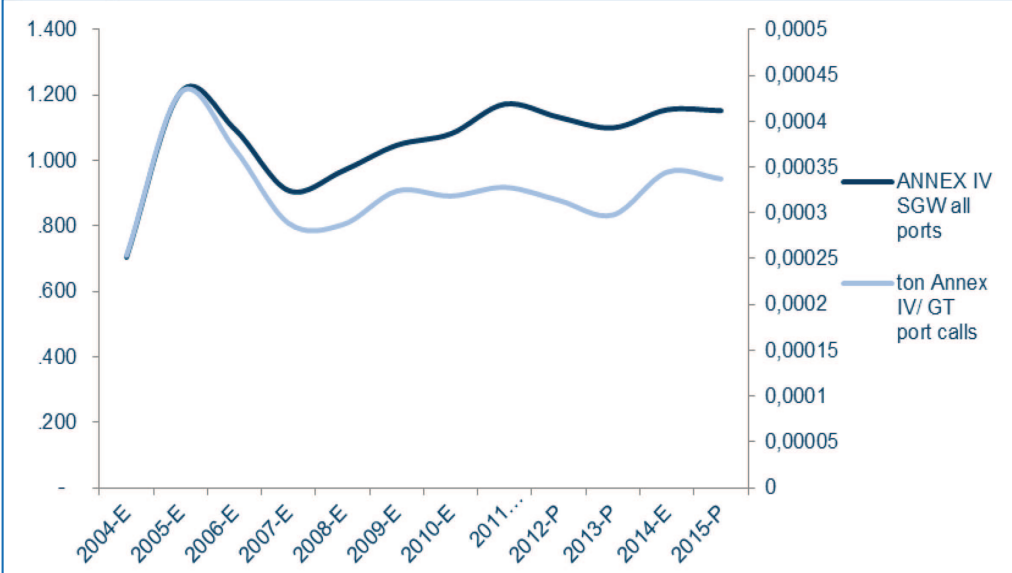
The fisheries and recreational sector also generates sewage, and typically those ships do not have on-board treatment facilities. Recreational vessels also typically operate within 12 nautical miles from shore. Furthermore, these segments are operating in port significant proportions of time (about 50% for fisheries vessels, and about 55% for recreational vessels), where they cannot discharge and therefore are normally delivered to PRF (or even not generated on board as recreational boaters will use shore toilet facilities). Estimates on the basis of the European recreational and fisheries fleet indicate a sewage generation of 1-1.5 mln m³ from the recreational boating sector, and about 1 mln m³ from the fisheries sector, both thus of similar order of magnitude as the merchant shipping sector. See annex X for assumptions underlying these figures.

Delivery and gap

The *port delivery data for sewage* in **Figure** shows a strong increase (75%) in sewage delivered from 2004 to 2005. which coincides with the revision and entry into force of MARPOL Annex IV (revision date: April 1, 2004 and entered into force on 1 August 2005). Since then, a decrease of between 2005 to 2008 was observed, with one possible explanation being that existing ships were required to comply with the provisions of the revised Annex IV five years after the date of entry into force of Annex IV, namely since 27 September 2008. Since 2008, a slight increase is observed. Note that the increasing cruise liner traffic to MS ports does not seem to influence this pattern significantly, which might be explained by the

improvements of sewage treatment technologies on board. It should be noted however, that it is not certain that all ports have registered their cruise liner sewage delivery as part of their data, as some ports have special arrangements with cruise liners. Waste delivery data correlated for the GT calling the ports show a similar pattern.

Figure 3. ANNEX IV SGW sewage delivered – in 1000 ton (left axis) and per unit of GT calls (right axis)



Source: delivery data collected by Ecorys from 29 merchant shipping ports

Lack of registration of delivered sewage e.g. from cruise liners (individual arrangements), insufficient knowledge on “treatment on board” facilities and other legal discharges do however reduce the transparency regarding where and how much sewage is delivered to ports although some areas begin to map the sewage delivery more systematically, e.g. in the Baltic Sea²².

When comparing the remaining volumes with volumes delivered to 29 ports, a *sewage delivery gap* of 7-17% is observed, indicating that this part of sewage is not delivered, so potentially discharged illegally. The uncertainty relates to varying estimates of sewage generation on-board ships. Table presents the estimated figures for a high and low scenario.

Table 3 Volumes of sewage generated and delivered, in 1000 m3 (average annual volumes 2011-2015), EU merchant ports

Scenario	Generated waste	Delivered waste	Waste gap
High	1,471	1,226	17%
Low	1,471	1,362	7%

Source: MARWAS calculations (generation), and port delivery data (collected by Ecorys for 29 ports and aggregated to EU level)

The limited delivery observed is confirmed in a study by HELCOM (2014) for the Baltic Sea, which reveals that **only 30% of cruise ship calls involve sewage delivery**. Reasons provided for this include statements on unreasonably high costs as, well as low capacity for waste delivery in some ports.

²² <http://www.helcom.fi/action-areas/shipping/sewage-from-ships/overview-report/>.

As delivery by the fisheries and recreational boating sector is currently not being reported, data on volumes delivered by these categories of vessels is not available.

Conclusion on Annex IV waste

Based on ship-generated waste estimates from CE Delft (2016), MARWAS calculations, delivery data from 29 ports, Helcom (2014), case studies and interviews, it is concluded that, for merchant shipping, of the sewage that is to be delivered to port, approximately 7-17% is not received by port reception facilities and potentially discharged illegally, affecting the marine environment. For the recreational and fisheries sector, while volumes of sewage generated are similar to those of the merchant sector, no data on delivery are available to assess whether the gap for these sectors is similar or, possibly, higher.

3. Garbage (MARPOL Annex V)

Definition

Annex V covers garbage, including domestic waste, plastics, food waste, cooking oil, animal carcasses, fishing gear, operational waste and incinerator ashes. In addition, Annex V waste also includes cargo residues; mostly tank washings from dry bulk.

MARPOL Discharge regime

Under MARPOL, it is allowed for Annex V to legally discharge of specific types of garbage. For example, food waste, animal carcasses and cleaning agents can still be legally discharged at sea (mostly when the ship is beyond 12 nautical miles from the nearest coast). All other garbage, including plastics, domestic wastes, cooking oil, incinerator ashes, operational wastes, and fishing gear cannot be legally discharged under MARPOL (see Table 3 in the Annex).

Primary waste generation

For household waste, MARWAS assumes a generation of 3 kg/person/day. For other garbage categories, however, the model does not provide estimates. The EUNOMIA study (2016) provides the most extensive estimates of waste generation for all Annex V waste types on an aggregate level and per waste category (see below).

Table 4. Annex V on-board waste generation estimates for 2013 (tons) by sub-category and ship segment

Sector / waste stream	Shipping	Fishing	Cruises	Passenger	Recreational	Nav y	Total	%
Annex V – domestic type waste	74,443	43,531	86,717	123,016	170,928	8,769	507,406	58%
Annex V – solid CR	122,521	/	/	/	/	/	122,521	14%
Annex V – fishing gear	/	218,467	/	/	/	/	218,467	25%
Annex V – Other operational type waste	27,074	4,305	/	360	/	867	32,606	4%
Total	224,038	266,303	86,717	123,376	170,928	9,636	881,000	
%	25%	30%	10%	14%	19%	1%		

Source: EUNOMIA, 2016.

The data show that the contribution of the various shipping segments differs between waste categories, where typically passenger ships (cruise, ferries, recreational boating) cover the majority of domestic waste (garbage), while cargo ships are the main responsible for MARPOL Annex V cargo residues and other operational waste. It should be noted that the figures presented only cover cargo residues from dry bulk. In calculating the figures, Eunomia already corrected for legal discharges of food waste. If an average treatment of 25% is assumed (see below), the gross waste generation would be an approximate 1.2 mln tons for all shipping sectors, and about 0.3 mln for merchant shipping alone. Fishing and recreational vessels together account for about half of the total annex V waste generation.

Treatment and legal discharge

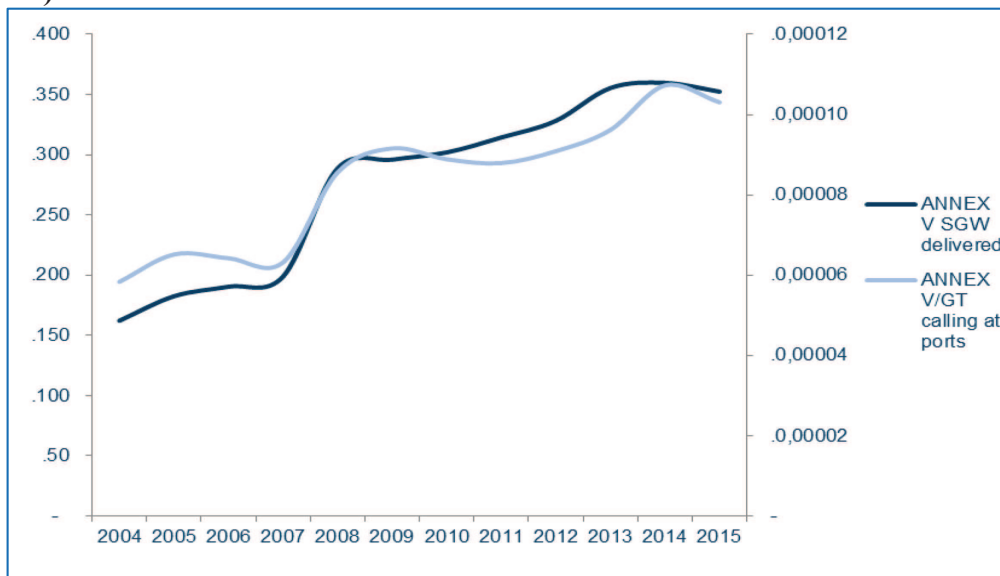
Food waste accounts for approximately 17% of total annex V domestic waste (Eunomia). Furthermore, fishing vessels, passenger ferries and recreational vessels are unlikely to have incinerators on board, but about a quarter of the shipping sector, in particular cruise vessels, do. This is in line with the MARWAS model, which assumes no treatment for small specialised vessels, and 20-30% on-board treatment of garbage for larger sized ships. For cruise ships, treatment (usually incineration) is assumed to be up to 80%, an estimate confirmed by Butt (2007) who indicates that on cruise ships, 75%-85% of residual waste is incinerated.

Delivery and gap

Data on Annex V waste delivery to 29 ports show an increase in waste delivery by merchant ships since the implementation of the PRF Directive, as reflected in Figure , showing volumes higher than the amounts of waste generated as estimated by Eunomia (see

Table above).

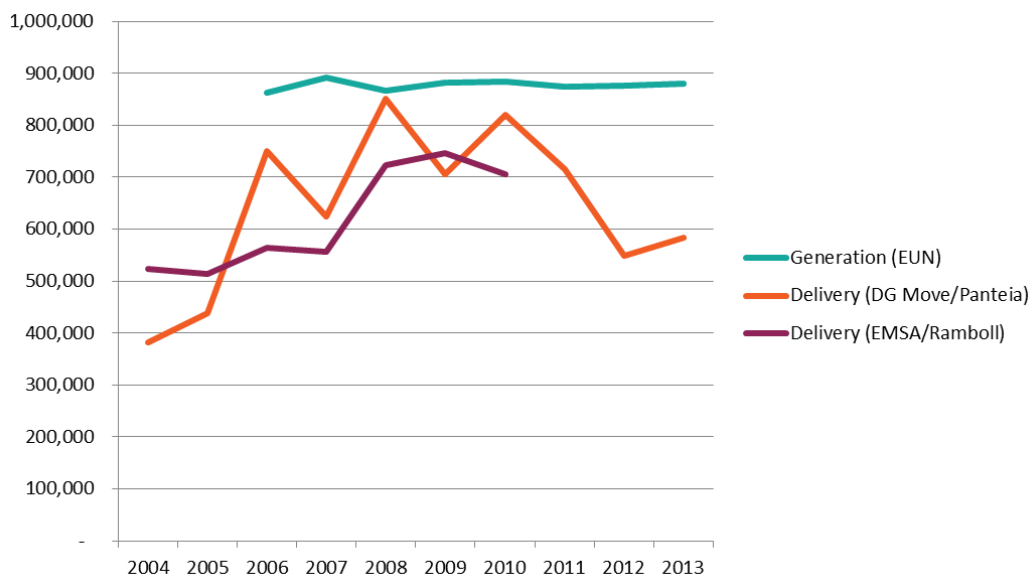
Figure 4. ANNEX V garbage delivered – in 1000 ton (left axis) and per unit of GT calls (right axis)



Source: Data from waste deliveries from 29 EU ports

In order to estimate the *delivery gap for garbage*, a comparison was made between total waste generated with waste delivered, using their delivery estimates from studies done by Panteia (2015, REFIT Evaluation) and Ramboll (2012), indicating a **significant gap between generation and delivery of about 33%** (order of 900,000 tons generated vs 600,000 tons delivered), as shown in Figure 5 below.

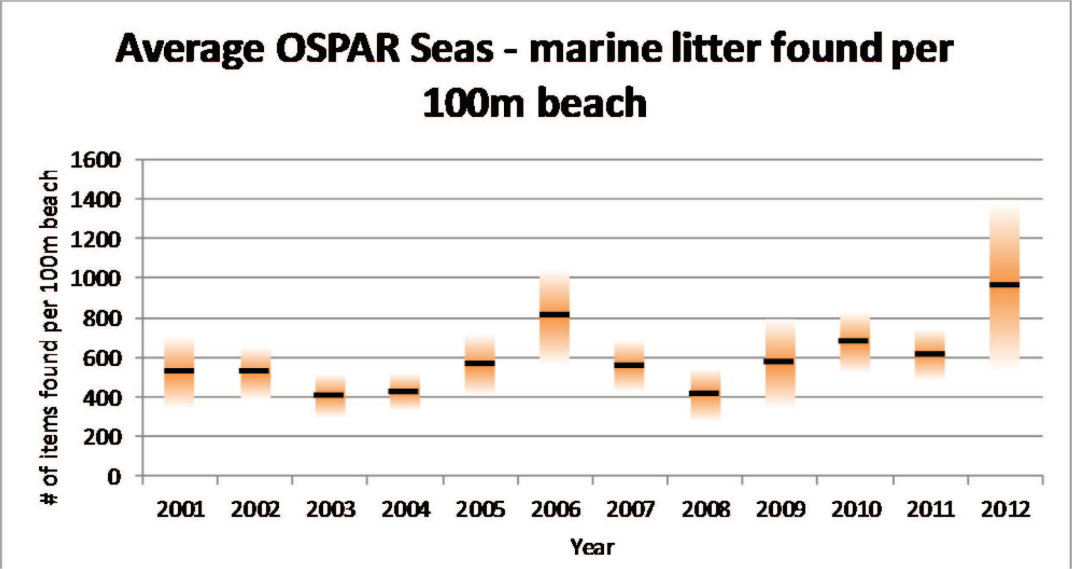
Figure 5 Delivery estimates based on EMSA/Ramboll (2012) and DG Move/Panteia (2015); Generation estimate (Eunomia) - tonnes



Source: Eunomia (2016)

At the same time, time series data from marine litter monitoring programmes (OSPAR, 2012) do not indicate a reduction of the amount of marine litter in European seas.

Figure 6. Marine litter found on European shores (number of items per 100m of coastline)



Source: OSPAR (in Panteia, 2015)

It should be noted that given the high share of marine litter from land-based sources, the above developments cannot be directly linked. However, a study by Sá et al (2015) **finds evidence that significant higher concentrations of Annex V waste float near dense shipping routes** (operational waste and packaging material), compared to the areas with little shipping traffic, indicate a significant contribution of the (merchant) shipping sector to waste at sea.

For the fisheries sector, more specific estimates exist in relation to fisheries equipment, including so-called abandoned, lost or otherwise discarded fishing gear (ALDFG), ranging up to 220,000 tons per year for the EU as a whole (calculations based on Eunomia, 2016). Data from fishing for litter programmes initiated over the past decade suggest that the amount of ALDFG is gradually decreasing, but still a lot of ‘old’ ALDFG is in Europe’s seas. ALDFG is to be passively fished and delivered to port, which is supported by fishing for litter programmes or independently.

Plastics are the most abundant debris found in the marine environment and comprise more than half of marine litter in European Regional Seas. Figures estimated point at 54,000 to 145,000 tonnes of plastic per year entering the marine environment from land-based sources (Eunomia, 2016). Visual surveys and surface trawls indicate a stock of plastics floating near the surface to be in the order of 268,000 tons, to which European seas are accounting at least 30% (Five Gyres Institute, 2014 as reported in Eunomia, 2016). These figures do not take into account plastics that sink or to micro-plastics that cannot be visually observed, indicating that the overall stock of plastics in the marine environment is significantly larger.

Analyses of the *origins of marine litter* found in European seas and on shore indicate that a substantial part originates from ships, but various sources use different estimates, caused by different measurement methods.

Table 5 Share of marine litter from sea based sources

Source	Baltic Sea	North Atlantic	Mediterranean Sea	Black Sea	EU average
Ocean Conservancy (2012) – waste count		20%			12%
Idem, weight corrected (Eunomia, 2016)					32%
Arcadis (2012)	18%	48%	16%	50%	34%
- Of which fishing sector	51%	88%	58%	48%	65%
- Of which other shipping	49%	12%	42%	52%	35%

Eunomia (2016) discusses the limitations of data and methods applied by Ocean Conservancy and Arcadis, and, also referring to other sources (Van Franeker et al., 2010 and Ioakeimidis et al., 2014), **assumes a general split of 20-40% of marine litter being derived from sea-based sources.**

Conclusion on Annex V waste

The amount of marine litter found in European seas remains at a rather constant level and time series of marine litter on European shores indicate that the problem has persisted since the implementation of the PRF Directive. Although land-based sources are dominant in generating marine litter, sea-based sources actively contribute to the problem with an estimated EU average 32% and values up to 50% for some sea basins. It is estimated that the fishing and recreational sectors are relatively large sea-based sources contributors, with shares of 30% and 19% respectively according to Eunomia (2016) (the balance provided by merchant shipping), and 65% for fisheries alone according to Arcadis (2012). Although garbage delivered in ports has increased since the introduction of the PRF Directive, a significant delivery gap thus remains.

4. Waste from exhaust gas cleaning systems and ozone depleting substances (MARPOL Annex VI)

Definition

Under MARPOL Annex VI strict requirements regarding emission levels are adopted. A range of waste types are included in Annex VI, such as waste from exhaust gas cleaning systems (scrubbers) and ozone depleting substances (ODS). The analysis concentrates on waste from scrubbers, as ODS is mainly handled through repair yards, which fall outside the scope of the Directive.

MARPOL discharge regime

Under MARPOL Annex VI strict requirements regarding emission levels are adopted (see Table 6). Scrubbers are one of several possibilities to comply with low emission standards

required in Sulphur Emission Control Areas (SECAs). Currently, Annex VI waste is not regulated by the PRF Directive.

Primary waste generation

Scrubbers are one of several possibilities to comply with low emission standards, but their use comes with the generation of so-called scrubber sludge; categorised under MARPOL Annex VI. Currently, Annex VI waste is not regulated by the PRF Directive.

This type of waste is mainly generated by merchant shipping, as their ship engines run on heavy fuel oil for which abatement measures are required, at least in Sulphur Emission Control Areas (SECA). Fisheries and recreational boating hardly contribute to the generation of Annex VI waste.

This waste category is currently generated in limited volumes only, due to the fact that the number of ships with on-board scrubbers is still relatively small. Volumes of waste generated have not been studied widely, but from a recent survey completed by an expert group on exhaust gas cleaning Systems (EGCS Subgroup under the European Sustainable Shipping Forum), some indications can be derived. According to the data presented, approximately 400 scrubbers have been installed on board of vessels. It is indicated that these concern both open loop and closed loop scrubbers. Open loop scrubbers take in sea water, use it for scrubbing, then treat it and discharge it back into sea, whereas closed loop scrubbers use fresh water from a holding tank that, after use and treatment, is used again, while the treatment gives wash water bleed-off and sludge.

The same survey provides indications that closed loop scrubbers would generate 1kg of dry matter per MWh, or 20 kg/MWh sludge in total (assuming 5% dry matter content). For an average ship with

A 15MW engine, operating 4,000 hours per year, this would imply 60 tons of dry matter or 1.2 mln tons of sludge (appr. 1,200 m³). Open loop scrubbers are reported not to generate any sludge.

The expert group has also reported that closed loop scrubbers bleed-off about 0.3 m³/MWh. If we assume an average RoRo ship to have installed power of 15 MW, this gives 4.5m³ of waste per hour. Assuming an average engine running time of 4,000 hours per year, one ship would thus generate 18.000 m³/year. The total volume of scrubber waste generated for all ships then depends on the share of systems that are operating in closed loop.²³ If 5% of the current 400 scrubbers would operate in closed loop mode, the total volume of waste generated amounts to 24,000 m³ sludge (1,200 m³ dry matter), with 360,000 m³ of bleed-off being generated.

The expected growth of this type of waste in the future with a growing uptake potential of scrubbers, driven by regulatory measures including SECA zones in Europe, and announced global sulphur content limits. Any estimate on volume is, however, premature, as it is uncertain how the shipping sector will respond to upcoming legislation (i.e. investing in exhaust gas cleaning systems – EGCS and choosing between open-loop or closed-loop systems, or switching to cleaner but more expensive fuels). The recent CE Delft study (2016) also concluded that it has proven difficult to provide estimates of volumes generated on-board ships for this type of waste.

²³ A verification of these figures and assumptions has been asked from EGCSA, but has not been received.

Treatment and legal discharges

The EGCS survey indicates that currently the majority of scrubbers sold are systems operating in open loop, which discharge wash waters and do not generate sludge. However, specific figures on the share of open loop scrubbers and the time they are operated in open loop mode have not been provided. The survey also indicates that closed loop systems still have some discharge (0.1-0.3 m³/MWh, although they are also stated to be able to operate with zero discharge for limited periods, depending on storage of bleed off water).

Delivery and gap

Data on delivery of Annex VI waste is not available, as this category is currently not separately included in the PRF Directive. Therefore no gap can be calculated. In absolute terms, the amount of potential waste to be delivered would currently be small as the number of scrubbers currently in use is very low, and a large share of these are open-loop scrubbers legally discharging into sea.

Conclusion on Annex VI waste

While the current volumes of Annex VI waste generation are limited, environmental legislation will drive the demand for increased use of exhaust gas treatment systems, causing a growing volume of Annex VI waste generation. An important factor is the ratio of closed vs open loop scrubbers.

5. Cargo residues

Cargo residues have been defined under the Directive as "remnants of any cargo material on board in cargo holds or tanks which remain after unloading procedures and cleaning operations are completed and shall include loading/unloading excesses and spillage. As such they include both cargo residues as defined in MARPOL Annex V, as well as tank washings falling under MARPOL Annexes I (oily tank washings) and II (tank washings containing noxious liquid substances).

The issue of cargo residues is very different from ship-generated waste and more complex. Cargo residues fall outside the scope of both Article 7 (delivery obligation) and Article 8 (fees) of the Directive, and are regulated under Article 10 (referring to MARPOL) instead. In contrast to ship-generated waste, cargo residues can vary widely. They may also still have a commercial value and therefore usually remain the property of the cargo owner. At the same time, depending on the type of residue, they may require special handling, equipment or treatment. As a result, cargo residues are normally a matter for the terminal operators and shippers to handle, rather than being under the direct competence of the port authorities. The costs are normally covered by the cargo owners (although the ship and/or its agent may also be involved). PRF providers are also used, in case the cargo owners are not interested and/or the terminals cannot take the residues.

The PRF Directive provides in Article 10 that cargo residues are to be delivered to a port reception facility in accordance with the provisions of MARPOL. MARPOL allows for discharges of Annex I and II tank-washings under strict conditions (ref. XX), and a general prohibition of CR discharges of cargo residues under Annex V, with the exception of non-harmful categories of residues and under predefined conditions.

Regarding oily tank washings under Annex I CE Delft (2016) concludes that these are only generated on oil tankers, whereas cargo residues are mostly generated by cargo ships (mainly dry bulk carriers). The amount generated depends on several factors such as the type of cargo, the handling equipment and the efficiency of the stevedores. Results from interviews concluded that the amounts generated per washing, per cargo tank, ranged from 1 to 2 m³ (CE Delft, 2016).

The inventory of waste delivery to ports has found that data on cargo residues is lacking in many ports, which is attributed to the fact that cargo residues are often delivered to terminal operators rather than PRF operators. As a result, data provided regarding the delivery of cargo residues is quite limited and shows strong fluctuations between years, for both types (oily and solid residues in tank washings). Conclusions on any delivery gap cannot be given as a result of above-mentioned limitations. However, as cargo residues have a residual value and thus delivery implies revenues instead of costs, it is generally regarded that this is a sufficient incentive to deliver cargo residues and not discharge them into the sea. Nonetheless, volatile commodity market prices affect the attractiveness of delivering cargo residues; if the market price is low, there is less of an incentive to deliver cargo residues. This is currently the case for oily residues due to the low oil prices.

Summarising the data on each waste category, the following table has been composed (see next page).

Table 1: 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)
Primary waste generation (1)	1,977,000 m ³	2,061,000 m ³ Merchant: 1,997,000 m ³ Fishing vessels: 55,000 m ³ Recreational craft: 9,000 m ³	27,240,000 m ³	29,240,000 m ³ Merchant: 27,240,000 m ³ Fishing vessels: 1,000,000 / 1,500,000 m ³ Recreational craft: 1,000,000 m ³	<i>Not provided</i>	<i>Not provided</i>	400 vessels with scrubbers on board, generating wash waters, sludge and bleed-off
Treatment/legal discharge (2)	38% ²⁴ of (1) = 751,000 m ³	Close to zero from fishing and recreational craft, thus limited to merchant shipping, i.e. 759,000 m ³	80-100% of (1) – assuming average 95% = 25,878,000 m ³	Merchant shipping: average 95% = 25,878,000 m ³ , Fishing vessels: 50% = 500,000 / 750,000 m ³ ²⁵ ; Recreational craft: 55% = 550,000 m ³	<i>Not provided</i>	<i>Not provided</i> ²⁶	Legal discharge from scrubbers operating in open-loop mode: 95% of 400 vessels (380)
Remaining to be delivered (3) = (1) – (2)	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 ²⁷	881,000 tonnes Merchant: 434,000 tonnes Fishing vessels: 266,000 tonnes Recreational craft: 171,000 tonnes ²⁸	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	<i>Unknown, as waste delivery data for fishing ports and marinas are unknown</i>	1,226,000 m ³	<i>Unknown, as waste delivery data for fishing ports and marinas are unknown</i>	Range from 286,000 to 404,000 tonnes ²⁹	Range from 580,000 to 820,000 tonnes	<i>Unknown</i>

²⁴ 38% estimate is based on the most relevant ship categories used in MARWAS.

²⁵ The waste deducted from waste produced for fishing and recreational craft is based on time of fishing vessels and recreational craft in ports.

²⁶ Details of the calculations can be found in the Eunomia study, section 2.6.5.2, which has estimated that approximately 20% of Annex V waste is incinerated on-board; this is confirmed by MARWAS which assumes 20-30% on-board treatment of garbage for large ships, and no treatment on board of small specialised vessels.

²⁷ Based on data from Eunomia (2015), including the identified sectors: shipping; cruises; and passenger.

²⁸ The balance of waste generated (10,000 tonnes) is created by navy.

²⁹ 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).

Delivery gap (3) – (4)	31,000 m³ (2.5%)	Unknown, but consisting of 31,000 m ³ caused by merchant shipping and a contribution from fishing vessels and recreational craft between 0 and 64,000 m ³	136,000 m³ (10%)	<i>Unknown</i>	Between 30,000-148,000 tonnes (7-34%)	Between 60,000-300,000 tonnes (7-34%)	<i>Unknown</i>
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Source: MARWAS (Annex I-IV waste); Annex V waste estimates are based on Eunomia (2016)

Annex 6 – MARPOL discharge norms and relevant amendments

MARPOL Annex I ³⁰			
Waste category	Ships outside special areas	Ships within special areas ³¹	Offshore platforms and all ships within 500 m of such platforms
Oily bilge water	Applicable to ships > 400 GT Discharge only permitted when: * the ship is proceeding en route;	Applicable to ships > 400 GT Discharge only permitted when: * the ship is proceeding en route	Discharge prohibited
Oily residues (sludge)	* the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14 of this Annex;	* the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14.7 of this Annex	
Other	* the oil content of the effluent without dilution does not exceed 15 parts per million; * the oily mixture does not originate from cargo pump-room bilges on oil tankers * the oily mixture, in case of oil tankers, is not mixed with oil cargo residues	* the oil content of the effluent without dilution does not exceed 15 parts per million * the oily mixture does not originate from cargo pump-room bilges on oil tankers * the oily mixture, in case of oil tankers, is not mixed with oil cargo residues	

³⁰ http://www.marpoltraining.com/MMSKOREAN/MARPOL/Annex_I/r15.htm and http://www.bsh.de/en/Marine_data/Environmental_protection/MARPOL_Convention/Discharge_regulations_in_Annex_I.pdf

³¹ The following European waters are special zones: Mediterranean Sea, Baltic Sea, Black Sea and North Western European Waters (Annex I).

MARPOL Annex IV³²			
Waste category	Ships outside special areas	Ships within special areas³³	Offshore platforms and all ships within 500 m of such platforms
Sewage	Discharge in principle prohibited unless ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land. Sewage which is not comminuted or disinfected may be discharged at a distance of more than 12 nautical miles from the nearest land	Of the EU waters, only Baltic Sea is appointed as special area. Currently regulation is not yet in force. If in force only applicable to passenger ships. The following applies: discharge of sewage from passenger ships within the special area will generally be prohibited under the new regulations, except when the ship has in operation an approved sewage treatment plant which has been certified by the Administration	See rules 'ships outside special areas'

MARPOL Annex V³⁴			
Waste category	Ships outside special areas	Ships within special areas³⁵	Offshore platforms and all ships within 500 m of such platforms
Food waste comminuted or ground	Discharge permitted ≥ 3 nm from the nearest land and en route	Discharge permitted ≥ 12 nm from the nearest land and en route	Discharge permitted ≥ 12 nm from the nearest land
Food waste not comminuted or ground	Discharge permitted ≥ 12 nm from the nearest land and en	Discharge prohibited	Discharge prohibited

³² <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Sewage/Pages/Default.aspx>, especially MEPC.157(55) and MEPC.227(64)

³³ The following European waters are special zones: the Baltic Sea (Annex IV)

³⁴ <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Documents/2014%20revision/Annex%20V%20discharge%20requirements%202007-2013.pdf>

³⁵ The following European waters are special zones: Mediterranean Sea, Baltic Sea, Black sea and North Sea (Annex V)

MARPOL Annex V³⁴			
Waste category	Ships outside special areas	Ships within special areas³⁵	Offshore platforms and all ships within 500 m of such platforms
	route		
Cargo residues ³⁶¹ not contained in wash water	Discharge permitted ≥ 12 nm from the nearest land and en route	Discharge prohibited	Discharge prohibited
Cargo residues ¹ contained in wash water	route	Discharge only permitted in specific circumstances ³⁷ and ≥ 12 nm from the nearest land and en route	Discharge prohibited
Cleaning agents and additives ¹ contained in cargo hold wash water	Discharge permitted	Discharge only permitted in specific circumstances ² and ≥ 12 nm from the nearest land and en route	Discharge prohibited
Cleaning agents and additives ¹ contained in deck and external surfaces wash water		Discharge permitted	Discharge prohibited
Carcasses of animals carried on board as cargo and which died during the voyage	Discharge permitted as far from the nearest land as possible and en route	Discharge prohibited	Discharge prohibited
All other garbage including plastics, domestic wastes, cooking oil, incinerator ashes, operational wastes and fishing gear	Discharge prohibited	Discharge prohibited	Discharge prohibited
Mixed garbage	When garbage is mixed with or contaminated by other substances prohibited from discharge or having different discharge requirements, the more stringent requirements shall apply		

³⁶ These substances must not be harmful to the marine environment.

³⁷ According to regulation 6.1.2 of MARPOL Annex V, the discharge shall only be allowed if: (a) both the port of departure and the next port of destination are within the special area and the ship will not transit outside the special area between these ports (regulation 6.1.2.2); and (b) if no adequate reception facilities are available at those ports (regulation 6.1.2.3).

MARPOL Annex VI		
Waste category	Ships outside special areas	Ships within special areas
Ozone Depleting Substances	Prohibited	
Nitrogen Oxides (NOx)	<p>n = engine's rated speed (RPM)</p> <p>Tier I – Construction on or after 1 January 2000 n < 130 → emission limit 17.0 n = 130 – 1999 → emission limit 45.n-0.2 (e.g. 720rpm – 12.1) n > 1999 → emission limit 9.8</p> <p>Tier II – Construction on or after 1 January 2011 n < 130 → emission limit 14.4 n = 130 – 1999 → emission limit 44.n-0.23 (e.g. 720rpm – 9.7) n > 1999 → emission limit 7.7</p> <p>Tier III – Construction on or after 2016 n < 130 → emission limit 3.4 n = 130 – 1999 → emission limit 9.n-0.2 (e.g. 720rpm – 2.4) n > 1999 → emission limit 2.0</p> <p>The same Tier I limits will apply to those existing marine diesel engine with a power output of more than 5,000 kW and a per-cylinder displacement at or above 90 litres installed on a ship constructed between 1st January 1990 and 1st January 2000. A certified approved method must be provided following the requirements set in the NOx Technical Code.</p>	<p>The IMO Marine Environment Protection Committee at its 66th session agreed to set the Tier III requirements to be applied to the marine diesel engines installed on:</p> <p>* ships constructed on or after 1st January 2016 and which operate in the North American ECA or the United States Caribbean Sea ECA, both designated for the control of NOx emissions.</p> <p>* ships constructed on or after the date of adoption by the committee of a new ECA, or a later date as may be specified in the amendment designating the new NOx Tier III ECA.</p>
Sulphur oxides and Particulate Matter (SOx)	<p>Outside an ECA established to limit SOx and PM emissions:</p> <ul style="list-style-type: none"> - 3.50% m/m on and after 1 January 2012 - 0.50% m/m on and after 1 January 2020 	<p>Inside an ECA established to limit SOx and PM emissions:</p> <ul style="list-style-type: none"> - 1.00% m/m on and after 1 July 2010 - 0.10% m/m on and after 1 January 2015
Volatile	This regulation only applies to tankers and VOC from tankers are regulated in	

MARPOL Annex VI		
Waste category	Ships outside special areas	Ships within special areas
organic compounds (VOC)	ports or terminals. The relevant Government designates which ports and terminals at which VOC emissions from tankers are to be regulated.	
Ship board Incinerators	<p>Shipboard incineration of the following substances shall be prohibited:</p> <ul style="list-style-type: none"> - Annex I, II and III cargo residues of the present convention and related contaminated packing materials; - Polychlorinated biphenyls (PCBs); - Garbage, as defined in Annex V of the present Convention, containing more than traces of heavy metals; - Refined petroleum products containing halogen compounds; - Sewage and sludge oil not generated on board; - Exhaust gas cleaning system residues. <p>Regulation 16 permits incineration of:</p> <ul style="list-style-type: none"> - PVC - plastics (where type approved to do so) (Reg.16.3) - Sewage sludge and sludge oil permitted in boilers but not when in ports, harbours and estuaries (Reg.16.) - Incinerators installed before 24 May 2005 on domestic shipping can be excluded by the Administration (Reg. 16.6.2) - Operating manual, training, and temperature control (Reg. 16.7 - 16.9) <p>Shipboard Incinerators installed after 1 January 2000 must be type approved and certified to meet prescribed emission standards.</p> <p>Shipboard incineration must only take place in a shipboard incinerator except for incineration of sewage sludge and sludge oil generated during normal operation of a ship, which may also take place in the main or auxiliary power plant or boilers, but in those cases, must not take place inside ports, harbours and estuaries.</p>	

Annex 7 – EMSA Assessment of the enforcement options

Paper by EMSA starting on the next page.

**EMSA's assistance with Directive
2000/59/EC on Port Reception Facilities
(PRF)**

**Technical assessment on the list of open questions
(Supplement on enforcement)**

1. Introduction

This is a complementary analysis to EMSA's technical assessment on a given list of open questions addressed in view of the forthcoming impact assessment for the revision of the PRF Directive.

The analysis focusses on a new risk based approach for PRF inspections in the context of the revision of the PRF Directive and it provides two alternative enforcement scenarios each tailor made to address the enforcement part of policy options number 3 and number 4 of the IA Support Study.

2. Risk based approach for PRF inspections

2.1 Introduction to the Issue

In relation to enforcement, the following should be taken into account:

- References to the PSC regime are outdated and should be amended. In particular, the mechanism to calculate annual inspection commitment for PRF inspections is outdated and should be revised;
- THETIS EU, which is available since April 2016 and serves as a platform to record and exchange information on the results of individual compliance verifications under Directive 2000/59/EC, may also be used to facilitate enforcement of the PRF Directive;
- There are no specific and accurate data on the number of actual PRF inspections conducted by the Member States annually. It may be assumed that a certain part of the total number of the PSC inspections may have also covered PRF requirements. However, so far, previous findings³⁸ and the limited use of the dedicated THETIS-EU - PRF module³⁹ indicate that, enforcement efforts by the Member States may well remain a problematic area for implementation of the PRF Directive.

In view of the revision of the PRF Directive, the enforcement part (i.e. the so-called "PRF inspection") may be streamlined and evolved on a risk-based approach aiming at more effective inspections and more efficient use of resources. In this regard, the hereunder analysis provides two alternative proposals each tailor made to address the different respective needs of each of the alternative policy options (PO/3 or PO/4)⁴⁰ described in the IASS.

2.2 Options for the enforcement provisions under the revised Directive

2.2.1 General

The current PRF Directive regulates a number of requirements to ensure the accomplishment of the purpose of the Directive⁴¹. In the enforcement part (Article 11), it requires from MS to ensure that:

- A)** A sufficient number of PRF inspections is carried out and
- B)** During a PRF inspection compliance with the "delivery obligation" under Articles 7 and 10 is verified.

In this regard:

A) The sufficient number of inspections (inspection commitment) is defined in Article 11.1(b) of the PRF Directive, setting up the minimum number of inspections equal to 25% inspection requirement set out in Directive 95/21/EC. For the year 2016, this provision would mean that a total number of **19453 "PRF inspections"** would need to be conducted by the Member States⁴².

³⁸ Refer to the Enforcement part (Theme III) of EMSA's Horizontal Analysis of Port Reception Facilities (Directive 2000/59/EC), December 2010.

³⁹ In 2016 only **1166 "PRF inspections"** were recorded in THETIS-EU.

⁴⁰ I.e. PO3: "MARPOL alignment and better enforcement" or PO4: "EU PRF Regime beyond MARPOL".

⁴¹ I.e. to reduce the discharges of SGW and CR into the sea, especially illegal discharges, from ships using ports in the EU, by improving the availability and use of PRFs for SGW and CR.

⁴² See Annex I to this report.

However, after the recast of the Directive 95/21/EC the above calculation has been abolished and the new PSC Directive⁴³ has established a “risk-based inspection regime”. In comparison to the old (95/21) regime the number of the PSC inspections has fallen from 23679 in 2010 (last year of old regime) to around 17800 in 2016⁴⁴.

In conclusion, the current PSC regime demands less number of inspections than the current PRF enforcement regime but the PSC inspections are conducted on a risk-basis, they follow detail procedures and they are all reported in THETIS. Although the PRF inspections in most Member States are conducted within the framework of the PSC inspections this is not the case for all Member States, their actual annual number is not clear and, in any case, their results are not reported in THETIS or in THETIS-EU⁴⁵.

B) A PRF inspection must verify that the ship complies with specific PRF requirements stemming from the PRF Directive. It may be part of another inspection (e.g. part of a PSC or a FS inspection) or it may be conducted solely as an inspection for checking compliance with the PRF Directive. Of course, the more demanding and complicating the requirements of the PRF inspection are, the more difficult is to be part of another enforcement regime because of the additional burden on the inspector and potential difficulties to match the respective requirements and procedures.

One must take into account that, different policy options i.e. **PO3** providing for an alignment with MARPOL or **PO4** providing for an EU PRF regime beyond MARPOL call for different enforcement regimes accordingly.

2.2.2 Policy Option 3 (“MARPOL alignment and better enforcement”) – Port State Control inspections according to the PSC Directive plus Flag State inspections

2.2.2.1 The PSC enforcement regime may also cover the PRF regime

The PRF inspection has a wider scope of application than a PSC inspection but, at the same time, it has a limited number of items to be checked during the inspection, while the PSC inspection is a random inspection that may cover (or not) a very broad number of items and not necessarily the MARPOL requirements. In addition, the PSC Directive does not cover the specific provisions of the PRF Directive with regard to the “delivery obligation”, exceptions etc, therefore, a PSC inspection cannot be considered per se as a PRF inspection unless the PSCO combines the PSC inspection with the additional control of the specific requirements of the PRF Directive.

As already mentioned, a PRF inspection may be part of another enforcement regime. In this context, it is evident that **the PSC enforcement regime** may substantially⁴⁶ cover the PRF enforcement requirements if the PSC Directive is amended to incorporate these requirements ensuring that a PSC inspection will also include the specific “PRF inspection”. Annex II provides a detailed comparison between the two regimes (PRF vs PSC) in order to have a better understanding of the adjustments that may be necessary for combining PSC and PRF inspections.

Provided that the PSC Directive is amended accordingly, the PSC regime may enforce effectively the PO3 principal to align the scope of the EU mandatory delivery requirement with MARPOL⁴⁷. Under PO3, the “EU delivery obligation” addresses what cannot be discharged legally according to MARPOL⁴⁸. In this regard, the PSC regime will cater for the proper enforcement of the EU PRF regime i.e. advanced waste notification (**AWN**), **risk-based selection of ships** for inspection and **compliance with the obligation to deliver** to ensure compliance with MARPOL requirements.

⁴³ Directive 2009/16/EC.

⁴⁴ However, the number of individual ships inspected has risen from 14577 to 14757. This indicates that more ships are inspected, but the frequency of inspections per ship has reduced. Numbers refer to the whole Paris MOU region. Total EU inspections are **15186**.

⁴⁵ Not mandatory reporting to THETIS-EU and a very small number has been reported up to now.

⁴⁶ But not fully, as its scope does not include Flag State inspections or inspections on domestic vessels, fishing vessels and recreational crafts.

⁴⁷ 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

⁴⁸ On the contrary, under PO4 the “EU delivery obligation” addresses all the SGW/CR produced on board a ship regardless whether they can be legally discharged under MARPOL. See below section 2.2.3.

Amendment of the PSC Directive

1) Advanced Waste Notification

It should be noted that the PSC Directive already covers the **AWN**, turning a ship to priority II and making it eligible for a PSC inspection in case of failure to comply with AWN requirements. In addition to this, a competent authority may impose a penalty in accordance with the provisions of the PRF Directive. Therefore, no additional regulation for AWN is necessary.

2) Risk-based selection system of ships for inspection

The PSC Directive already has a **risk-based approach for selection of ships** and this will cater also for the purposes of the PRF Directive in the sense that a Member State may report a ship as potentially harming the marine environment (e.g. in case of no delivery of SGW/[CR]) and then turn it into **priority I for selection for a mandatory additional PSC inspection**.

The selection system could be further streamlined if a specific “**unexpected factor**” is added in Annex I of the PSC Directive: “- Ships which have not complied with the obligation to deliver their SGW [or CR] in accordance with the PRF Directive”. This would turn the ship automatically to Priority II and eligible for a PSC additional inspection.

It should be noted that the addition of a new unexpected factor would not pose any inconsistencies to the PSC – Paris MOU system because, within the framework of the PO3, non delivery of non-dischargeable SGW/[CR] (when an exception cannot be granted) implies a potential breach of MARPOL and, consequently, the ship may be considered to pose a threat of harm to the marine environment. Therefore, an additional more detailed inspection (or expanded inspection depending on ship’s type and inspector’s professional judgement) is appropriate to focus on compliance with MARPOL and the EU PRF requirements⁴⁹.

If the ship has failed to comply with the notification requirements/AWN, as already mentioned in paragraph (1) above, it may be selected for an additional more detailed (or expanded inspection depending on ship’s type and inspector’s professional judgement⁵⁰) to verify compliance with the EU PRF requirements (and MARPOL).

3) Combining PSC with PRF inspection

The main adjustment that needs to be made is to ensure the control of the “obligation to deliver” according to Article 7 or Article 10 of the current PRF Directive⁵¹, within the context of a PSC inspection.

For this purpose, it would be appropriate to **expand the scope of the “initial PSC inspection”** to cater also for a verification of the delivery of SGW/[CR] according to the PRF Directive, mainly by checking the certificates and documents of the ship (e.g. Oil Record Book, Garbage Record Book, Ship’s logs e.t.c.), checking the submitted Advanced Waste Notification Form⁵² and checking, if available, previous waste delivery receipts.

There are two consecutive steps to follow:

- **First** the PSCO shall assess the ship’s operation in relation to Article 7 and Article 10 of the PRF Directive. If compliance with the PRF Directive requirements of Article 7 or 10 is not confirmed⁵³ this shall constitute a clear ground for a more detailed inspection to verify compliance with the EU PRF requirements (i.e. Article 7 or 8 of the PRF Directive). In the context of this inspection, if non-compliance with the EU Directive can

⁴⁹ See below paragraph (3).

⁵⁰ See Annex I, part II.3B(c) of the PSC Directive.

⁵¹ The references to current Articles will be adjusted to the revised Directive.

⁵² In accordance with Article 6 of the PRF Directive.

⁵³ I.e. delivery has not occurred in previous port of call (and no exception can be confirmed) or the ship has declared no waste to be delivered ashore while the PSCO finds that there is no sufficient dedicated storage capacity on board for the coming voyage.

be substantiated⁵⁴, then the PSCO will follow the standard PSC procedures (recording of deficiency, possible detention⁵⁵, e.t.c.).

- **Second** the PSCO, in accordance with Article 7 of the PRF Directive will decide for the delivery of SGW at the port of inspection or (if sufficient dedicated storage capacity exists⁵⁶) will grant an exception. If the decision of the PSCO is for the ship to deliver SGW in the port's PRF then a ship related message should be recorded in THETIS indicating that the ship has to deliver its SGW in a PRF. This will be useful for the next PSC inspection where verification can be made.

Failure to deliver the SGW/[CR] will constitute a deficiency and the ship may also be detained until it delivers all SGW/[CR]. It may also lead to a penalty for the breach of the respective requirements of the PRF Directive. The penalty could be imposed irrespective of whether the non-delivery has occurred in a port of the Member State or in a port of another Member State⁵⁷.

In summary⁵⁸, the PSC Directive will be amended to:

1. **add a specific "unexpected" factor** in Annex I ("Ships which have been reported not complying with the obligation to deliver their SGW [and/or CR] in accordance with Articles X and X of the Directive 20XX/XX/EU") (Currently Articles 7 and 10 of the Directive 2000/59/EC");
2. the definition of the "initial PSC inspection" in Article 2.11 refers to "the checks required by Article 13.1". Therefore, **Article 13.1 will be amended** by adding an additional bullet-point as "(d) verifies that the ship is in compliance with Articles X and X of the Directive 20XX/XX/EU" (Currently Articles 7 and 10 of the Directive 2000/59/EC);
3. **Amend Article 13 paragraph (3)** as follows: "A more detailed inspection shall be carried out, including further checking of compliance with on-board operational requirements, whenever there are clear grounds for believing, after the inspection referred to in point 1, that the condition of a ship or of its equipment or crew does not substantially meet the relevant requirements of a Convention or of the relevant EU maritime legislation";
4. **Amend paragraph (1) of Article 19** as follows: "1. The competent authority shall be satisfied that any deficiencies confirmed or revealed by the inspection are, or will be, rectified in accordance with the Conventions and the relevant EU maritime legislation".
5. **Amend Annex V** to include in section (A) two new clear grounds i.e. "20. Evidence from the check of ship's certificates and documents and/or the submitted Advanced Waste Notification that the ship has not complied with Articles X and X of the Directive 20XX/XX/EU" (Currently Articles 7 and 10 of Directive 2000/59/EC) and "21. ships with overriding or unexpected factors as listed in Annex I";
6. **Amend Annex X** to add a new subparagraph: "3.12. Areas under Directive 20XX/XX/EU" (Currently Directive 2000/59/EC). Failure to comply with Article X of the Directive 20XX/XX/EU" (Currently Article 7 of Directive 2000/59/EC)"
7. **THETIS** needs to be adapted to cater for the PRF requirements.

(All references to figures should be adapted to the revised PRF Directive).

These amendments would ensure that all PSC inspections would also look on the PRF enforcement (i.e. for 2016, a number of 15186 PRF inspections would have been conducted). The PRF Directive (especially Article 7 and

⁵⁴ **For example: a)** such a case would be if there is a ship related message from previous inspection that the ship had to deliver all SGW/[CR] before departure and the ship has not complied with this **or b)** if there is an alert from another Member State that the ship did not deliver SGW in accordance with Article 7 of the PRF Directive and, after checking ship's documents, the PSCO confirms that indeed the ship did not deliver its waste.

⁵⁵ There might be a need for specific guidance on recording deficiencies or detaining a ship on the basis of an EU legal requirement.

⁵⁶ The concept of "sufficient storage capacity" will need to be defined in relation to MARPOL i.e. to include also the possibility for legal discharges under MARPOL for the coming voyage. Moreover, Member States will need to define the competent authorities and procedures for granting an exception (because not all the ships calling at a port of a Member State will be inspected by the PSC authorities). Otherwise, the decision to deliver or not SGW/CR will be left to the Master of the ship.

⁵⁷ This implies that the revised PRF Directive should have a specific provision **allowing for the Member State of the next port of call to impose a penalty if a delivery in the previous port of call has not occurred (and there was no exception granted).**

⁵⁸ See also Annex III for a schematic description of the PSC-PRF inspections.

Article 10) would need to be revised in line with the above analysis to guide the PSCOs during the PSC-PRF inspection.

2.2.2.2 Additional Enforcement Regime

As already explained, the PSC regime may substantially cover the PRF enforcement requirements but its scope cannot coincide with the current scope of the PRF Directive. There are two options: **first** to rely solely in the PSC Directive or **second** to provide for an additional enforcement regime to cover potential Flag State inspections and domestic vessels equivalent to the current PRF regime. The additional regime may also cover the cases where a MS conducts PRF inspections on board foreign flagged vessels not within the context of the PSC Directive (i.e. the PRF inspector is not a PSCO⁵⁹).

(N.B.: The fishing vessels and recreational crafts will be considered separately as “Policy option variants: with or without additional focus on marine litter” and they may be added either to PO3 or PO4 or not added at all⁶⁰).

2.2.2.2.(1) Flag State inspections

The PSC enforcement regime will ensure that a large number of PRF inspections will be conducted and recorded in THETIS. However, inspections by the Flag State shall remain a possibility as it is the prerogative of a Flag State to inspect any ship in its Register at any time.

Therefore, it is sensible (but not necessary) to provide also for a possibility to perform “PRF Flag State Inspections”. Although the FS inspections of ships on international voyages will cover the same ships covered by PSC inspections, the Member States may use the possibility to conduct also a PRF inspection during a normal FS inspection and to record the results in THETIS-EU.

The number of the “FS-PRF inspections” will be added to the number of the PSC-PRF inspections⁶¹ thus improving enforcement of the PRF provisions. Reporting in THETIS-EU will increase awareness regarding the compliance with the PRF Directive requirements.

It should be noted that the FS inspections may be undertaken within or out of the EU. However, FS-PRF inspections may only be conducted when a ship is in a port of a Member State preferably⁶² to a port of the Member State whose flag is flying to avoid potential conflicting decisions on the obligation to deliver between PSC and FS inspections.

It is not possible to estimate the total number of inspections to be conducted under the Flag State regime as the FS-PRF inspection would be in the discretion of the Member States. Nevertheless, it may be regulated that if a Member State performs a FS-PRF inspection it shall record the inspection to THETIS-EU (mandatory reporting of the FS-PRF inspections).

Notwithstanding the FS-PRF inspections of ships on international voyages the Member States should also enforce the PRF provisions on board domestic vessels.

2.2.2.2.(2) Inspections on domestic vessels

For the Domestic vessels a separate PRF enforcement regime is necessary as these vessels cannot be covered by the PSC regime. EMSA does not have a clear picture of the total number of the domestic vessels in the Member States. The MARINFO data base provides some indicative figures but it should be noted that only ships above

⁵⁹ This would create additional burden to ships given that the PSC Directive regime will already cover foreign flagged ships. It may however, be a way out if Member States require this possibility.

⁶⁰ See below chapter 3.

⁶¹ N.B.: every PSC inspection will be also a PRF inspection.

⁶² But not necessarily as in this case the Port State will have the decisive role.

100GT are recorded and the actual number of all the domestic vessels (irrespective of size), might be significantly larger.

In the MARINFO data base there are **2959** potentially “domestic” vessels in the EU⁶³.

THETIS-EU could be used either on voluntary or on mandatory basis to report PRF inspections on board domestic vessels (in case of mandatory reporting a threshold of e.g. 100GT would seem necessary for a realistic reporting of the PRF inspection and for avoiding excessive administrative burden).

Furthermore, a minimum inspection obligation of **at least 20%** of all domestic vessels above 100GT may also be introduced. This percentage is equal to the one already used in similar legislation (i.e. the Sulphur Directive) and safeguards that there will be also for domestic vessels a minimum number of inspections conducted per annum. In this case, Member States would need to provide a list of all the active⁶⁴ seagoing domestic vessels above 100GT. In this regard, a mandatory system of inspections for domestic vessels would comprise **around 600 PRF inspections** annually reported in THETIS-EU.

Probably the optimum solution would be to require from Member States to establish control procedures, to the extent required, for domestic vessels to ensure compliance with the applicable requirements of this Directive and to report inspections in THETIS-EU (no mandatory minimum threshold for inspections).

2.2.2.3 Pros and Cons

The option “Port State Control inspections according to the PSC Directive plus Flag State inspections” aims at the application of the MARPOL convention through the provisions of the EU legislation⁶⁵.

In this regard, amending the PSC Directive in a way that a PRF inspection becomes part of every PSC inspection may facilitate the enforcement of the PRF Directive and, ultimately, the enforcement of MARPOL provisions against illegal discharges.

In the context of this proposal, all initial PSC inspections will be also covering the requirements of the PRF Directive. In addition, if relevant clear grounds (or relevant unexpected/overriding factors) exist, the PSCOs will ensure a more detailed verification of PRF compliance and respective actions will be undertaken in accordance with the provisions of the PSC Directive. In other words, the PRF Directive is to become like a “relevant instrument” of the PSC Directive and will be applied through PSC inspections.

Therefore, an immediate benefit of this proposal will be that through the PSC inspections the selection of ships will be made on a risk basis, a significant number of inspections will be conducted annually (16000+), detailed follow-up procedures will be in place and all the inspections and results will be recorded in a database.

In comparison to the current legislative requirements the option entails fewer inspections (i.e. around 16000 per annum instead of around 19500 and, therefore, less administrative burden⁶⁶. It will also cover more effectively the domestic vessels than the current PRF Directive and will ensure a more effective and efficient enforcement regime because of the risk based approach and the use of existing resources (PSCOs) which are already familiar with MARPOL implementation.

Notwithstanding the existing PRF legislation, the actual implementation of the provisions for the enforcement of the PRF Directive may well be below the minimum requirements. As regards inspections, in most of the Member States they were carried out within the Port State Control framework, but the check-lists used by the PSC inspectors normally did not contain any elements specific to the PRF Directive⁶⁷. In addition, although THETIS-EU is available

⁶³ All above 100GT. No fishing vessels included. Data for 2015.

⁶⁴ I.e. authorised/certified to conduct sea voyages.

⁶⁵ PRF and PSC Directives.

⁶⁶ Full incorporation of the PRF inspection in the PSC inspection will also entail time savings in comparison to today's regime.

⁶⁷ Refer to the Enforcement part (Theme III) of EMSA's Horizontal Analysis of Port Reception Facilities (Directive 2000/59/EC), December 2010.

since April 2016 only **1166** “PRF inspections” were recorded in THETIS-EU within 2016. Therefore, in comparison to the current actual situation⁶⁸, the proposed new PSC-PRF regime might entail additional administrative burden to the Member States in the sense that actual enforcement of the legislative requirements will become more effective. However, any new regime which secures better enforcement would entail additional administrative burden compared to what is (not) happening today.

There is a possibility for some assumptions in order to calculate the additional administrative burden:

It should be taken into account that in the context of the PSC inspection the PSCOs already control the relevant MARPOL requirements as appropriate. Because of the proposal, there may be a slight increase of the burden of each PSC inspection related mostly to the initial control of the data in AWN and in THETIS for verifying compliance with Article 7 of the PRF Directive and to possible follow-up actions if deficiencies revealed.

In this regard, we may assume that, under normal conditions (i.e. the ship requests to deliver its waste) around 5 minutes would be the additional time for a PSCO to control the specific PRF requirements. If the ship does not deliver all the waste ashore then the PSCO will need to evaluate if there is sufficient dedicated storage capacity for the coming voyage. This could take up to 15 minutes for performing the necessary calculations. As an average, we may assume that on each initial PSC inspection an addition of 10 minutes may be needed because of the PRF requirements.

Of course, it is not possible to estimate the time for a more detailed inspection if clear grounds are revealed as this would depend on the merits of each case. In any case, this is already the current situation in the PSC inspection regime.

However, the proposed amendment of the PSC Directive does not cover the current obligation of the Member States according to the PRF Directive⁶⁹ to “ensure that the information notified by masters in accordance with Article 6 be appropriately examined”. In other words, the Member States would still need to establish a mechanism to ensure the examination of all AWN submitted. This is not part of the inspection process but it is an important task ensuring the maximum benefit from the AWN and may reveal clear grounds for a PSC inspection. If this is done by the PSC authorities or another authority it should be left to the discretion of the Member States.

There may be a negative approach from those Member States that are currently using a separate enforcement regime to implement the PRF Directive in the sense that this regime will not be needed anymore. According to the latest EMSA’s visits to Member States⁷⁰ seven (07) Member States are using a separate PRF regime. However, four (04) of them also use the PSC regime⁷¹. A possible solution would be to use these resources for conducting Flag State inspections particularly on domestic vessels, fishing vessels and recreational crafts but maybe also for examining all the AWN submitted and informing the PSC authorities in case clear grounds revealed.

In summary, the option of amending the PSC Directive ensures a risk-based selection system, reliable reporting and harmonised application of the relevant procedures. In addition, it generates less administrative burden to the Member States and to ships as there is no increase in the total number of inspections conducted on board ships but only a slight burden to the current PSC inspection. As long as the procedures for the “PRF inspection within the PSC inspection” will be kept as simple as possible and close to the current PSC procedures, then the burden to each PSC inspection will be minimum related mostly to the initial control of the data in AWN and in THETIS for verifying compliance with Article 7 of the PRF Directive⁷² calculating if sufficient dedicated storage capacity exists on board.

⁶⁸ I.e. limited enforcement efforts by the Member States.

⁶⁹ Article 12(1d).

⁷⁰ I.e. second cycle of visits (2012-2016), for the monitoring of the implementation of the PSC Directive.

⁷¹ I.e. only 3 MS exclusively use other authorities than the PSC authorities to implement the PRF Directive. See **Annex VII** of this report.

⁷² Figure to be adjusted to the revised Directive.

2.2.3 Policy Option 4 (“EU PRF Regime beyond MARPOL”) – Dedicated PRF inspection regime

2.2.3.1 The need for a dedicated “PRF enforcement regime”

As described in the Executive Summary of the draft IASS the Policy Option 4 (PO4) seeks to strengthen the mandatory delivery of all waste under the PRF Directive, thereby going beyond the scope of MARPOL, and also aiming to address (at least part of) the "legal discharges" (mainly sewage and small quantities of oily waste).

The enforcement of the aforementioned policy option would require a dedicated EU enforcement regime to control delivery of all SGW/CR regardless of the MARPOL discharge provisions. It is uncertain how effective an EU enforcement regime beyond MARPOL would be but it would be necessary to secure stricter control of all SGW/[CR], better information sharing among the Member States, a dedicated PRF targeting mechanism for selection of ships for inspection and a tailor made PRF inspection procedure to secure the delivery of all SGW/[CR] beyond the requirements of MARPOL.

2.2.3.2 “PRF targeting mechanism”

Selection of ships for inspection to verify compliance with the provisions of Directive 2000/59/EC for ships other than fishing vessels and recreational craft authorized to carry no more than 12 passengers would be conducted both for ships flying the flag of the Member State and ships flying the flag of another State (FS and PS inspections). The whole regime may be organised under the same principles of the enforcement regime of the Sulphur Directive.

Introduction of a dedicated PRF targeting system would be necessary:

Article X - Union risk based targeting mechanism⁷³

1. **Based on the results of inspections foreseen by paragraph 1 of Article Y, associated findings, waste alerts and pre arrival notification conveyed from the SSN Network, ships other than fishing vessels and recreational craft authorized to carry no more than 12 passengers calling in EU Member States shall, in the inspection database, be attributed to a priority for inspection.**
2. **The relevant priority shall be determined by alerts created by the Member States and by a combination of the following generic and historical parameters:**
 - a. **ships which have not complied with the notification requirements in Article C (Currently Article 6);**
 - b. **ships for which the examination of the information provided by the master in accordance with Article C (Currently Article 6), has revealed other grounds to believe that the ship does not comply with this Directive;**
 - c. **Ships which have never been inspected before, within the context of this Directive;**
 - d. **Ships which have been reported by port authorities or other competent bodies that they have not complied with Articles A (Currently Article 7) and B (Currently Article 10);**
 - e. **Ships which have been the subject of a report, by the master or a crew member, for not complying with Articles A (Currently Article 7) and B (Currently Article 10) unless the Member State concerned deems the report to be manifestly unfounded.**
3. **Taking into account the above parameters and to facilitate the selection process in case of multiple ships in port, the following four priorities for inspection are proposed:**
 - a. **A Ship is considered as PRF Priority 1 (PRF1) and shall be inspected if it has an alert created by the last port of call when there is clear evidence that the ship has proceeded to sea without having complied with Articles A (Currently Article 7) and B (Currently Article 10);**
 - b. **A ship is considered as PRF Priority 2 (PRF2) and may be inspected if three or more of the criteria noted in paragraph 2 are met.**

⁷³ The targeting mechanism may well be included in an Annex to the Directive or it may be adopted by an IA or DA and may be elaborated further.

- c. **A ship is considered as PRF Priority 3 (PRF3) and may be inspected if one or two of the criteria noted in paragraph 2 are met.**
- d. **A ship is considered as normal priority and may be inspected if none of the criteria noted in paragraph 2 are met.**

2.2.3.3 “PRF inspections”

A PRF inspection should be an in-depth investigation for ensuring that the ship was in compliance with the EU requirements for delivery of all SGW/CR and that, within EU waters, has not made any discharges (whether allowed or not by MARPOL). For this reason, a dedicated PRF inspection procedure should be established and formalised on the basis of today’s EMSA’s guidance for ship inspections under the PRF Directive.

An additional element to enhance effectiveness of the dedicated “EU PRF enforcement regime” would be to introduce a mandatory requirement for all EU PRFs to issue a “**waste delivery receipt**”⁷⁴ and for all ships using EU PRFs to keep on-board these receipts for at least two years.

Furthermore, it is proposed to introduce a system to calculate the **annual PRF inspection commitment per Member State** adhering the same principles implemented for the enforcement of the Sulphur Directive through the Commission Implementing Decision (EU) 2015/253 and in particular Article 3. This rule will offer certainty to Member States on how many PRF inspections should perform and on the same time will allow for better monitoring of the Member States’ enforcement efforts. However, for the PRF inspections a 20% inspection rate should be proposed to be closer, as far as possible, to the current (legal) level of inspections of the PRF Directive⁷⁵.

Article Y - Inspection commitment to verify compliance with the provisions of Directive [20XX/XX/EC] on Port Reception Facilities

1. **Member States shall carry out inspections to verify compliance with Articles A (Currently Article 7) and B (Currently Article 10) of at least 20 % of the total number of individual ships calling in the relevant Member State per year. The total number of individual ships calling in a Member State shall correspond to the average number of ships of the three preceding years as reported through SafeSeaNet.**
2. **Inspections performed on ships registered in the Member State will be taken into account equally if the result is recorded in THETIS EU**
3. **Member States shall comply with the frequencies specified in paragraphs 1 and 2 by selecting ships on the basis of a Union risk-based targeting mechanism in THETIS EU and of specific alerts on individual ships reported in THETIS EU.**
4. **Member States shall ensure that the information related to inspections performed in accordance with paragraphs 1 and 2 are transferred to the inspection database as soon as the inspection report is completed or the detailed assessment of factors relating to the ship's compliance with this Directive, such as the accuracy of any information provided in accordance with Article C (Currently Article 6), has taken place.**

The inspection commitment per Member State if the proposed Article was to be implemented in 2017 can be found in Annex IV of the present assessment. It should be noted however that these figures are generated from the current SSN data and may not cover all smaller ships (below 300GT) or domestic vessels. For these ships the Member States should establish control procedures to ensure compliance with the applicable requirements of the PRF Directive.

2.2.3.5 “Inspection Data Base”

⁷⁴ See Annex V for an analysis of the application of this requirement particularly in relation to unmanned PRFs. To note however, that regulating for unmanned PRFs would increase further the complexity of the whole inspection system.

⁷⁵ I.e. 25% of individual ships and around 19500 inspections.

A dedicated module in THETIS EU would be necessary to serve as a platform to record and exchange information on the results of individual compliance verifications under the PRF Directive as well as to convey relevant information (waste notification) from SafeSeaNet.

Article Z – Inspection Data Base

- 1. EMSA shall develop, host and maintain an inspection database (THETIS EU) set up in accordance with this Directive**
- 2. THETIS EU shall:**
 - a. serve as a platform to record and exchange information on the results of inspections under Directive 20XX/XX/EC;**
 - b. provide data for the Union risk based targeting mechanism;**
 - c. set up the priorities for inspections in accordance with the generic and historical parameters of Article Y;**
 - d. calculate the inspection commitments for each Member State in accordance with the provisions of Article X;**
- 3. Member States shall take the appropriate measures to ensure that the provisions of paragraph 3 of Annex III of Commission Directive 2014/100/EU in relation to pre arrival waste notification are met.**

2.2.3.5 Pros and Cons

The option of a “dedicated “PRF enforcement regime” will require additional inspection efforts and, therefore, additional resources, for all the Member States, even for those that already have a separate “PRF inspection regime” because it will formalise the selection system and will provide minimum targets.

The tailor made selection system, waste alerts and the detailed reporting in THETIS-EU would facilitate EU requirements going beyond MARPOL.

In addition, it would serve better the current obligation of the Member States according to the PRF Directive to “ensure that the information notified by masters in accordance with Article 6 be appropriately examined”. A dedicated PRF regime would safeguard the examination of all AWN submitted.

If a dedicated PRF inspection is to be conducted then significant time would be needed for the inspector to control the relevant ship’s documents (e.g. certificates, ORB, GRB, ship’s logs, plans, tables e.t.c.) and to have a look around to get acquainted with the overall condition of the ship particularly in the engine room, cargo holds, ballast, bunker, waste bins e.t.c. We may assume that at least one (01) hour would be needed for the inspector to get acquainted with the ship and to check ship’s documents on top of the 10 minutes for controlling only the specific PRF requirements⁷⁶.

Of course, it is not possible to estimate the time for a detailed inspection if non-compliances are revealed as this would depend on the merits of each case. However, it may be assumed that, as an average, at least 2 hours may be needed for the whole PRF inspection.

In addition to the above, a separate PRF inspection would be added to the current number of the PSC inspections and would entail additional logistics (transportation costs for the inspectors, different time windows engaging more of the ship’s crew time e.t.c). In theory, the PSC regime might still be used to conduct the PRF inspections (as an extension to the PSC inspection). However, in practice, it would be extremely difficult to combine the different selection procedures and targeting as well as the different inspection procedures and the separate reporting in THETIS-EU.

⁷⁶ We assume 10 minutes on the basis of the analysis already conducted under section 2.2.2.3 above.

For this reason, although the total number of the PRF dedicated inspections (estimated⁷⁷ to **17220**) would not be significantly higher compared to the total number of the combined PSC-PRF inspections of PO3 (estimated⁷⁸ to **15186**) however, this would entail significantly higher administrative burden for the Member States and for the industry as this number would be added to the number of the current PSC inspections.

3. Fishing vessels and recreational crafts (Policy option variants: With or without additional focus on marine litter)

3.1 General

In the draft IASS a variant option is defined to specifically address the issue of marine litter (MARPOL Annex V waste) from ships and will group all the measures that can effectively make a contribution to reaching the overall reduction target set in the circular economy. Two variants will be distinguished:

1. Approach based on incentives: as fishing vessels and small recreational craft can be held accountable for a significant part of the marine litter from sea-based sources, these vessels should be included in the indirect fee regime of the Directive. In addition, the passively fished waste could be brought under the scope of the Directive, and arrangements put in place that this type of waste can be delivered on shore free of charge.
2. Approach based on enforcement and incentives (more stringent variant): this variant will include the incentive part mentioned above, but **will also address 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 the vessels in the THETIS-EU module for reporting the inspections. This variant also includes the reporting of fishing vessels, and should consider the differentiation based on GT or length.

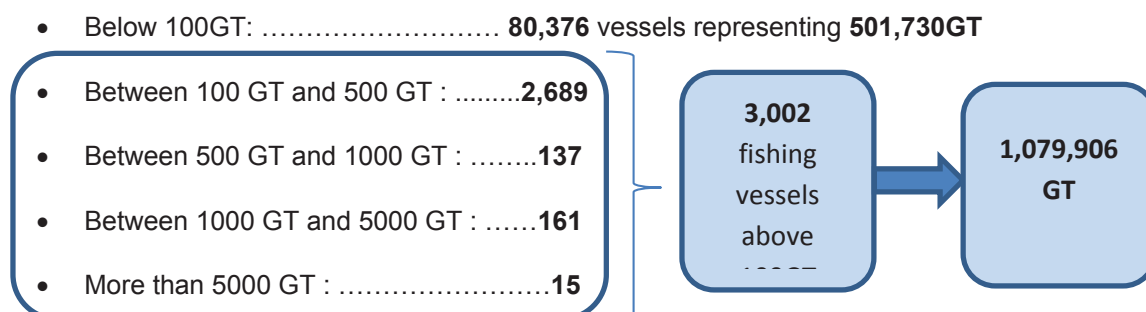
Hereunder an analysis of the fishing fleet and the recreational crafts in the EU is provided with some alternative proposals for selecting the optimum one for becoming the enforcement part of the policy option variant “with additional focus on marine litter”.

3.2 Fishing Vessels

3.2.1 The fishing fleet in the EU

In accordance with the data in the EU fishing fleet registry⁷⁹ the composition of the EU fishing fleet is as follows:

The total number of EU fishing vessels⁸⁰ is **83,378** with a total **1,581,636GT**. There are:



⁷⁷ Calculation for year 2017. See Annex IV.

⁷⁸ Actual number of PSC inspections in 2016.

⁷⁹ <http://ec.europa.eu/fisheries/fleet/index.cfm?method=Search.SearchAdvanced&country>

⁸⁰ On 22 March 2017. Norway – Iceland are exempted.

In the MARINFO database⁸¹ the total number of EU fishing vessels⁸² above 100GT is **2990**. Therefore, it may be assumed that the data for fishing vessels above 100GT are relatively accurate⁸³.

From all the EU fleet there are **7918** fishing vessels with more than 15 meters LOA⁸⁴. They represent 1,330,440GT.

There are 9213 fishing vessels equipped with VMS⁸⁵ representing 1,299,249GT.

These data clearly show that less than 3.6% of all the EU fishing vessels are above 100GT. Furthermore, 9.5% of all the EU fishing vessels are above 15 meters LOA and around 11% are equipped with VMS.

However, in terms of Gross Tonnage the whole EU fishing fleet counts for 1,581,636GT. The vessels above 100GT represent more than **68%** of the total EU fishing fleet tonnage. The vessels above 15 meters LOA represent almost **84%** of the total EU fishing fleet tonnage. The vessels equipped with VMS represent more than **82%** of the total EU fishing fleet tonnage⁸⁶.

3.2.2 Alternative proposals for strengthening the enforcement on fishing vessels

In accordance with the PRF Directive, Member States shall establish control procedures, to the extent required, for fishing vessels (and recreational craft authorised to carry no more than 12 passengers) to ensure compliance with the applicable requirements of the PRF Directive.

On top of this requirement and taking into account the above figures, we may use one of the aforementioned thresholds for a mandatory inspection regime for fishing vessels. The threshold, the frequency of the inspections and the percentage of the vessels to be inspected in relation to each Member State's fleet, will define the total number of mandatory inspections.

In this regard, the following alternative options may be proposed⁸⁷:

A) All fishing vessels above 100GT flying the flag of a Member State shall be inspected at least once per year by this Member State or by a Port Member State (eligible 3.6% of all EU fishing vessels/68% of the total EU fishing fleet tonnage).

This option entails around **3000 inspections per year** (see Annex VI for an analysis of the inspection burden per Member State). Fishing vessels above 100GT must have a MARPOL Annex V garbage management plan and may have an IMO number.

The inspections could be recorded in THETIS-EU (on a mandatory or voluntary basis). Advanced Waste Notification would also be possible but it may entail a significant administrative burden to smaller vessels which normally conduct short voyages. The obligation to inspect all fishing vessels above 100GT annually may also entail significant administrative burden for the Member States particularly in case of vessels operating in remote areas, small ports or islands.

B) Member States shall inspect annually at least 20% of all fishing vessels above 100GT flying their flag (eligible 3.6% of all EU fishing vessels/68% of all fishing fleet tonnage, same target group as above option).

The percentage is equal to the one already used in similar legislation (i.e. the Sulphur Directive). This option entails around **600 inspections per year** (see Annex VI for an analysis of the inspection burden per Member State).

A more stringent option would be for the Member States to inspect annually at least 30% of all fishing vessels above 100GT flying their flag. It would entail 900 inspections per year.

⁸¹ See Annex VI for an analysis of the number of fishing vessels per Member State.

⁸² Norway – Iceland are exempted.

⁸³ However, these figures do not include fishing vessels flying a flag of a third country (non-EU) that may be based in EU Member States.

⁸⁴ Length Overall.

⁸⁵ Vessel Monitoring System.

⁸⁶ N.B. 260 fishing vessels above 15 meters LOA (56,137GT) found in the database not equipped with VMS (22 March 2017).

⁸⁷ N.B.: The legal wording of the proposals should be looked at with DG MARE.

The inspections could be recorded in THETIS-EU (on a mandatory or voluntary basis). Advanced Waste Notification would also be possible but it may entail a significant administrative burden to smaller vessels which normally conduct short voyages.

The option gives more flexibility to the Member States to select the vessels for inspection in a more convenient way (e.g. in bigger ports not on remote areas) while at the same time imposes less administrative burden to both the administrations and the industry.

C) Member States shall inspect at least 20% of all fishing vessels above 15 meters LOA flying their flag (eligible 9.5% of all EU fishing vessels/82% of the total EU fishing fleet tonnage).

This option entails around **1,600 inspections per year**. Inspections could be recorded in THETIS-EU (on a mandatory or voluntary basis). Advanced Waste Notification might also be possible but it would entail a significant administrative burden to the whole enforcement system (SSN – PRF Inspectors for evaluating the AWN) because of the significant increase of the total number of vessels reporting on a daily basis, without providing significant benefits. Fishing vessels above 15 meters LOA must have a VMS on board and they need to report regularly their catch. In this regard, it might be possible to amend the respective EU legislation⁸⁸ to cater also for a waste report which could be used by the relevant authorities⁸⁹.

A more stringent option would be for the Member States to inspect annually at least 30% of all fishing vessels above 15 meters LOA flying their flag. It would entail 2400 inspections per year.

In both cases, selection of vessels for inspection could be made on the basis of a targeting mechanism to be developed.

In the light of the above, the most realistic scenario seems to be **option (B)**. This option, covers an important part of the fishing fleet (68% of the total tonnage), focussing on vessels posing the biggest threat. In addition, it comprises only 'Flag State inspections' and gives the flexibility to the Member States to select the most convenient/efficient inspections for complying with the 10% obligation. Although it generates a relatively small annual number of inspections the target group is around 3000 vessels (the biggest ones) and thus it may have an important effect in better enforcement. This option is also the most realistic one if AWN is considered necessary for fishing vessels as it covers a relatively small number of vessels in comparison to option C. However, also in this case, it would worth exploring the possibility to provide waste notification through the established electronic reporting of the fishing vessels (VMS) in order to avoid, if possible, an additional layer of reporting and the respective administrative burden.

3.3 Recreational Crafts

In the MARINFO database the total number of active recreational crafts is **3668**. However, not all of them are connected to the EU (only 850 have registered a port call in Europe, in one year time - 2015⁹⁰).

All of the **850 ships called in the EU** were above 100GT and had an IMO number.

In accordance with the PRF Directive, Member States shall establish control procedures, to the extent required, for (fishing vessels) and recreational craft authorised to carry no more than 12 passengers to ensure compliance with the applicable requirements of the PRF Directive.

On top of this requirement and taking into account the above figures we may use 100GT as a threshold for a mandatory inspection regime for recreational crafts.

In this regard, the following proposal could be made:

⁸⁸ I.e. Council Regulation (EC) No 1224/2009 and Commission Implementing Regulation (EU) No. 404/2011 laying down detailed rules for the implementation of Council Regulation (EC) No. 1224/2009 establishing a Community control system, for ensuring compliance with the rules of the Common Fisheries Policy of 20 November 2009

⁸⁹ DG MARE would need to be consulted.

⁹⁰ EMSA does not have data for years after 2015.

Member States shall inspect at least 20% of the total number of individual crafts calling in the relevant Member State per year. The total number of individual ships calling in a Member State shall correspond to the average number of ships of the three preceding years (eligible 850 vessels but no accurate/detailed data available).

This proposal entails around **170 inspections per year** and the inspections may be recorded in THETIS-EU (on a mandatory or voluntary basis). Advanced Waste Notification would also be possible but it may entail a significant administrative burden if vessels conduct short voyages. Selection of vessels for inspection may be done on the basis of a targeting mechanism to be developed.

However, and taking into account, the lack of credible data, the relatively small number of annual inspections and the small targeted group, the proposal to include a mandatory inspection regime for recreational crafts cannot be supported adequately.

Annex I Calls, ships and 25% rule per Member State as if Directive 95/21 was still in force⁹¹;

Country Description	ATA	Port Call ID (Count Distinct)	IMO Number (Count Distinct)		25% rule
Belgium	2016	24449	5470		1368
Bulgaria	2016	3085	1357		339
Croatia	2016	4870	978		245
Cyprus	2016	2416	821		205
Denmark	2016	17355	2485		621
Estonia	2016	5944	1336		334
Finland	2016	20846	1404		351
France	2016	42707	5733		1433
Germany	2016	41949	5150		1288
Greece	2016	32608	4446		1112
Iceland	2016	2625	356		89
Ireland	2016	12444	1460		365
Italy	2016	38077	5730		1433
Latvia	2016	6490	1978		495
Lithuania	2016	3383	1581		395

⁹¹ No calls by ships flying national flag, no Fishing vessels.

Malta	2016	3331	945		236
Netherlands	2016	36771	7013		1753
Norway	2016	43610	2848		712
Poland	2016	13430	2444		611
Portugal	2016	8607	2466		617
Romania	2016	5452	1992		498
Slovenia	2016	2134	737		184
Spain	2016	80901	10029		2507
Sweden	2016	32052	2694		674
United Kingdom	2016	88368	9564		2391
Totals	Totals	573904	81017		20254

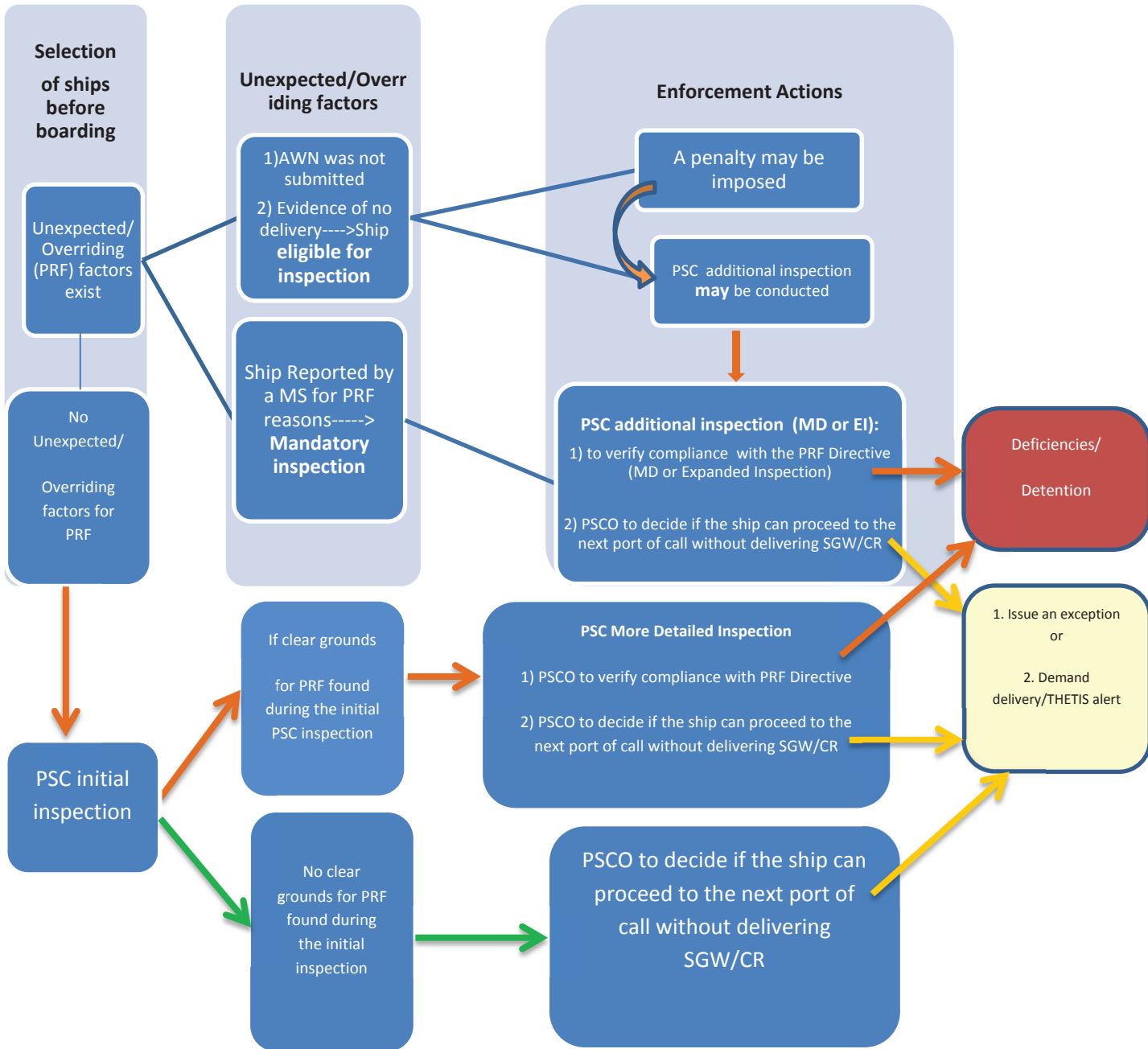
Total without Norway and Iceland = **19453**

Annex II Comparison between a “PRF Inspection” and a “PSC inspection”:

	PRF Inspection (Dir 2000/59)	PSC Inspection (Dir 2009/16)	Comments
Objective	To enforce compliance with the PRF waste and Cargo Residue landing requirements of the PRF Directive.	To enforce compliance with International Conventions (e.g. MARPOL) and regulations. (Art.1: “...compliance with international and relevant Community legislation...”).	<u>PSC inspection</u> is broader than <u>the PRF inspection</u> and may cover (or not) the MARPOL discharge requirements if clear grounds revealed or in case of overriding - unexpected factors.
Scope	To all ships, (including fishing vessels and recreational crafts), irrespective of their flag, calling at, or operating within, a port of a Member State (very few exceptions basically warships).	To any ship of a foreign flag and its crew calling at a port or anchorage of a Member State to engage in a ship/port interface (fishing vessels, pleasure yachts not engaged in trade and warships excluded).	<u>PRF inspection</u> may be conducted on board almost all ships (including domestic vessels, fishing vessels & recreational crafts) either flying the flag of the MS or a foreign flag. <u>PSC inspection</u> may only be conducted on board ships flying a foreign flag (fishing vessels/yachts excluded).
Notification Requirements	Pre-arrival submission of AWN. Failure to submit may lead to enforcement actions (mandatory delivery, penalty etc).	Failure to submit AWN is an unexpected factor i.e. the ship becomes eligible for a PSC inspection (Priority II).	A PSC additional inspection may be triggered by a failure to submit an AWN according to the PRF Directive.
Inspection Commitment	Obsolete and confusing targets for the number of inspections.	Fair share of the inspections between the MS and number of inspections based on a risk approach.	<u>PRF old 25% rule (2016): 19453</u> inspections (fishing vessels & recreational crafts excluded from this number as there are no quantified inspection commitments for these vessels). <u>PSC nbr of inspections (2016): 15186</u> inspections.
Inspectors	No qualifications for PRF inspectors.	PSCOs must have documented training and experience.	A PSCO may be a PRF inspector without any additional qualifications. A PRF inspector cannot be a PSCO (unless properly trained and authorised)
Inspection items	1. Generic selection scheme for ships for inspection (fishing vessels & recreational crafts excluded): — ships which have not complied with the notification requirements; — ships for which the examination of the information provided by the master in accordance with Article 6 of the PRF Directive has revealed	1. Highly sophisticated and risk based selection scheme. 2. Enforcement/control of ship’s log books and of the Certificates & Documents according to MARPOL (Initial inspection). 3. Enforcement of the MARPOL requirements for discharge of SGW/CR (in case of MD or Expanded inspection).	The PSC <u>selection of ships for inspection</u> already covers the AWN requirement of the PRF Directive while it may also cover the rest of the PRF Directive’s requirements if MS report or accuse a ship as potentially harming the marine environment. The <u>PRF inspection</u> always focuses on the “delivery obligation” of SGW and CR. The <u>PSC inspection</u> may never come to control the MARPOL

	<p>other grounds to believe that the ship does not comply with the PRF Directive.</p> <p>2. Control of ship's log books and of the Certificates & Documents according to MARPOL (e.g. IOPPC, ORB, GRB etc).</p> <p>3. Enforcement of Articles 7 & 10 of the PRF Directive ("delivery obligation" and possible exceptions on the basis of the concept of "existing sufficient dedicated storage capacity").</p> <p>4. Exemptions (from the obligation to deliver) in accordance with Article 9.</p> <p>5. Establish an appropriate information and monitoring system to improve the identification of ships which have not delivered their SGW/CR (THETIS-EU has been developed since April 2016 on a voluntary basis).</p>	<p>N.B.: a More Detailed inspection is to be conducted whenever there are clear grounds for believing that the ship does not meet the requirements of a Convention (i.e. MARPOL) or in case of overriding - unexpected factors (in this case either a MD or an Expanded inspection).</p> <p>4. Mandatory Inspection database (THETIS) and a detailed system for reporting inspections and follow-up measures.</p>	<p>requirements for discharge of SGW/CR and will never control the "discharge obligation" according to the PRF Directive.</p>
<p>Follow-up measures</p>	<p>1. Warning or simple request to comply with any non-conformity, such as re-notification.</p> <p>2. Formal request to deliver SGW before the vessel leaves, for example, when there is insufficient storage capacity for the ships SGW for the next journey.</p> <p>3. Hold the ship to ensure notification and delivery of all or part of the SGW.</p> <p>4. Inform the next port of call for a more detailed assessment.</p> <p>5. Penalties for the breach of the provisions of the Directive</p>	<p>1. Recording of deficiencies against MARPOL</p> <p>2. Detention</p> <p>3. Penalties for the breach of the provisions of the Directive</p>	<p>Holding a ship or recording a non-compliance according to the PRF Directive has not the same consequences as a detention or a deficiency according to the PSC Directive (affecting SRP, Flag & ROs and Banning).</p>

Annex III: Diagram of combined PSC-PRF inspections.



Annex IV: Annual PRF inspection commitment for sea going ships per Member State if the provisions of the new proposal (EU dedicated PRF enforcement regime) were to be implemented in 2017

Member State	2014 Total Individual Ships	2015 Total Individual Ships	2016 Total Individual Ships	Average Total Individual Ships	2017 PRF Inspection Obligation
Belgium	5242	5265	5538	5348	1068
Bulgaria	1465	1370	1388	1407	280
Croatia	634	1005	1024	887	176
Cyprus	801	847	849	832	166
Denmark	2770	2825	2873	2822	564
Estonia	1422	1333	1361	1372	274
Finland	1503	1486	1539	1509	300
France	6028	6014	5930	5990	1198
Germany	5340	5127	5360	5275	1054
Greece	4615	4899	4848	4787	956
Iceland	332	353	359	348	68
Ireland	1473	1460	1513	1482	296

Italy	6174	6374	6353	6300	1260
Latvia	2070	1985	2005	2020	404
Lithuania	1565	1649	1606	1606	320
Malta	1078	1129	1145	1117	222
Netherlands	8033	7967	8031	8010	1602
Norway	3207	3316	3727	3416	682
Poland	2531	2616	2531	2559	510
Portugal	2805	2933	2560	2766	552
Romania	2025	2044	2024	2031	406
Slovenia	646	752	739	712	142
Spain	10467	10693	10710	10623	2124
Sweden	2743	2714	2703	2720	544
United Kingdom	10180	10225	10385	10263	2052
Total				86202	17220

Annex V: Mandatory Waste receipt: how to address the problems in smaller/unmanned ports?

On the case of the unmanned PRFs, EMSA has acknowledged that “without adding considerable costs to unmanned facilities the provision of a receipt cannot be made mandatory”. Therefore, either the new PRF Directive will require a - costly - mandatory waste delivery receipt for all cases or will **exempt** the unmanned PRFs from issuing receipts (N.B.: in this case there may be a need to define what an unmanned facility is).

Should the 2nd option is decided, then in the case of unmanned PRFs, the Inspectors in the next port of call may have to rely solely on the information entered into the Record Books on-board the ship and the information provided by the ship on the advanced waste notification form. However, in practice, there is no credible way to verify only through an ex post-delivery inspection if the delivery has actually taken place and the entries in the Record Books and the Waste Notification Form are true.

A practical approach to have some level of control and enforcement would be:

1. To regulate an obligation for ships to **report waste delivered information** (by the ship representative electronically in the NSW).

and

2. a) To regulate in the new Directive an obligation for all the Member States which allow the use of unmanned facilities, to conduct a defined number of **unexpected inspections** when a ship calls to a port/berth with unmanned PRFs for verifying in advance of the delivery, that the WNF is true. This would be part of the MS's annual inspection obligation commitment and would constitute a specific percentage (e.g. **20% of the total annual number of individual ships calling in the MS' unmanned PRFs per year**). The total number of individual ships calling in a MS's unmanned PRFs shall correspond to the average number of ships of the three preceding years as reported through SafeSeaNet/THETIS-EU.

Unexpected Inspections could be combined with:

- b) an obligation for the operator of the unmanned PRF to conduct a minimum number of **verifications** to verify that the reported delivery of SGW by the ship has actually taken place. (In practice, this means that a ship would need to be targeted, according to its pre-notification report and then the quantities actually delivered to be recorded by the operator of the unmanned PRF either with presence or not of a ship representative. The verifications could be done in person or by using e.g. electronic measurements or photos activated by a photocell e.t.c., for minimising administrative burden); (a minimum percentage e.g. 20% of the total number of the deliveries of SGW in each unmanned facility may be proposed based on the average number of deliveries from ships during the three preceding years as reported through SafeSeaNet/THETIS-EU.

The **targeting mechanism** could be enhanced with a 'ship related message' indicating that a ship is bound for a port with unmanned PRF or that the last port of call was a port with unmanned PRF, for selecting ships either for unexpected inspections or verifications.

Annex VI: Annual PRF inspection commitment for fishing vessels above 100GT per Member State if all vessels should be inspected once a year or if a 20% inspection commitment per annum is introduced.

FLAG_NAME	Number of fishing vessels (all vessels to be inspected annually)	ANNUAL INSPECTION (10% Rule)
Ireland	181	36
Poland	45	10
Croatia	84	16
Denmark	168	34
United Kingdom	360	72
Estonia	35	8
Germany	83	16
Finland	31	6
Spain	680	136
France	423	84
Greece	44	8
Latvia	62	12
Malta	14	2

Romania	3	0
Belgium	49	10
Cyprus	5	2
Sweden	68	14
Bulgaria	9	2
Portugal	225	46
Italy	189	38
Netherlands	195	40
Lithuania	37	8
TOTAL	2990	600

Annex VII: PRF Directive - Inspection Authorities in Member States

PRF Directive - Inspection Authorities in Member States		
MS	PSC Responsible?	If NO who is responsible?
Belgium	NO	FPS Mobility and Transport - Environmental control
Bulgaria	YES	
Croatia	YES	
Cyprus	YES	In cooperation with Cyprus Port Authority. Port fees include the collection of waste
Denmark	YES	Separate report produced in each inspection
Estonia	YES	Port Supervision Department - Environmental inspectorate
Finland	YES	
France	YES	
Germany	Partly	Federal States - Harbour Police and Administration
Greece	YES	PSCOs during PSC inspections - In addition local HCG authorities
Iceland	YES	On behalf of the Environmental Agency
Ireland	YES	
Italy	NO	Ministry of Environment through ICG personnel
Latvia	NO (see comment)	Responsibility lies with the Ministry of Environmental Protection. Para 33 of Cabinet Regulation No 455 provides that "compliance of Regulation may be controlled by PSC"
Lithuania	YES	Klaipeda State Seaport Authority - Environment Protection Department of Klaipeda Region
Malta	NO	Ports and Yachting Directorate, TM
Netherlands	YES	
Norway	YES	Partly the Norwegian Coastal Administration
Poland	NO	Environmental Protection Inspectorate in Maritime Office
Portugal	NO	Port Authority (PSC acts under MARPOL)
Romania	YES	RNA- APMC
Slovenia	YES	
Spain	YES	(In respect of Articles 6, 7 and 11)
Sweden	YES	
United Kingdom	YES	

Annex 8 – Regional differences

In this Impact Assessment, the territorial dimension of the problem and the differentiated territorial impacts of the options considered have been taken into account. This has been done in several ways: by conducting a Territorial Impact Assessment in cooperation with DG REGIO, and by analysing the environmental vulnerability different sea basins to different types of waste discharged at sea. The results of these two exercises are summarised in this annex.

Part I: Territorial Impact Assessment for the Revision of Directive 2000/59/EC on Port Reception Facilities for ship-generated waste and cargo residues

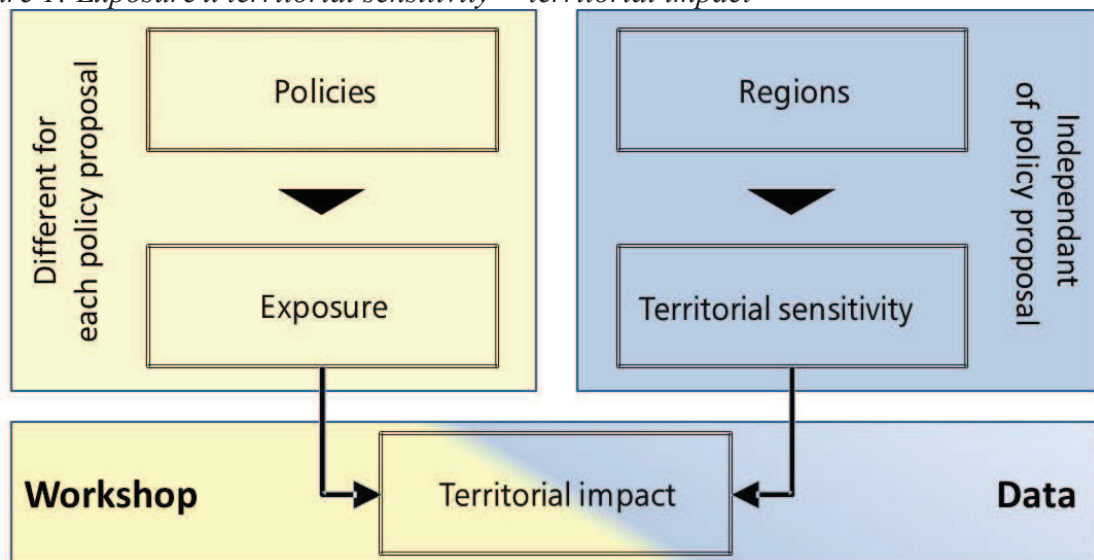
1. Principle

A Territorial Impact Assessment (TIA) was carried out following the "ESPON TIA quick check" method⁹². A TIA aims at showing the regional differentiation of the impact of EU policies. The "ESPON TIA quick check" approach combines:

- 1) expert judgement on the potential effect of the amended PRF Directive (exposure)
- 2) a set of indicators describing the characteristics of European regions (territorial sensitivity).

This combination of exposure and territorial sensitivity results in potential territorial impacts (cf. following figure). This approach is based on the vulnerability concept developed by the Intergovernmental Panel on Climate Change (IPCC).

Figure 1: $Exposure \times territorial\ sensitivity = territorial\ impact$



Source: ÖIR, 2015.

“Territorial sensitivity” describes the baseline situation of the region according to its ability to cope with external effects. It is a characteristic of a region that can be described by different indicators independently of the directive analysed. “Exposure” describes the intensity of the

⁹² The ESPON TIA tool is available at: <http://tiatool.espon.eu/tia/>; (username: Guest and password: ToR-guest).

potential effect caused by the amended legislation on a specific indicator. Exposure illustrates the experts' judgement, i.e. the main findings of the expert discussion at the TIA workshop. The results of the guided expert discussion are judgments about the potential impact of an EU policy in different thematic fields (economy, society, environment, governance) for a range of relevant indicators. These results are fed into the ESPON TIA Quick Check web tool. The web tool translates the combination of the expert judgments on exposure with the different sensitivity of regions into maps showing the territorial impact of EU policy on NUTS3 level. These maps serve as a starting point for the further discussion on the different impacts of a concrete EU policy on different regions. Consequently, the experts participating in the workshop provide the main input for this quick check on territorial effects of an EU policy proposal.

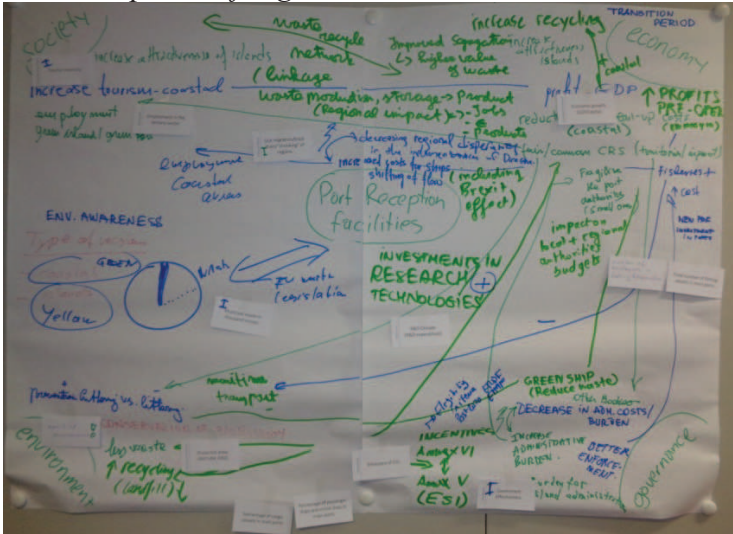
The workshop on the revision of the Directive 2000/59/EC on Port Reception Facilities for Ship Generated Waste and Cargo Residues (PRF Directive) was held on 17th of March 2017 in Brussels and brought together 17 experts representing different stakeholders, as e.g. port administrations, ship owners, NGOs and environmental institutions, regional authorities and European institutions such as DG REGIO, DG MOVE, the CoR and ESPON EGTC. Two moderators from the ÖIR, provided by ESPON, prepared and guided the workshop and handled the ESPON TIA tool.

2. Process

2.1. Identifying the potential territorial effects considering economy-, society-, environment- and governance-related indicators – drafting a conceptual model

In the first step of the TIA workshop, the participants discussed about the potential effects of the revision of the PRF Directive on the development of regions, in the fields of economy, society, environment and governance. The participants identified potential linkages between the revision of Directive and the effects on territories including interdependencies and feed-back-loops between different effects (see figure below).

Figure 2: Workshop findings: Conceptual model of the potential territorial effects from a revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues on the development of regions



Source: Territorial impact assessment expert workshop, Brussels 17th March 2017

During the workshop session the following issues were discussed:

Environment

- The planned revision of the Directive will reduce littering at sea. Consequently, it will generate strong positive effects on the maritime environment and decrease the pollution of the sea. These potential positive effects were analysed in the study on the environmental vulnerability analysis of ship-generated waste (COWI, Ecorys 2016). (The ESPON TIA quick check approach does not allow picturing effects other than those on territorial units.)
- Less waste discharged at sea will also reduce the waste being washed up on the coastlines and littering of the beaches. This would reduce the disturbance of ecosystems and protected areas along the coasts of mainland and islands.
- More collected and correctly treated ship-generated waste could increase the recycling rates and reduce the ecological footprint. Consequently, it will reduce the need for new resources in terms of metabolism.
- However, when the collected waste is not treated correctly, it could be brought to landfills in the coastal regions and islands causing the respective negative effects on the environment.
- The “green ship concept” would foster resource cycles on ships which could help to reduce the ship-generated waste and accordingly reduce the waste that needs to be delivered to harbours and be prepared for re-use, recycling and other recovery.
- Positive effects on air quality are expected.
- The amendment of the Directive (resulting in more effective implementation and enforcement) will contribute to increase the environmental awareness especially in ports and on ships.

Economy

- A more effective collection of ship-generated waste and the reduction of sea littering can increase the attractiveness of islands and coastal regions. This could have a positive effect on tourism and consequently on the economic development of these regions.
- More collected ship-generated waste in the ports could lead to more activities related to waste treatment and recycling which could increase the GDP in the green technologies sector.
- Increased recycling rates will lead to a higher value of the collected waste, which could affect the value chains positively in line with the circular economy concept. For instance the collected plastic bottles could be recycled in the textile production or similar products.
- The increased amounts of ship-generated waste in the port regions could stimulate the need for new recycling solutions. This could result in an increasing investment in research in the fields of recycling and green technologies.
- Often public authorities and especially municipalities collect “stranded waste” from the beaches. Due to the reduction of the amount of “stranded waste” the need for its collection by public authorities will be reduced and consequently public budgets will be relieved.

Society

- The improved environmental situation in the sea and along the coastline could potentially create new job opportunities in tourism and consequently could reduce out-migration, especially from islands.

- Due to the positive economic effects, employment in the service sector and in fishery and agriculture could increase.

Governance

- When the implementation of the amended Directive is done in an efficient way, the administrative costs of government could decrease. However, if new administrative burden is created, administrative costs will increase.

2.2 Identifying the types of regions affected

The experts agreed that in general all coastal regions would be affected by the modification of the Directive, as the Directive covers all ports. Additionally, it was agreed that islands would be especially affected in some aspects.

2.3. Picturing the potential territorial effects through relevant indicators

In order to assess the potential effects pictured in the conceptual model, suitable indicators need to be selected related to the economy, environment, society and governance parameters that the experts discussed. The experts chose indicators that are relevant for coastal regions. For some indicators the experts suggested to assess the effects on islands separately. The availability of data for all NUTS 3 regions is posing certain limitations to indicators that can be used. Experts therefore chose in some cases indicators that, despite being relevant to the revision of the Directive, were not their first choice.

2.4. Judging the intensity of the potential effects

The participants of the workshop were asked to estimate the potential effects deriving from the modification of the PRF Directive. They judged the potential effect on the territorial welfare along the following scores: strong advantageous effect / weak advantageous effect / neutral or unknown effect / weak disadvantageous effect / strong disadvantageous effect on territorial welfare.

2.5. Calculating and mapping the potential “regional impact” – Combining the expert judgement with the regional sensitivity

The principle described above is applied: the effects deriving from a particular policy measure (exposure) are combined with the characteristics of a region (territorial sensitivity) to produce potential territorial impacts.

The result of the territorial impact assessment is presented in maps, showing potential territorial impacts based on the combination of the expert judgement of the exposure with the territorial sensitivity of a region, described by an indicator at NUTS3 level. For some indicators that are available at NUTS2 a regional breakdown to NUTS3 was conducted by using proxy indicators. Whereas expert judgement is a qualitative judgement (i.e. strong advantageous effect on territorial welfare/weak advantageous effect/no effect/weak disadvantageous effect/strong disadvantageous effect), the sensitivity is a quantitative indicator.

3/ Potential regional impacts identified

3.1. Impacts on environment-related indicators

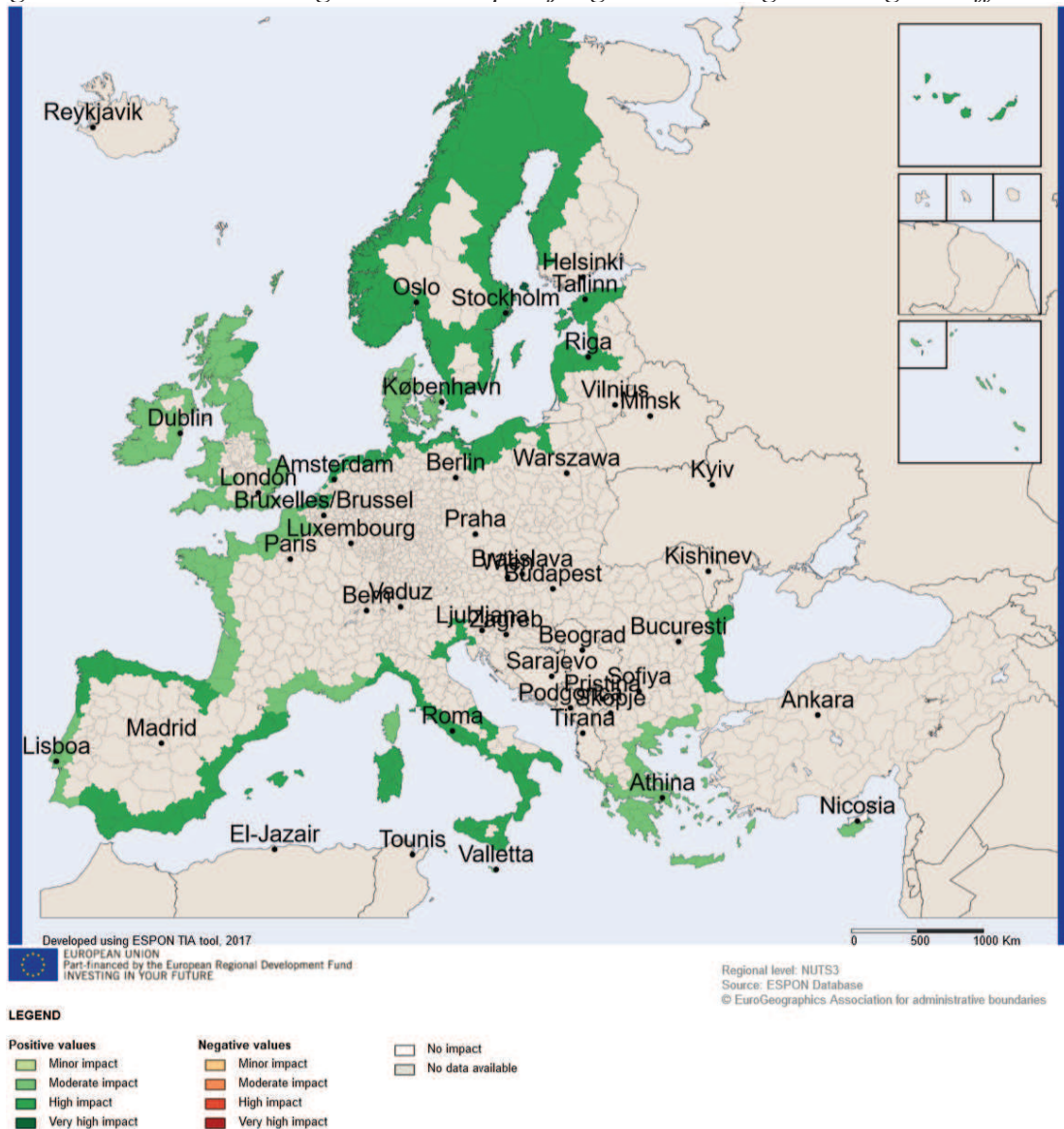
The experts in the workshop selected 2 indicators as being relevant to capture the environmental effects of the revision of the PRF Directive:

- Protected areas (NATURA 2000)
- Pollutants in air (PM10)

The effect of the revised PRF Directive on both of these environmental indicators is expected to be advantageous. All experts expect positive environmental impacts to stem from the revised Directive. These positive impacts are assumed to affect more strongly EU regions with a large share of protected areas under the Natura 2000 programme. These regions are mainly situated along the Bulgarian and Romanian coast of the Black Sea, on the Italian and Spanish coast of the Mediterranean Sea, the Spanish regions on the Atlantic coast, the Norwegian regions, the German coastal regions and almost all coastal regions of the Baltic Sea. Other coastal regions would face a moderate positive impact.

The majority of the participants of the workshop also judged that a weak advantageous effect could be expected of the modification of the PRF Directive on the air quality. Linked with the current sensitivity of the coastal regions (measured in PM10 pollutants in the air), this weak advantageous effect could result in a minor positive impact in almost all coastal regions.

Map 1: Result of the expert judgement: Protected areas (NATURA 2000) in coastal regions potentially affected by the revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues expert judgement: strong advantageous effect



Source: Territorial impact assessment expert workshop, Brussels 17th March 2017

3.2. Impacts on economy-related indicators

The experts in the workshop selected 6 indicators as being relevant to capture the economic effects of the revision of the PRF Directive:

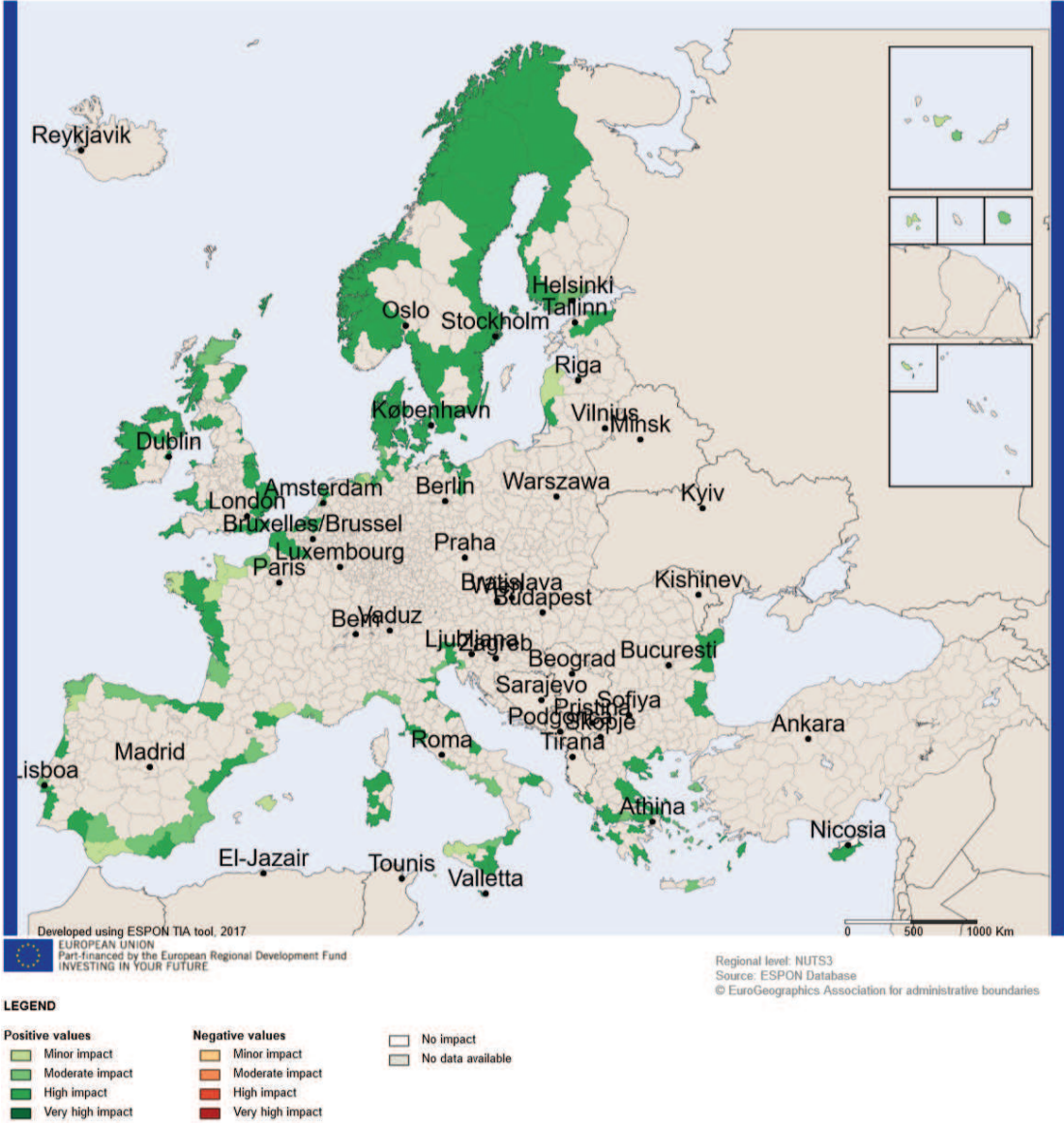
- Passenger ship transport economy: Percentage of passenger ships and cruise ships in main ports
- Cargo ship transport economy: Percentage of cargo vessels in main ports
- Port economy: Total number of vessels (all types) in main ports
- Tourism: Tourist Intensity
- Economic growth (GDP/capita)
- R&D Climate (R&D expenditure)

Most workshop participants expected a strongly advantageous effect on the transport economy for passenger ships and cruise ships. Regions where the transport by passenger ships

is highly important would be more affected by regulations changing the preconditions for the passenger-ship transport economy than regions, where the passenger-ship transport economy has less relevance. Combining this sensitivity with this strongly advantageous effect expected by the experts would result in a moderate to high impact in port regions.

The majority of the experts participating in the TIA workshop expected an advantageous effect on the cargo ship transport economy. Regions where the transport with cargo vessels is highly important would be more affected by legislation changing the preconditions for operating cargo vessels than regions, where the cargo-ship transport economy has less relevance. A highly positive impact could be expected in the coastal regions of countries in the North and North-West of Europe, as especially in Sweden, Norway, Denmark, the UK and Ireland. Also the coastal regions of Romania and Bulgaria in the Black Sea could benefit from a highly positive impact. The impact on regions of the Atlantic coast of France and Spain, as well on the European Mediterranean coast, differs from region to region.

Map 2: Result of the expert judgement: Cargo ship transport economy in coastal regions potentially affected by the revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues – expert judgement: weak advantageous effect

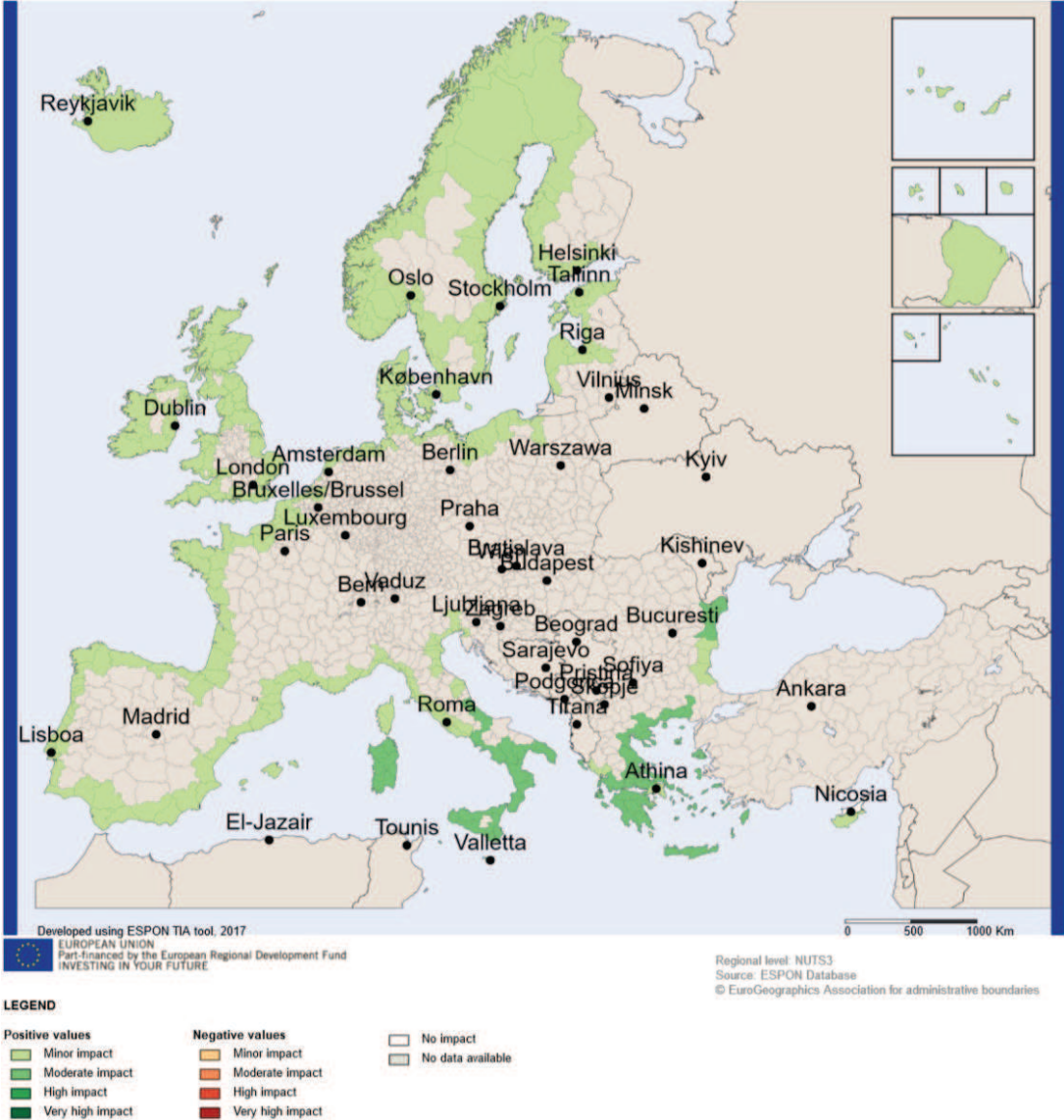


Source: Territorial impact assessment expert workshop, Brussels 17th March 2017

The majority of the workshop participants expected an advantageous effect on the economy of ports. A hypothesis is made that the bigger the harbour and the more vessels are in-coming, the higher the sensitivity of the port economy is towards changes in the regulations. Almost all coastal regions would face a minor positive impact.

The experts agreed that a better environmental quality, especially less littering on the sea near the coast and on the beach will have definitely positive effects on tourism. The positive effect on islands was seen as even more advantageous. It would mainly benefit the coastal regions in the South East of Europe (Greece, South Italy, Romania), with a moderate positive impact. All other coastal regions would face a minor positive impact. If the effect on islands was strongly advantageous, the potential territorial impact would be even stronger, ranging between high and very high (Italian and Greek islands in the Mediterranean Sea).

Map 3: Result of the expert judgement: Tourist intensity in coastal regions potentially affected by the revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues – expert judgement: weak advantageous effect



Source: Territorial impact assessment expert workshop, Brussels 17th March 2017

The participants definitely saw a potential positive effect from the modifications of the PRF Directive and its improved implementation on the economic growth of coastal regions. Regions with lower GDP per capita are expected to benefit more from directives such as the PRF aiming at GDP growth increase. Especially the Eastern European coastal regions in the Baltic Sea and the Black Sea and some regions in Greece could potentially benefit with a high positive impact, whereas most other regions would have a moderate impact.

The experts discussed that a higher volume of delivered waste by ships could call for new and more innovative ways to handle the ship-generated waste. This could stimulate additional investments in research in the fields of waste recovery and recycling. Consequently, the participants saw a potentially advantageous effect of the modification of the PRF Directive on the R&D climate. Regions with an already highly innovative climate and with a greater share of enterprises engaged in product and/or process innovation activities are considered to be more sensitive to legislation influencing innovation than others. As the centres of innovation are mainly not located in coastal regions, almost all coastal regions would face just a minor impact on the R&D climate caused by the need of new technologies in the recovery, re-use and recycling of ship-generated waste.

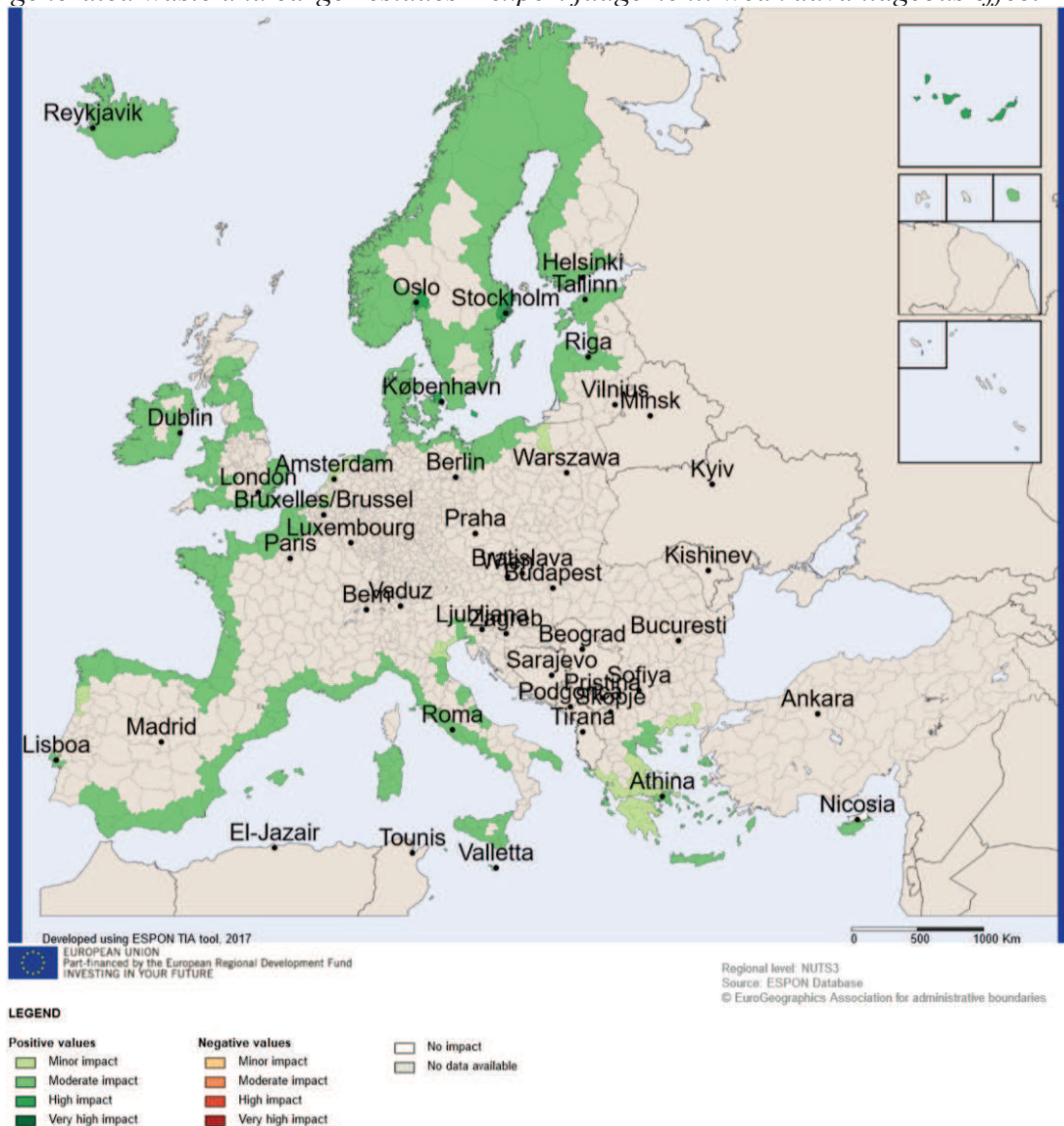
3.3. Impacts on social-related indicators

The experts in the workshop selected 3 indicators as being relevant to capture the social effects of the revision of the PRF Directive:

- Employment in the tertiary sector
- Employment in Fishery and Aquaculture
- Out-migration/brain drain/“shrinking” of regions

The experts agreed that the modifications of the PRF Directive would cause positive effects on the employment in the tertiary sector. It is assumed that regions with a greater share of employment in the tertiary sector are likely to be more affected by the resulting changes in the level of employment than regions with a lower share. The following map shows the potential territorial impact from the revision of the PRF Directive based on the employment in the tertiary sector in coastal regions, combining the expert judgement with the territorial sensitivity. Most coastal regions would gain a moderate positive effect. In the coastal regions of Greece, only a minor positive impact is expected, because in these regions the service sector is less developed.

Map 4: Result of the expert judgement: Employment in the tertiary sector in coastal regions potentially affected by the revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues – expert judgement: weak advantageous effect



Source: Territorial impact assessment expert workshop, Brussels 17th March 2017

Whereas the majority of the voting participants (10 out of 13) saw a potential advantageous effect of the modification of the PRF Directive and its improved implementation on the employment in fishery and aquaculture, a minority of three experts judged the effects on fishery and aquaculture as weakly disadvantageous. It is assumed that regions with a higher share of employment in fishery and aquaculture are more sensitive to legislation aiming at changing the conditions in these sectors than others. About 90 % of the regions with a relevant share of the employment in fishery and aquaculture would face a minor positive impact, whereas the remaining 10 % would face a moderate positive impact.

According to the experts' opinion, the improved environmental situation in the sea and along the coastline as well as potential new job opportunities in tourism could theoretically reduce the out-migration from coastal regions and especially from islands. However, only a few experts considered that the revision of PRF Directive could have a concrete effect on migration patterns. 8 out of 17 experts expressed an opinion about the impact of the Directive

on this indicator. The effect is expected to be positive for coastal regions, and even more so for islands. It is assumed that regions experiencing out-migration and brain drain will benefit more from actions aimed at their reduction. A weak advantageous effect on out-migration and brain drain would lead to a moderate positive impact in most coastal regions. Some coastal regions on Norway, in Romania and in the West of Greece could gain even a high positive impact. Most islands would gain a very high positive impact.

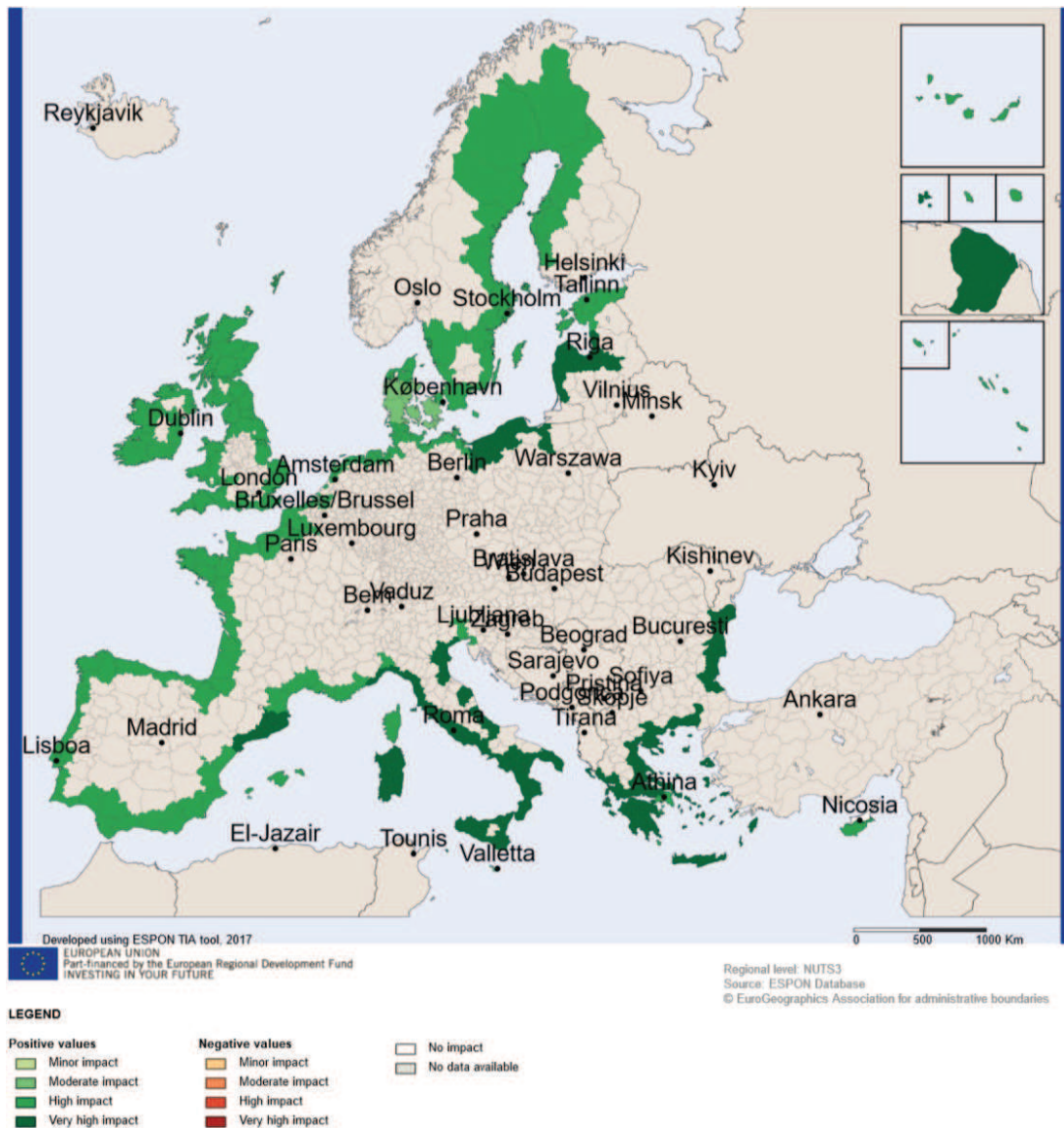
3.4. Impacts on governance-related indicators

The experts in the workshop selected 2 indicators as being relevant to capture the governance effects of the revision of the PRF Directive:

- Government effectiveness
- Ability to deal with additional waste

The experts discussed that an efficient and correct implementation of the modified PRF Directive could reduce administrative burdens and decrease administrative costs. However, an insufficient implementation would bring about new administrative burdens and would increase administrative costs as well. 14 experts judged the expected effects on government effectiveness as advantageous and 2 as weakly disadvantageous in coastal regions (respectively 10 and 2 in islands). The sensitivity of the government effectiveness is measured by the Regional Competitiveness Index. Regions with a low Regional Competitiveness Index will benefit more from an improvement of government effectiveness by implementing new standards of administration than regions that already have high standards of their administration. If the above mentioned Directive is implemented efficiently, the Eastern European regions of the Baltic Sea in Latvia, Lithuania, and Poland; the Black Sea regions in Romania and Bulgaria; and the Italian and Greek regions in the Mediterranean Sea could gain the highest positive impact on government effectiveness. Most of the other regions would also gain a high positive impact.

Map 5: Result of the expert judgement: Government effectiveness in coastal regions potentially affected by the revision of Directive 2000/59/EC on port reception facilities for ship generated waste and cargo residues – expert judgement: strong advantageous effect



Source: Territorial impact assessment expert workshop, Brussels 17th March 2017

The participants judged the modifications of the PRF Directive and its improved implementation on the ability to deal with additional waste differently for coastal regions and for islands. For coastal regions the effects were judged as positive overall. For islands the judgement was more diverse: 9 experts judged the potential effects of the revised PRF Directive advantageous whereas 3 judged them as weakly disadvantageous. The ability to deal with additional waste delivered by ships due to a more effective implementation of the Directive could be linked to the existing experience in treating generated waste. The more experience in waste disposal a region already has, the higher its ability to handle additional waste correctly. As no data exist at regional level on the experience in treating ship-generated waste, the amount of municipal waste generated in thousand tonnes within one region was established as a proxy indicator. For the coastal regions the majority of the experts expect a weakly advantageous effect. This would lead to minor positive impacts on most coastal regions. Some coastal regions in the South and East of Spain could gain a moderate positive impact. Most islands would gain a moderate or high positive impact.

4. Conclusions and policy implications

4.1. Findings based on the results of the TIA Quick check

The experts expect predominantly positive effects on territorial development from a revision of the Directive on Port Reception Facilities for Ship Generated Waste and Cargo Residues. Many positive effects are quite equally distributed to all coastal regions. However, especially some of the Eastern and Southern European coastal regions could more than others benefit from a more effective Directive regulating ship-generated waste:

- The EU regions neighbouring the **Black Sea in Romania and Bulgaria** could experience a relatively higher positive impact on economic growth and especially on tourism as a catching-up effect. An efficient implementation of the Directive could also increase their governance effectiveness due to learning effects also for other fields.
- The increased environmental quality could especially induce a more positive impact on tourism in **Greek and Southern Italian regions in the Mediterranean Sea** enabling also a higher positive impact on economic growth in Greek coastal regions.
- An effective implementation of the revised PRF Directive could bring a more positive impact on the governance effectiveness to the **Eastern European coastal regions in the Baltic Sea**.
- Additionally, a higher positive impact on economic growth can be expected.
- As far as data are available, the TIA shows that the outermost regions could benefit especially in **economic aspects** from the revised Directive. Due to a catching-up effect they could get a relatively higher positive impact on economic growth and especially on **tourism intensity**. These effects could contribute to reduce "out-migration" and "brain-drain".

4.2. Findings and recommendations from the expert discussion

After linking the results of the expert judgements on the effects with the sensitivity of the regions towards these effects, the experts discussed on conclusions and policy implications.

- **Additional focus on a differentiation between the sea basins**

The experts are familiar with the existing regional differences in the implementation of the current Directive with respect to the different European sea regions. In particular, the intensive exchange and collaboration in certain sea regions, e.g. in the Baltic Sea or the Mediterranean Sea, is noteworthy. The TIA reflects this situation only partly. For future investigation, more focus should be given to these differences by sea basin.

- **A differentiated approach for the ports of small islands and small coastal ports**

Experts discussed the idea of a differentiated approach with regard to the infrastructure that would be needed for ports of small islands and small coastal ports to receive and treat waste from cruise ships and fishing boats that would bring disproportionate burden for investment in waste reception infrastructures. According to the Commission, the current Directive leaves sufficient flexibility to adopt a differentiated approach to address these challenges. In addition, the possibility of making these investments eligible for the Cohesion Fund was suggested as an option.

- **The effects of the indirect fee and the wish for more transparency and harmonisation**

The principle of an indirect fee is that the fees for the delivery of generated waste have to be paid to the harbour authority, independently of whether waste is delivered to the harbour or

not. This should encourage ships to deliver their waste. However, the indirect fee is calculated differently for each harbour. This situation causes several problems:

- Some ships opt for an avoidance strategy and deliver their garbage to non-EU countries where fees are lower, or those ports where no indirect fee is charged. Negative effects on the environment are likely to arise, as in the Non-EU countries some ports do not provide facilities to treat the garbage correctly.
- Cargo ships calling to several ports within a short time period without producing a huge amount of waste are forced to pay the fee, even if no relevant waste is produced. This increases the costs for this type of shipping.
- There are possibilities to define exemptions from the indirect fee for ships in regular and scheduled traffic, but these definitions differ among the Member States. This results in a distortion of competition between Member States and types of ships.
- Due to the different implementation of the Directive, the calculation of the indirect fee differs among Member States. This results in different prices for the same amount of waste in different ports. Consequently, ships are encouraged to go to ports with lower fees ("PRF shopping").

Due to these "imbalances" most of the experts called for **more transparency** of the calculation of the indirect fee and for a **better harmonisation** of the implementation of the Directive.

- **The need to strengthen the value chain after the delivery of the ship-generated waste**

In some ports there is no separate collection and treatment of the waste that has been previously segregated on board the ship; instead, the waste is discarded together in one waste bin and probably not recycled but brought to landfills, causing negative effects on the environment. This discourages the ship crew who has treated the waste correctly in line with the demands of international standards and the EU waste legislation.

The experts representing ship owners and shipping companies emphasise the need to put concrete attention on the link between waste leaving the vessel and its treatment on land.

- **Public money for collecting litter**

At the moment, fishing vessels do not fall under the indirect fee obligation of the Directive. The waste that is passively fished at sea (such as the abandoned, lost and otherwise discarded fishing gear - ALDFG, plastic bottles, etc.) is not included in the scope of the PRF Directive. As a result, the fishing vessels have to pay separately for any such waste they want to deliver on shore. This provides a disincentive for collecting marine litter at sea and delivering this waste to PRF. The modification of the PRF Directive could foresee that in the future the indirect fees should include fishing vessels, so that they can deliver all their garbage without having to pay any additional direct charges, and that this fee shall also include the passively-fished waste. This should reduce this type of waste being dumped at sea. Additionally, it was discussed whether other sources of finance, as e.g. money from the EU fisheries fund, could be used for offering the right economic incentive to fishermen for collecting the waste from the sea and delivering this waste to PRF.

1. Principle

The environmental vulnerability analysis is used as an input for the analysis of the problem and of the potential impacts of options in the Impact Assessment. The environmental damage of the discharge of a particular waste type from ships is a combination of the amount of waste discharged and the vulnerability of the marine environment to this particular type of waste. The environmental vulnerability analysis used for this Impact Assessment takes into account regional difference as assessments are made separately for four European water basins according to their specific features and vulnerability.

In line with the WFD and the MSFD, the environmental vulnerability study is based on the scientific relation between selected environmental features (descriptors) that represent the marine environment, such as species, habitats and human activities on the one side and the impact by the different waste types. The next step in this concept is to describe the way in which the features are affected by the impact of waste.

An environmental damage analysis has been carried out for three types of ship-generated waste, namely:

- Oily waste (liquids, solid waste, containers etc. with oil residue)
- Sewage (waste water from sanitation, kitchen and laundry facilities)
- Garbage (solid waste)

The environmental impact of ship-generated waste is assessed for the following European Waters:

- Baltic Sea
- Eastern Atlantic Ocean
- Mediterranean Sea
- Black Sea

The vulnerability analysis applies methods and results that have been developed and agreed upon among several Member States authorities in earlier EU-funded projects of regional scale⁹³. The approach is compatible with EU-wide methodologies for the assessment of the quality of the marine environment, as developed under the Marine Strategy Framework Directive (MSFD).

The different waste types will have different environmental impacts, which can be weighted accordingly. That will aid to focus on waste types of particular interest and concern.

In the BRISK and BEAWARE projects, the following approach to determine environmental vulnerability was developed and agreed upon:

- **Step 1:** Identification of vulnerability features (descriptors) to be mapped.
- **Step 2:** Scoring of each of the identified sensitive features from low, medium, high to very high vulnerability based on fixed and agreed criteria, see below. The following

⁹³ BE AWARE, 2015. Environmental and socio-economic vulnerability.

http://www.bonnagreement.org/site/assets/files/17082/technical_sub_report_2_vulnerability_analysis-1.pdf

BRISK, 2012. http://www.brisk.helcom.fi/publications/en_GB/publications/

vulnerability scores were used: Score 4 (= very high), Score 3 (=high), Score 2 (=moderate/medium), Score 1 (=low).

- **Step 3:** Assessment of total environmental vulnerability of an area by adding all individual scores of the features.

For more information on the different steps and the method used, please refer to annex 4.

2. Vulnerability characteristics of the waters

Below is a summary of the characteristics of the regions as basis for determining the vulnerabilities towards each waste type (to the extent possible) and hence the overall vulnerability.

2.1. Baltic Sea

The Baltic Sea is a large brackish sea. It receives fresh water from many large and small rivers, while salt water only can enter from the North Sea along the bottom of the narrow Danish straits (Little Belt, Great Belt and the Sound between Denmark and Sweden). These conditions create a pronounced salinity gradient from southwest to northeast, where salinities can range from 20 PSU in the southern Kattegat to < 1 PSU in the innermost parts of the Bothnian Bay and the Gulf of Finland⁹⁴.

The pronounced salinity gradient is the most important factor for the Baltic Sea ecosystems. Relatively few organisms are adapted to the stressful brackish conditions and the biodiversity of brackish ecosystems are therefore low compared to open oceans. The number of benthic fauna species is about 2,000 at the saline Danish west coast, approximately 800 species are found in the Sound and less than 100 in the brackish waters of the northern Baltic proper, while fewer than 20 inhabit the seabed of the Bothnian Sea. In the BRISK project⁹⁵, vulnerability mapping related to oil spills from marine traffic, generally showed a relatively low vulnerability in open waters compared to relatively high vulnerability in shallow and coastal waters, and an increase in vulnerability towards the coastlines with a few hotspots, where sensitive areas were located with high vulnerability. There was little variation between seasons.

2.2 East Atlantic Ocean

The East Atlantic Ocean in this context comprises the Greater North Sea, the English Channel and the Bay of Biscay and Iberian Coast region. The area is one of the busiest maritime areas. Offshore activities, related to the exploitation of oil and gas reserves, and maritime traffic are very important. The northern part is relatively shallow with sediments mainly composed of mud, sandy mud, sand and gravel. The southern part of the region includes the continental shelf and slope, and parts of the abyssal plain with features such as seamounts, banks and submarine canyons. The region is situated in temperate latitudes with a climate strongly

⁹⁴ HELCOM (2009). Biodiversity in the Baltic Sea-An integrated thematic assessment on biodiversity and nature conservation in the Baltic Sea. Balt. Sea Environ. Proc. No 116 B.

<http://www.helcom.fi/Lists/Publications/BSEP116B.pdf> IPIECA, 1994: Vulnerability mapping for oil spill response. IMO/IPIECA Report. Series Volume 1.

⁹⁵ BRISK, 2012. http://www.brisk.helcom.fi/publications/en_GB/publications/ EU, 1998: European Environment Agency: *Environmental Risk Assessment – Approaches, Experiences, and Information Sources. 1998*

influenced by the inflow of oceanic water from the Atlantic Ocean. Hundreds of fish species are known to inhabit the area, many with high economic value for fisheries. Some 10 million seabirds are present during most of the year.

Species of cetaceans and seals occur regularly over large parts of the area. The coastline is highly varied with fjords, estuaries, sandbanks, bays, or intertidal mudflats. In the southern part, rocky cliffs, shingles and rocky shores are found as well as sandy and muddy beaches and coastal lagoons. Major activities in the region include fishing, the extraction of sand and gravel, and offshore activities related to the exploitation of oil and gas reserves.

1.3. Mediterranean Sea

The Mediterranean Sea is a series of deep basins connected to each other. It has a mean depth of 1500 m and is only connected to the Atlantic Ocean through the Gibraltar Strait, which is 22 km wide and has a depth of 320m⁹⁶. The strait significantly restricts water exchange. The limited water exchange, combined with high temperatures, results in large evaporation and, because the loss of water from evaporation exceeds input of water from rainfall and rivers, the salinity of the Mediterranean is relatively high.

The biological productivity in the region is generally low. However, the biological diversity is high with many endemic species⁹⁷. The continental shelf is generally very narrow, but the coastal marine area from the shore to the outer extent of the continental shelf, contains rich ecosystems and the few areas of high productivity in the region. The reasons for the high habitat diversity are the steep depth gradient in the basin and the latitudinal range causing climatic conditions to range from sub-tropical to temperate. Marine ecosystems in the Mediterranean are important for fisheries and tourism.

Coastal and marine ecosystems of the Mediterranean include rocky shores, brackish water lagoons, estuaries, wetlands, sea grass meadows and deep water benthic systems including seamounts and cold-water coral reefs and pelagic systems⁹⁸.

1.4. Black Sea

The Black Sea is the world's largest inland water basin, which is only connected to the Mediterranean Sea through the shallow Bosphorus Strait. The average depth of the Black Sea exceeds 2000 m except in the North-Eastern Sea of Azov. The Black Sea receives freshwater from five large rivers and very small amounts of salt water enter the Black Sea from the Mediterranean Sea. These conditions result in a constant stratification of water masses and an extremely slow water renewal. Hypoxic conditions and high concentrations of hydrogen sulphide exist below 200m depth.

The biodiversity of the Black Sea is low, both because of natural conditions due to little exchange with other sea areas and due to pressure from several issues including eutrophication/nutrient enrichment, changes in marine living resources and chemical pollution (including oil). There have been extensive fisheries in the Black Sea, which has declined in later years.

⁹⁶ Tomczak M., Godfrey JS. 1994. Regional Oceanography: An introduction. Pergamon Press

⁹⁷ UNEP/MAP, 2012. State of the Mediterranean Marine and Coastal Environment, UNEP/MAP – Barcelona Convention, Athens, 2012.

⁹⁸ *Ibid.*

Pollution, loss of biodiversity and coastal degradation have been identified as the major issues affecting the environmental state of the Black Sea. Eutrophication has changed the structure of the Black Sea ecosystem. Oil pollution threatens the Black Sea coastal ecosystems and the levels of pollution are unacceptable in many coastal areas and river mouths.

3. Characteristics of waste types

In order to allocate vulnerability scores to each type of ship-generated waste, each type of waste was characterised in terms of chemical characteristics and potential type of impact on the marine environment. This is outlined below.

3.1. Oily waste

This chapter is on oil waste and does not include larger accidental oil spills. Oily waste may contain various kinds of hydrocarbons, but volatile compounds will evaporate before the waste enters the marine environment and persistent long-chained oil residue will therefore not be present. On that basis, it is valid to assess fate and impact of oily waste based on the most common oil compounds, which could be total hydrocarbon (THC), or polyaromatic hydrocarbons (PAH).

3.2. Sewage

Sewage is interpreted as treated or untreated wastewater discharged from ships. The impact of sewage will be determined as an increase of nutrient concentration in water bodies likely to be affected in a relevant period after release (1 day- week). IMO and the Baltic countries have agreed that from 2021 sewage in the Baltic Sea from passenger ships (>12 passengers) are only allowed to be discharged after treatment.

3.3. Garbage

Garbage is defined as any persistent material discarded into the sea. Plastic is estimated to account for 50-80 % of waste stranded on beaches, floating on the ocean surface and on the seabed⁹⁹. According to MARPOL Annex V definition, garbage is defined to include:

- Food waste
- Cargo residues contained or not contained in wash water
- Cleaning agents and additives contained or not contained in wash water
- Animal carcasses
- All other waste including plastics, synthetic ropes, fishing gear, waste bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing materials, paper, rags, glass, metal, bottles, crockery and similar refuse.

The impact of garbage on the marine environment in this report is focused on the impact from plastic, including digestion or entanglement of litter by animals and aesthetic impacts (e.g. plastic on shore).

4. Vulnerability analysis

⁹⁹ Barnes, D, Galgani, F, Thompson, RC and Barlaz, M (2009). Accumulation and fragmentation of plastic debris in global environments. *Phil.Trans R Soc.B* , 364, pp.1985-1998.

In the following, environmental scores of the four selected feature groups are presented for each waste type and sea region.

4.1. Oily waste

The impact of oily wastes does not include effects such as oiled birds etc., since it can be assumed that the oily waste (not spills) is not in free phase (as slicks) but soaked up in textiles etc. in relatively small amounts.

Table 1.1 lists the vulnerability scores of oily waste for the Baltic Sea. The rationale behind scoring of the Baltic Sea and the North Sea are almost identical under the assumption that the two regions are similar in response. Based on available literature¹⁰⁰ it can be assumed that oil components in oily waste discharged to the marine environment hence disappear quickly (within days). Only limited amounts of PAHs will enter the water, where they are likely to be degraded naturally through physical, chemical and potentially biological processes. It is assumed that impacts will be limited to the water column, primarily on plankton or other small pelagic organisms. Only small amounts of oil compounds from oily waste will reach the sea floor or the coast. The impact scores on habitats and protected areas in the Baltic Sea are estimated a little lower than those on species, as most habitats and protected areas are coastal and oily waste is less likely to reach the coast since larger ships sail in a distance from it and oily waste will weather and fate on its drift ashore. That is not the case for the North East Atlantic, where protected areas are found in the central North Sea, and that is reflected in the score values for impacts on protected areas (Table 1.2).

A main argument for the relatively high impact score is the potential effects that PAH may have on marine life. Many PAHs are known to be potentially lethal to organisms or lead to long-term chronic effects on the population level¹⁰¹.

Length of interruption of socio-economic activities or services are most likely short, as the discharges of oily waste are presumed to be low amounts in short pulses mainly in open sea. In combination with low probabilities of placing a responsibility to potential pollution from oily waste, compensation possibilities are most likely very limited.

Table 1.1. Vulnerability scores and resulting environmental vulnerability of oily waste in the Baltic Sea

Oily waste	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	4	1	1	8
Habitat	2	3	1	1	7
Protected area	2	3	1	1	7
Socio-economic	2	1	1	1	5
Sum					27

¹⁰⁰ ITOPF, 2017: <http://www.itopf.com/knowledge-resources/documents-guides/document/tip-2-fate-ofmarine-oil-spills/>

¹⁰¹ OSPAR, 2009. Assessment of impacts of offshore oil and gas activities in the North-East Atlantic. OSPAR commission, Offshore industry series.

Table 1.2. Vulnerability scores and resulting environmental vulnerability of oily waste in the North East Atlantic Ocean

Oily waste	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	4	1	1	8
Habitat	2	3	1	1	7
Protected area	2	4	1	1	8
Socio-economic	2	1	1	1	5
Sum					28

The rationale behind the vulnerability score of the Mediterranean Sea and the Black Sea (Table 1.3 and Table 1.4) are to a large degree similar to the Baltic and Eastern Atlantic. The assumption that impacts are mainly occurring in the water column, lower the impact score value for the Mediterranean Sea because of its oligotrophic nature. This implies that the encounter rate between oily wastes and organisms in general is lower in the Mediterranean Sea than in the other sea regions and therefore less organisms will potentially be affected. This is done by lowering the impact score with one unit in each feature.

Table 1.3. Vulnerability scores and resulting environmental vulnerability of oily waste in the Mediterranean Sea

Oily waste	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	3	1	1	7
Habitat	2	2	1	1	6
Protected area	2	2	1	1	6
Socio-economic	2	1	1	1	5
Sum					24

Table 1.4. Vulnerability scores and resulting environmental vulnerability of oily waste in the Black Sea

Oily waste	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	4	1	1	8
Habitat	2	3	1	1	7
Protected area	2	4	1	1	8
Socio-economic	2	1	1	1	5
Sum					28

4.2. Sewage

The impact of sewage has been determined as an increase of nutrient concentration in water bodies likely to be affected in a relevant period after release (1 day- week).

Table 2.1 lists vulnerability scores and the resulting environmental weight of sewage in the Baltic Sea.

Table 2.1. Vulnerability scores and resulting environmental vulnerability of sewage in the Baltic Sea

Sewage	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	2	1	1	6
Habitat	1	2	1	1	5
Protected area	2	1	1	1	5
Socio-economic	1	2	2	1	6
Sum					22

The 'fate of sewage discharged in the Baltic Sea' is scored as 2 for species and protected areas. It is assumed that sewage will quickly be diluted in the water column and nutrients from the sewage will be taken up by phytoplankton within days. Species in open water may therefore be exposed to local elevated nutrient concentrations for short periods. This applies also for protected areas near potential discharges, as they are vulnerable to added nutrients. Habitats are mostly coastal and they are assigned a low score value of 1, since nutrients from sewage most likely have been diluted or taken up before they can affect the areas.

'Impacts of discharged sewage in the Baltic Sea' are assigned a score value of 2 for species, habitats and socio-economic features. The Baltic Sea is already under pressure from eutrophication and is sensitive to additional nutrients. Protected areas are scored with a value of 1, corresponding to their expected long distance from sewage discharges.

'Length of interruption' are assigned a score value of 1, except for socio-economic features, on the grounds they are potentially more vulnerable to sewage discharge, e.g. near beaches or other places of high tourism value, which can be closed for health reasons. Possible compensation is assigned a score value of 1 for all features, because of an expected temporary impact with low probability of assigning blame.

Table 2.2. Vulnerability scores and resulting environmental vulnerability of sewage in the East Atlantic Sea

Sewage	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	1	1	1	5
Habitat	1	1	1	1	4
Protected area	2	2	1	1	6
Socio-economic	1	1	1	1	4
Sum					19

Table 2.2 shows vulnerability score values and environmental weight of sewage waste in the North East Atlantic Sea. Fate of sewage is assumed the same as described for the Baltic Sea following the same argumentation and it receives the same score values.

Impact is set to have a score value of 1, except for protected areas since the North East Atlantic is not as eutrophicated as the Baltic Sea and any sewage discharge is assumed to quickly be diluted and taken up by plankton organisms. Protected areas are given a score value of 2, because they are found in central parts of the region and are potentially more impacted by nutrients from sewage.

Length of interruption are assigned a score value of 1, because of the quick fate of sewage and relatively low impact. 'Possible compensation' is assigned a score value of 1 for all features, because of an expected temporary impact with low probability of assigning blame.

Table 2.3. Vulnerability scores and resulting environmental vulnerability of sewage in the Mediterranean Sea

Sewage	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	2	1	1	6
Habitat	2	2	1	1	6
Protected area	2	2	1	1	6
Socio-economic	2	2	1	1	6
Sum					24

In Table 2.3 is the vulnerability scores and environmental weight of sewage in the Mediterranean Sea. Fate and impact of sewage is scored a value of 2. That is a reflection of the general oligotrophic conditions in the Mediterranean Sea as opposed as the more eutrophicated Baltic Sea and East Atlantic Sea. Biological productivity in an oligotrophic sea area is more nutrient-limited than in a eutrophic sea area and pulses of nutrient releases from a sewage discharge may have a longer fate and stronger impact.

Score values of length of interruption and possible compensation are set to 1, based on the identical arguments for sewage discharge in the North East Atlantic Sea.

Table 2.4. Vulnerability scores and resulting environmental vulnerability of sewage in the Black Sea

Sewage	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	2	1	1	1	5
Habitat	1	1	1	1	4
Protected area	2	2	1	1	6
Socio-economic	1	1	1	1	4
Sum					19

Table 2.4 lists the vulnerability score values for sewage waste discharge in the Black Sea. In general, the rationale for the scoring follows that of the scoring of the Baltic Sea. Except for length of interruption, where it is assumed lower in the Black Sea area, compared to the Baltic Sea.

The above scores for sewage are based on the assumption of equal persistence in the marine environment compared with the other investigated waste types (oily wastes and garbage). This assumption is necessary in order to carry out a general investigation as the present. The persistence of sewage, however, is remarkably shorter (hours) compared to the persistence of oil wastes (weeks/months) and the persistence of garbage (hours-decades). This implies that sewage discharged far away from vulnerable areas (shore, shallows, archipelagos) will be diluted and/or transformed by biological processes. The total discharge of sewage hence is to be corrected in order to obtain the discharge that potentially can affect environmental vulnerable areas. Recent scientific work¹⁰² indicates that nutrient discharge in the open areas of the North Sea has limited effect on the eutrophication. The effective discharge is expected to be of the same order of magnitude as the illegal discharge assessed by MARWAS.

4.3 Garbage

The impact of garbage is focused on digestion or entanglement of litter by animals and aesthetic impacts (e.g. plastic on shore).

Table 3.1 lists vulnerability scores and the resulting environmental weight of garbage in the Baltic Sea, East Atlantic Sea, Mediterranean Sea and the Black Sea.

Table 3.1. Vulnerability scores and resulting environmental vulnerability of garbage in the Baltic Sea, East Atlantic Sea, Mediterranean Sea and the Black Sea

Garbage	Fate	Impact	Length of interruption	Possible compensation	Sum
Species	4	2	1	1	8
Habitat	4	2	1	1	8
Protected area	4	2	2	1	9
Socio-economic	4	3	2	1	10
Sum					35

The scoring is done under the assumption that the vast majority of garbage is plastic. The fate of plastic is a slow degradation, where macro plastic is degraded to micro plastic and eventually total degraded on a time scale of centuries¹⁰³. It is globally distributed, although plastic seems to accumulate in enclosed seas, such as the Mediterranean Sea and the Black

¹⁰² OSPAR, 2017:

http://qsr2010.ospar.org/media/assessments/p00440_supplements/p00440_suppl_4_disc_harges_of_wastes.pdf

¹⁰³ Li WC, Tse HF, Fok L. 2016. Plastic waste in the marine environment: A review of sources, occurrence and effects. *Science of the Total Environment*, 566–567, 333–349.

Sea¹⁰⁴. It is also assumed that length of interruption and possible compensation are similar in the investigated sea regions. On that basis, the four sea regions receive the same vulnerability score and environmental weight in relation to garbage. The rationale behind is presented in the following.

Macro plastic is generally defined as having a size >25 mm and organisms can be entangled in it or ingest particles. Micro plastic is assessed to be even more harmful as they can accumulate in food webs and potentially act as carrying vectors of hydrophobic contaminants¹⁰⁵. For these reasons, fate score values are set to 4.

Impact from garbage in the Baltic Sea is scored based on possible impacts from entanglement and/or ingestion by marine species, in particular marine mammals, sea birds and fish. Both entanglement and ingestion are commonly found, although entanglement is more frequently observed than ingestion¹⁰⁶. Effects of entanglement on populations are rarely possible to assess, but some reports show significant long-term effects¹⁰⁷. Effects on the marine environment from ingestion and related exposure to contaminants carried by plastic are unclear, although the ubiquitous and increasing presence of plastic raises concerns¹⁰⁸. On this basis, impact scores are set to a value of 2 for species, habitats and protected areas. For socio-economy, the value is set to 3, due to potential aesthetic effects from garbage on beaches, nature reserves etc.

Length of interruption is assigned a score value of 1 for species and habitats, due to relatively low impact from garbage. The score value for habitats and socio-economy are set to 2, due to potential aesthetic effects from garbage on beaches, nature reserves etc.

Possible compensation is assigned a score value of 1 for all features, because of an expected low impact with low probability of assigning blame.

5. Summary and sensitivity analysis

In the table below are summarized the environmental weights for each ship-generated waste type per sea region.

Table 5.1. Summary of environmental vulnerability for ship-generated waste in four regions of European Seas

Environmental weight	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

¹⁰⁴ Galgani F, Hanke G, Maes T. 2015. Global Distribution, Composition and Abundance of Marine Litter. In: Marine Anthropogenic Litter, (Eds. M. Bergmann, L. Gutow, M. Klages). Springer Open Access.

¹⁰⁵ Li WC, Tse HF, Fok L. 2016. Plastic waste in the marine environment: A review of sources, occurrence and effects. *Science of the Total Environment*, 566–567, 333–349.

¹⁰⁶ *Ibid.*

¹⁰⁷ Kühn S, Rebolledo ELB, Franeker JA van. 2015. Deleterious Effects of Litter on Marine Life. In: Marine Anthropogenic Litter, (Eds. M. Bergmann, L. Gutow, M. Klages). Springer Open Access.

¹⁰⁸ *Ibid.*

Different views and arguments may exist on the methodology and scoring used in this report. Some uncertainty concerning score values may arise from this. In order to use these uncertainties constructively in the project, an alternative and independent set of scores have been elaborated to compare the resulting environmental weight in order to assess the uncertainties of the subjective aspect of the scoring method.

A different marine biologist who was not a part of the present project conducted the alternative scoring. He is experienced in this kind of environmental scoring procedure through in participation in the similar earlier projects (BRISK and BE AWARE projects).

Table 5.1. Comparison between environmental vulnerability of the project and an alternative scoring

Environmental weight	Oily waste		Sewage		Garbage	
	Project score	Alternative score	Project score	Alternative score	Project score	Alternative score
Baltic Sea	27	27	22	18	35	38
East Atlantic Sea	28	28	19	19	35	38
Mediterranean Sea	24	27	24	24	35	38
Black Sea	28	28	19	19	35	38

The above table indicates that the differences in the assessments carried out by different experts are minor and have a max deviation of 3 points out of 20-30, corresponding to maximum 10-13%. In 50% of the indices, the two experts gave the identical values. This indicates that the assessment method is stable enough for the present purpose.

Annex 9 – Calculation of administrative burden and enforcement costs

I. Calculation of administrative costs from complying with the current Directive (Baseline)

A. Administrative burden:

The following calculations provide an update of the administrative burden caused by the PRF Directive as this had been estimated by the “Ex-Post evaluation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues (Panteia)”.

1. Estimation of cost of developing WRH plans (table 1)

Hourly wage costs (Eurostat data for Public administrations/2015)	Daily wage costs, derived from Eurostat (based on 8 hours)	Number of days required for developing ¹⁰⁹	Costs for developing WRH Plan
21.98	175.84	30 (min)	5275
21.98	175.84	220 (max)	38685

2. Estimation of annual cost of updating WRH plans (table 2)

Hourly wage costs (Eurostat data for Public administrations/2015)	Daily wage costs, derived from Eurostat (based on 8 hours)	Number of days required for updating ¹¹⁰	Costs for updating WRH Plan
21.98	175.84	16 (min)	3865
21.98	175.84	40 (max)	7034

In order to arrive at annual costs of developing and updating WRH plans, the following assumptions have been made (according to Panteia methodology):

- On average **10,000 EURO is spent on developing WRH plans**. We have taken a value below the average of the values listed in Table 1, as we think there may be a bias towards the values being based on somewhat larger ports (as inputs were taken from Panteia survey, which has few responses from small ports).
- On average **4,000 EURO is spent annually on updating WRH plans**, again using a value below the average, following the same reasoning as above.
- We assume that a new WRH plan has a useful life time of 15 years, after which the WRH plan will be newly developed.
- We assume there are 1,500 ports in the EU¹¹¹.

¹⁰⁹ Ex-post evaluation (Panteia, 2015): “In the consultation, port authorities were asked to indicate how much time they spent to develop WRH plans. Those that answered to this question in the stakeholder consultation indicated that they spent **between 30 and 220 days on developing the WRH plan** and **between 16 and 40 days per year to update the WRH plan**. Time spent on the WRH plans largely depends on the size of the port”.

¹¹⁰ See footnote 1.

On the basis of the above-mentioned assumptions, the total annual costs for WRH plans for port users are:

3. Total annual costs for WRH plans for ports (table 3)

Activity of WRH plan	Number of ports	Average <u>annual</u> costs (EURO)	Total annual costs (EURO)
Development	1500	667 ¹¹²	1,000,000
Update	1500	4000	6,000,000
Total			7,000,000

4. Estimates of costs for Member States to approve WRH plans (table 4)

Hourly wage costs (Eurostat data for public administrations/2015)	Annual hours (OECD EU Average annual hours actually worked for 2015)	Calculated average annual wage cost EU for public administration
21.98	1696	37278
2015 number of port calls (Eurostat)	Number of staff needed ¹¹³	Estimated costs
2,224,608	111.23	4,146,432

5. Application for an Exemption (port users) (table 5)

Hourly wage costs (Eurostat)	Daily wage costs ¹¹⁴ , derived from Eurostat (based on 8 hours)	Number of days required for applying ¹¹⁵	Costs for Applying for an exemption
26.6	212.8	10	2,128 euro

Average number of exemptions granted per year:

Today, there are reports from only 7 Member States (2 of them have also reported in SSN). Some of the data is fragmented, possibly obsolete and difficult to extract the final number of exemptions. However, we may assume that 710 exemptions from 7 MS may correspond to **2,333 exemptions** from all 23 maritime EU MS¹¹⁶. Therefore:

2,333 exemptions x 2,128 euros = **4,964,624 euro** annual costs for port users.

6. Assessment and granting exemptions (competent authorities) (table 6)

¹¹¹ According to Panteia.

¹¹² 10000 euros/15 years = 667 euros.

¹¹³ In the Panteia study it was found that one desk officer, on average, handled the administrative costs that follow from roughly 20,000 port calls i.e. 1 officer per 20,000 port calls.

¹¹⁴ Assuming that one officer will be responsible for compiling the application file.

¹¹⁵ The assumption takes into account the preparation of the application file, communication between ship and shipping company, communication with Port Authorities/PRF operators/administrations, collection of necessary information from all relevant stakeholders e.t.c. Participants in the Correspondence Group on Exemptions established under the ESSF/PRF SG have offered information on the average time which ranges from 15 minutes (but not including time spent from ship Agents) to 1 month. The **10 days assumption** is a conservative average within these limits.

¹¹⁶ Y = 23 x 710/7 = 2333.

The same assumptions may be used for calculating the cost incurred by the Competent Authorities for assessing and granting exemptions:

Hourly wage costs (Eurostat data for public administrations/2015)	Daily wage costs ¹¹⁷ , derived from Eurostat (based on 8 hours)	Number of days required for assessment ¹¹⁸	Costs for Assessing and granting an exemption
21.98	175.84	30	5,275 euro

2,333 exemptions x 5.275 euros = **12,306,575 euro** annual costs for Competent Authorities.

7. Advance waste notification

7.1 Port users

Regarding the information obligations of the PRF Directive, stakeholders indicated¹¹⁹ that it generally takes between 30-60 minutes to complete and submit the advance waste notification, but an average sized cruise ship spends roughly 8 man-hours to retrieve and/or estimate the necessary information on the amounts of waste to discharge. Passenger vessels that are not cruise ships face similar difficulties as cruise ships, though not as substantially; therefore an assumption of 4 hours has been made for this category.

85% of port calls were freight vessels, with an estimated average time of 1 hour work. Passenger vessels (14%) around 4 hours, and cruise ships (1%) around 8 hours. The division as noted above was applied to the 2015 Eurostat statistics of port calls in the EU, against an average wage cost in the Maritime transport sector of €26,6 (also by Eurostat).

The large share of freight transport in the number of annual port calls (85% in 2013) and the relatively small share of cruise ships (1%) and other passenger transport (14%) have been weighed in our calculation, resulting in **total annual costs of 89.9 million EURO**:

Estimated administrative burden on port users (reporting) (table 7A)

Number of hours required for notification	Sector – share in overall port calls EU	Number of port calls/2015 (Eurostat)	Hourly wage costs/2016 (Eurostat)	Estimated total costs
1	Freight – 84%	1,868,671	26.6	49,706,649 ¹²⁰
4	Passengers – 15%	333,691	26.6	35,504,722 ¹²¹
8	Cruise ships – 1%	22,246	26.6	4,733,949 ¹²²

¹¹⁷ Assuming that one officer will be responsible for checking the application file.

¹¹⁸ The assumption takes into account the initial examination of the application file, communication with the applicants (ship and shipping company), communication with Port Authorities/PRF operators/administrations, collection of necessary information from all relevant stakeholders etc. It is also based on the outcome of the CG for exemptions established under the ESSF/PRF SG. The participants indicated a range of time spent from one week to 45 days or several weeks. 30 days seems to be a sensible average in this regard.

¹¹⁹ Panteia study.

¹²⁰ $Y = 1 \times 26.6 \times 1,868,671 = 49,706,649$.

¹²¹ $Y = 4 \times 26.6 \times 333,691 = 35,504,722$.

¹²² $Y = 8 \times 26.6 \times 22,246 = 4,733,949$.

Total	100%	2,224,608		89,945,320
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7.2 Port/competent authorities

Once transmitted to the port authority, the advance notification form needs to be processed, creating an administrative burden on the side of the port/competent authority. The port of Piraeus indicated¹²³ that they have one person who is working full time on the management/assessment of the advance notification forms, which comes down to roughly 10 minutes per port call¹²⁴. Calculations are presented in Table 7B:

Estimated administrative burden on authorities (assessment) (table 7B)

Number of hours required for process	Number of port calls/2015 (Eurostat)	Hourly wage costs (Eurostat data for public administrations/2015)	Estimated total Costs ($Y = 2224608 \times 0.16 \times 21.98 = 7,823,501$)
0.16	2,224,608	21.98	7,823,501

8. Inspection – providing documentation and collaboration (port users)

The Panteia study had assumed¹²⁵ that “on average, 2.27% of all port calls are subject to inspection” This assumption gave a number of 51,961 inspections annually. However, this figure is far higher than the actual figure of Port State Control inspections (the number of the all EU PSC inspections under the regime of the repealed PSC Directive was around 20,000 inspections annually - for 2016 the figure would have been **19,453**)¹²⁶.

Therefore, calculations have been based on approximately **19,500** inspections, and one 1 hour work for the crew member to accompany the inspector (according to Panteia¹²⁷):
 $19,500 \text{ hours} \times 26.6 \text{ euro}^{128} = \mathbf{518,700 \text{ euro}}$ (based on the 25% yearly inspection target).

Alternatively, we have 1166 inspections recorded in THETIS-EU for 2016 so:
 $1166 \times 1 \text{ hour} = 1166 \text{ hours} \times 26.6 \text{ euro} = \mathbf{31,016 \text{ euro}}$ (actual cost).

Inspection – reporting results from inspections (Competent Authorities)

The enforcement costs for the competent authority were based on the same calculation, but the EU average hourly wage costs for public administration were used.

Therefore, we calculate $19,500 \text{ inspections} \times 1 \text{ hour}$ (according to Panteia) = $19,500 \text{ hours} \times 21.98 \text{ euro}^{129} = \mathbf{428,610 \text{ euro}}$ (based on the 25% inspection target)

Alternatively, we have 1166 inspections recorded in THETIS-EU for 2016 so:
 $1166 \times 1 \text{ hour} = 1166 \text{ hours} \times 21.98 \text{ euro} = \mathbf{25,629 \text{ euro}}$ (actual cost)

¹²³ Panteia study.

¹²⁴ Panteia study

¹²⁵ Based on data collected in the stakeholder consultation.

¹²⁶ See EMSA’s Technical assessment on the list of open questions (Supplement on enforcement)/Annex I.

¹²⁷ Based on the information collected in additional interviews and the stakeholder consultation, an inspection lasts generally no more than one hour, and **requires a crew member to accompany the inspectors.**

¹²⁸ Hourly wage cost in the Maritime transport sector for 2016.

¹²⁹ Eurostat for year 2015.

The following table summarises the results (in million euro):

Administrative costs	Stakeholder	Annual costs
Total annual costs for WRH plans	Ports	7.0
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

B. Enforcement costs (Inspections undertaken – cost of the Inspectors):

Two approaches can be applied for calculating these costs:

I. based on the **25% target** in the Directive:

19,500 inspections¹³⁰ x 1 hour¹³¹ = 19,500 hours x 21.98 euro¹³² = **428,610 euro.**

II. based on the number of **inspections actually reported** (in THETIS-EU):

1,166 inspections x 1 hour (according to Panteia) = 1,166 hours x 21.98 euro = **25,629 euro.**

¹³⁰ See EMSA's Technical assessment on the list of open questions (Supplement on enforcement)/Annex I.

¹³¹ The 1hr estimated time for an inspection has been derived from the Panteia ex-post evaluation.

¹³² Hourly wage costs (Eurostat data for public administrations/2015).

II. Quantification of the impacts of the Policy Measures

(Impact on administrative burden and enforcement)

The following calculations provide an estimate of the impact of various proposed policy measures/options for the revision of the PRF Directive.

1. Policy measures on Inspections (PM-3D.1, 3D.2, 3E)

A. Enforcement costs

PM-3D.1 Incorporate the PRF inspections in the PSC Regime (amending Directive 2009/16/EC)

a) PSC regime:

In the year 2016, 15,186 inspections were conducted in the EU Member States under the PSC Regime. It is assumed that under normal conditions (i.e. the ship requests to deliver its waste), it would take a Port State Control Officer (PSCO) approximately **5 minutes additional** time to control the specific PRF requirements. If the ship does not deliver all the waste ashore then the PSCO will need to evaluate if there is sufficient dedicated storage capacity for the coming voyage. This could take up to **15 minutes** for performing the necessary calculations. If we take a conservative approach (based on the maximum time assumption), 15 minutes would have to be added to each initial PSC inspection for checking compliance with the PRF requirements¹³³.

Additional cost of 15 minutes per PSC inspection = 21.98 euros¹³⁴ x 15 min./60 min. = 5.5 euros; **Total annual cost:** 15,186 inspections x 5.5 euros = **83,523 euro**

b) **A separate regime for domestic vessels** would be complementing the PSC regime (checking 20% of all individual domestic vessels each year i.e. 600 inspections¹³⁵).

Total (PRF) annual cost of domestic inspections: 600 inspections x 2 hours (average time for a fully dedicated PRF inspection) x 21.98 euros = **26,376 euro**

Total annual inspection cost for PM-3D.1: 83,523 euros + 26,376 euros = 109,899 euro

- **Estimated cost savings** in comparison to 25% target in the Directive: 428,610 euro - 109,899 euro = **318,711 euro**.
- **Estimated cost increase** in comparison to the cost of inspections actually reported (in THETIS-EU): 109,899 euro - 25,629 euro = **84,270 euro**.

PM-3D.2 Develop a dedicated EU PRF targeting mechanism:

The annual number of the PRF dedicated inspections is estimated at **17,220**¹³⁶.

¹³³ It should be noted that all the other 'PRF related' actions (e.g. checking ship's documents, checking the tanks and garbage tins etc) will be part of the PSC inspection so no additional time has been calculated).

¹³⁴ Hourly wage costs (Eurostat data for public administrations/2015).

¹³⁵ See EMSA's Technical assessment on the list of open questions.

¹³⁶ See EMSA's Technical assessment on the list of open questions.

If a dedicated PRF inspection is to be conducted, then significant time would be needed for the inspector to control the relevant ship's documents (e.g. certificates, ORB, GRB, ship's logs, plans, tables etc.), as well as to get acquainted with the overall condition of the ship particularly in the engine room, cargo holds, ballast, bunker, waste bins etc. It is assumed that at least one (1) hour would be needed for the inspector to assess the overall condition of the ship and to check the ship's documents in addition to the 10 minutes for controlling specific PRF requirements. It is not possible to estimate the time for a detailed inspection if non-compliances are revealed as this would depend on the merits of each case. Therefore, we may assume an average of **2 hours** for each PRF inspection to be conducted.

Total annual inspection cost for PM-3D.2: $17,220 \times 2 \text{ hours} \times 21.98 \text{ euros} = 756,991 \text{ euro}$

- **Estimated cost increase** in comparison to 25% target in the Directive: $756,991 \text{ euro} - 428,610 \text{ euro} = \mathbf{328,381 \text{ euro}}$.
- **Estimated cost increase** in comparison to the cost of inspections actually reported (in THETIS-EU): $756,991 - 25,629 \text{ euro} = \mathbf{731,362 \text{ euro}}$.

PM-3E Bring fishing vessels and small recreational craft into the PRF inspection regime:

Member States will be required to inspect annually at least 20% of all **fishing vessels above 100GT** flying their flag, i.e. around 600 inspections per year¹³⁷.

Cost of inspections: $600 \text{ inspections} \times 2 \text{ hours} \times 21.98 \text{ euros} = \mathbf{26,376 \text{ euro}}$

Member States will be required to inspect annually at least **20% of all individual recreational crafts above 100GT** calling in their ports i.e. around **170 inspections** per year¹³⁸.

Cost of inspections: $170 \text{ inspections} \times 2 \text{ hours} \times 21.98 \text{ euros} = \mathbf{7,473 \text{ euro}}$

Total annual inspection cost of PM-3E (vessels >100GT): $26,376 \text{ euros} + 7,473 \text{ euros} = 33,849 \text{ euro}$

An alternative approach for targeting recreational craft has also been developed, which is based on the vessel's length overall, i.e. a threshold of 24meters LOA¹³⁹. There are currently around 3,000 recreational crafts above 24meters LOA in the EU (source: DG MARE). Requiring Member States to inspect annually at least 20% of all individual recreational crafts above 24meters LOA calling in their ports will mean around 600 inspections per year. Therefore in this case:

Total number of inspections of fishing vessels and small recreational crafts: $600 \text{ inspections} + 600 \text{ inspections} = 1,200 \text{ inspections}$.

¹³⁷ See EMSA's Technical assessment on the list of open questions.

¹³⁸ However, this figure may be underestimating the actual number of recreational crafts calling in the EU. See EMSA's Technical assessment on the list of open questions.

¹³⁹ Length Overall

Total annual inspection cost of PM-3E: 1,200 inspections x 2 hours x 21.98 euro = 52,752 euro (based on 24 LOA threshold for recreational craft)

B. Administrative costs of inspections (costs for crew involved, administrative burden):

It is assumed that each inspection requires a crew member to accompany the inspectors.

PM-3D.1 (incorporate PRF Inspections in PSC regime):

- a) **PSC:** Users (ship's crew) additional time is estimated to 15 minutes (0.25 hours) per PSC inspection. Cost/PSC = 15,186 inspections x 0.25 hours x 26.6 euro¹⁴⁰ = **100,987 euro**
- b) **Domestic vessels:** 600 inspections x 2 hours (average time for a fully dedicated PRF inspection) x 26.6 euro = **31,920 euro**

Total administrative cost for port users (ships) of PM-3D.1: 100,987euros + 31,920 euros = 132,907 euro

- **Estimated cost savings** in comparison to 25% target in the Directive: 518,700 euro – 132,907 euro = **385,793 euro**.
- **Estimated cost increase** in comparison to the cost of inspections actually reported (in THETIS-EU): 132,907 euro - 25,629 euro = **107,278 euro**.

PM-3D.2 (dedicated PRF Inspection regime):

Dedicated PRF: Users (ship's crew) additional time is estimated to 2 hours per PRF inspection. Therefore:

Total administrative costs PM-3D.2: 17,220 inspections x 2 hours x 26.6 euro¹⁴¹ = 916,104 euro

- **Estimated cost increase** in comparison to 25% target in the Directive: 916,104 euro - 518,700 euro = **397,404 euro**.
- **Estimated cost increase** in comparison to the cost of inspections actually reported (in THETIS-EU): 916,104 euro - 25,629 euro = **890,475 euro**.

PM-3E (inspection regime for fishing vessels and recreational craft):

fishing vessels & recreational crafts (above 100GT): additional time for port-users (ship's crew) is estimated at 2 hours per PRF inspection.

Total administrative costs PM-3E= 770 inspections x 2 hours x 26.6 euro¹⁴² = 40,964 euro.

¹⁴⁰ I.e. hourly wage cost in the Maritime transport sector of €26,6 (Eurostat).

¹⁴¹ I.e. hourly wage cost in the Maritime transport sector of €26,6 (Eurostat).

¹⁴² I.e. hourly wage cost in the Maritime transport sector of €26,6 (Eurostat).

(If the 24 meters LOA threshold is applied for recreational crafts this will result in 600 inspections per year on these crafts. This means 1200 inspections x 2 hours x 26.6 euro = 63,840 euro).

2. Policy measures on Exemptions (PM-5A)

PM-5A Harmonising exemption procedures for ships in scheduled and regular traffic:

Harmonising exemption procedures for ships in scheduled and regular traffic includes the introduction of a standard exemption certificate and electronic exchange of information of the exemptions through SafeSeaNet.

a) The ESSF/PRF-SG/“Correspondence Group on exemptions”, has shared experiences and input on expected time and cost savings, including the recent introduction of an online application tool in one of the EU MS for the evaluation and granting of exemptions in all their seaports. The new system in place has resulted in a reduction from (up to) 45 days needed for the exemption process to 20 days, which corresponds to 25 days of time saving, or a 56% reduction of the time needed for assessing and granting an exemption. Therefore, taking a conservative approach¹⁴³ and based on an average time of 30 days for assessing and granting an exemption, the proposed measures may reduce the time for competent authorities to complete the process with **10 days**. This corresponds to a reduced cost for assessing and granting an exemption i.e. **3,517 euro**.

Hourly wage costs (Eurostat data for public administrations/2015)	Daily wage costs ¹⁴⁴ , derived from Eurostat (based on 8 hours)	Number of days required for assessment ¹⁴⁵		Costs for Assessing and granting an exemption	
		Current average time	Reduced time	Current situation	Review (PM-5A)
21.98	175.84	30	(30 – 10) = 20	5,275 euro	3,517 euro

The updated annual costs for competent authorities with PM 5A is calculated as follows:
2,333 exemptions¹⁴⁶ x 3,517 euro = **8,205,161 euro**

Potential cost savings annually: **12.3 million euro¹⁴⁷ - 8.2 million euro = 4.1 million euro**

b) Also on the ship's side, this measure should lead to more clarity on eligibility, documentation to be provided and **reduced time for obtaining an exemption**. The cost associated with the application for an exemption was estimated to be **2128 euro** (see table on the quantification of the administrative burden). However, given limited data available, it is

¹⁴³ As some competent authorities already have IT applications in place, a more conservative approach in terms of time savings is warranted.

¹⁴⁴ Assuming that one officer will be responsible for checking the application file.

¹⁴⁵ See the Calculation of administrative burden caused by the PRF Directive – table 6.

¹⁴⁶ Based on the number of exemptions reported through SSN and to the Commission in 2015.

¹⁴⁷ See the Calculation of administrative burden caused by the PRF Directive – chapter 6.

difficult to indicate expected time and cost savings for the crew member involved in the process.

3. Policy measures on aligning the Advance Waste Notification (PM-4B)

In table 7A (see above) the current administrative burden on port users because of the advance waste notification has been calculated:

Estimated current administrative burden on port users (reporting) = 89,945,320 euro

A possible alignment and updating of the PRF Directive's waste notification form, with MARPOL (IMO Circular 834) as foreseen in PM-4B will provide some benefits mostly with regard to cargo residues, Annex II and Annex VI waste which are currently different or not included in the 'EU' form.

It may be assumed that for freighters around **5% time savings** will occur (mostly because of the alignment on cargo residues). For cruise and passenger vessels we may assume only **1% savings** because cargo residues are not applicable. Based on these assumptions, the following calculation is made of the time saved from the alignment of the advance waste notification:

Freighters: 1 hour x 5% = 0.05 hours savings;
 Passenger ships: 4 hours x 1% = 0.04 hours savings;
 Cruise ships: 8 hours x 1% = 0.08 hours savings.

Estimated administrative burden on port users (reporting) / updated after alignment with MARPOL

Number of hours required for notification	Sector – share in overall port calls EU	Number of port calls/2015 (Eurostat)	Hourly wage costs/2016 (Eurostat)	Estimated total costs
1-0.05 = 0.95	Freight – 84%	1,868,671	26.6	47,221,316 ¹⁴⁸
4-0.04 = 3.96	Passengers – 15%	333,691	26.6	35,149,675 ¹⁴⁹
8-0.08 = 7.92	Cruise ships – 1%	22,246	26.6	4,686,609 ¹⁵⁰
Total	100%	2,224,608		87,057,600

Estimated cost savings from aligning the PRF Directive with MARPOL definitions of Ship Generated Waste and Cargo Residues = 89,945,320 - 87,057,600 = **2,887,720 euro**

¹⁴⁸ $Y = 0.95 \times 26.6 \times 1,868,671 = 47,221,316.$

¹⁴⁹ $Y = 3.96 \times 26.6 \times 333,691 = 35,149,675.$

¹⁵⁰ $Y = 7.92 \times 26.6 \times 22,246 = 4,686,609.$

Annex 10 – Glossary of terms

Term	Definition	Source
Black water	'Water polluted with food, animal, or human waste.'	http://www.businessdictionary.com/definition/black-water.html
Bleed-off water	<p>'A small amount of scrubbing water extracted to bleed-off unit to remove contaminants.'</p> <p>'...small amount of aqueous solution removed from the cleaning medium of an EGCS[Exhaust Gas Cleaning Systems]/EGR to keep its required operating properties and efficiency...'</p> <p>'...condensate from cooling of exhaust gas in an EGR [Exhaust Gas Recirculation] process...'</p>	<p>https://ec.europa.eu/transport/sites/transport/files/modes/maritime/events/doc/2011_06_01_stakeholder-event/item9.pdf</p> <p>EMSA's assistance with Directive 2000/59/EC on Port Reception Facilities (PRF), Technical assessment on the list of open questions, Ref. EMSA.2017.036676, p.16</p> <p>IMO, PPR 4/11- Guidelines for the discharge of exhaust gas recirculation bleed-off water- Report CG, p.5</p>
Cargo residues	<p>'...the remnants of any cargo material on board in cargo holds or tanks which remain after unloading procedures and cleaning operations are completed and shall include loading/unloading excesses and spillage.'</p> <p>'...the remnants of any cargo which are not covered by other Annexes to the present Convention and which remain on the deck or in holds following loading or unloading, including loading and unloading excess or spillage, whether in wet or dry condition or entrained in wash water but does not include cargo dust remaining on the deck after sweeping or dust on the external surfaces of the ship.'</p>	<p>Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues, Article 2(d).</p> <p>1978 Annex V OF THE 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011), Regulation 1 Definitions (2)</p>
Exhaust Gas	'Exhaust Gas Cleaning Systems	EMSA's assistance with Directive

Cleaning Systems (EGCS)	(EGCS) are systems designed to reduce the sulphur oxide emissions by ships using otherwise non-compliant fuels. These systems [are] more commonly known by “scrubbers”...'	2000/59/EC on Port Reception Facilities (PRF), Technical assessment on the list of open questions, Ref. EMSA.2017.036676, p.5
Fishing gear	'...any physical device or part thereof or combination of items that may be placed on or in the water or on the sea-bed with the intended purpose of capturing, or controlling for subsequent capture or harvesting, marine or fresh water organisms.'	1978 Annex V OF THE 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011), Regulation 1 Definitions (6)
Food wastes	'...any spoiled or unspoiled food substances and includes fruits, vegetables, dairy products, poultry, meat products and food scraps generated aboard ship.'	1978 Annex V OF THE 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011), Regulation 1 Definitions (8)
Garbage	'...all kinds of food wastes, domestic wastes and operational wastes, all plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, and animal carcasses generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention. Garbage does not include fresh fish and parts thereof generated as a result of fishing activities undertaken during the voyage, or as a result of aquaculture activities which involve the transport of fish including shellfish for placement in the aquaculture facility and the transport of harvested fish including shellfish from such facilities to shore for processing.'	1978 Annex V of the 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011), Regulation 1 Definitions (9)
Good environmental	'...the environmental status of marine waters where these	Directive 2008/56/EC of the European Parliament and of the

status	provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive...'	Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), Article 3, par.5.
Gray water	'Relatively clean waste water, such as from kitchen, bathroom (not the toilet), and laundry cycles. This water can be reused or recycled with little or no treatment for landscape irrigation and other non-potable uses. Also called sanitary water.'	http://www.businessdictionary.com/definition/gray-water.html
Marine litter	'Marine litter consists of items that have been deliberately discarded, unintentionally lost, or transported by winds and rivers, into the sea and on beaches. It mainly consists of plastics, wood, metals, glass, rubber, clothing and paper. Land-based sources include tourism, sewage and illegal or poorly managed landfills. The main sea-based sources are shipping and fishing.'	http://ec.europa.eu/environment/marine/pdf/flyer_marine_litter.pdf
Oil	'...petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products (other than petrochemicals which are subject to the provisions of Annex II of the present Convention)...'	1978 Annex I of the 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by oil (Revised version as of 2010), Regulation 1 Definitions (1)
Operational wastes	'all solid wastes (including slurries) not covered by other Annexes that are collected on board during normal maintenance or operations of a ship, or used for cargo stowage and handling. Operational wastes also includes cleaning agents and additives contained in cargo hold and external wash water. Operational wastes does not include grey water, bilge water, or other similar discharges essential to the operation of a ship, taking into	1978 Annex V OF THE 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011), Regulation 1 Definitions (12)

	account the guidelines developed by the Organization [IMO].'	
Plastic	'...a solid material which contains as an essential ingredient one or more high molecular mass polymers and which is formed (shaped) during either manufacture of the polymer or the fabrication into a finished product by heat and/or pressure. Plastics have material properties ranging from hard and brittle to soft and elastic. For the purposes of this annex, "all plastics" means all garbage that consists of or includes plastic in any form, including synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products.'	1978 Annex V OF THE 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011), Regulation 1 Definitions (13)
Scrubber	See 'Exhaust Gas Cleaning Systems'	
Sewage	'...1. drainage and other wastes from any form of toilets and urinals; .2 drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises; .3 drainage from spaces containing living animals; or .4 other waste waters when mixed with the drainages defined above.'	1978 Annex IV of the 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the Prevention of pollution by sewage from ships (revised version as of 2011), Regulation 1 Definitions (3)
Sludge	'...dirty and heavily dense waste that results from “washwater” discharge filtration and conditioning equipment and retained on-board.'	EMSA's assistance with Directive 2000/59/EC on Port Reception Facilities (PRF), Technical assessment on the list of open questions, Ref. EMSA.2017.036676, p. 16
Special area	'...a sea area where for recognized technical reasons in relation to its oceanographic and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by	1978 Annex V OF THE 1978 Protocol relating to the 1973 International Convention for the Prevention of Pollution from ships: Regulations for the prevention of pollution by garbage from ships (Revised version as of 2011),

	garbage is required.'	Regulation 1 Definitions (14)
Wash water	'The water used for washing down the pollutant exhaust stream...'	EMSA's assistance with Directive 2000/59/EC on Port Reception Facilities (PRF), Technical assessment on the list of open questions, Ref. EMSA.2017.036676, p. 6
Waste hierarchy	<p>'Preamble ... (31) The waste hierarchy generally lays down a priority order of what constitutes the best overall environmental option in waste legislation and policy, while departing from such hierarchy may be necessary for specific waste streams when justified for reasons of, inter alia, technical feasibility, economic viability and environmental protection.'</p> <p>'1. The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy:</p> <ul style="list-style-type: none"> (a) prevention; (b) preparing for re-use; (c) recycling; (d) other recovery, e.g. energy recovery; and (e) disposal.' 	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Article 4.