

# Study on **Land-Sourced Litter (LSL)**

In the Context of the  
Initiative of the Declaration of the Global Plastics Associations  
for Solutions on Marine Litter

**Commissioned by:**

BKV Beteiligungs- und Kunststoffverwertungsgesellschaft mbH, Frankfurt/Main  
(Germany)

IK Industrievereinigung Kunststoffverpackungen e.V., Bad Homburg (Germany)

KVS Kunststoff Verband Schweiz, Aarau (Switzerland)

FCIO Fachverband der Chemischen Industrie Österreichs, Vienna (Austria)

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# Content

1. Introduction
2. Data on marine litter for the Baltic Sea, North Sea and Mediterranean Sea
3. Plastics production and use
4. Pressure indicators for LSL
- (5. Behaviour)
- (6. Stakeholders in the field of LSL)

## Objectives

- Review of literature / data on LSL for the Mediterranean Sea, the North Sea and the Baltic Sea;
- Serve as long-term reference and baseline for subsequent discussions and strategies;
- Display possible research and implementation activities of different stakeholders and behavior aspects in the field of LSL;
- Pave the way for sound impact assessment of measures to reduce LSL.
- Impact assessment is not covered with the study;
- A starting point only; more work focussing on measures required to meet the general objective: to prevent marine litter

## Monitoring „Places“ of marine litter items (debris)

- **Marine litter** is any persistent, manufactured or processed solid material discarded, disposed or abandoned in the marine coastal environment. Occurring in different sizes at different locations.
  - **Beach litter** at the coastline
  - **Floating debris** on the water surface and in the water column < 40 cm depth. It can be estimated by
    - direct observation of large debris items,
    - by net trawls for smaller items or
    - by aerial surveys
  - **Sea floor debris** on the sea bed  
(much less widely investigated than water surface / beach)

# DATA ON MARINE LITTER

## SSL and LSL of marine litter

Sea (ocean)-based sources of marine litter (SSL)	Land-based sources of marine litter (LSL)
<b>Waste from Vessels</b>	<b>Individual actions</b>
<ul style="list-style-type: none"> <li>• Merchant shipping (cargo, equipment, etc)</li> <li>• Naval and research vessels</li> <li>• Private vessels (pleasure)</li> <li>• Public vessels (cruise liners, ferries)</li> </ul>	<ul style="list-style-type: none"> <li>• Littering in general (inland and coastal)</li> <li>• Littering caused by tourism (recreational visitors to the coast)</li> <li>• Events (e.g. charity, fly balloons)</li> </ul>
<b>Fishing activities</b>	<b>Facilities and Construction</b>
<ul style="list-style-type: none"> <li>• Fishing vessels</li> <li>• Abandoned, lost or otherwise discarded fishing gear (fishing nets, ropes and light sticks)</li> <li>• Aquaculture installations</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial or manufacturing outfalls (e.g. by-products, plastic resin pellets)</li> <li>• Construction and demolition sites</li> <li>• Harbours (Seaport, commercial port, fishing port, ferry port etc.)</li> <li>• Ship-breaking yard</li> <li>• Agriculture activities</li> </ul>
<b>Other Structures</b>	<b>Municipalities</b>
<ul style="list-style-type: none"> <li>• Legal and illegal dumping at sea;</li> <li>• Offshore oil and gas platforms, and drilling rigs</li> </ul>	<ul style="list-style-type: none"> <li>• Litter and waste generated in coastal and inland zones from improper waste management</li> <li>• Wastes from dumpsites located on the coast or riverbanks</li> <li>• Untreated municipal sewerage</li> </ul>
<b>Transport of litter and waste</b>	<b>Transport of litter and waste (on land or on waterways)</b>
<ul style="list-style-type: none"> <li>• Natural events.(tsunamis, storm, strong sea)</li> </ul>	<ul style="list-style-type: none"> <li>• Rivers and floodwaters;</li> <li>• Discharge from storm water drains / sewer</li> <li>• Natural storm related events (e.g. mistral, tornadoes, hurricanes)</li> </ul>



River in Albania 2011,  
© Öko-Institut, M. Blepp

## LSL - Situation Worldwide

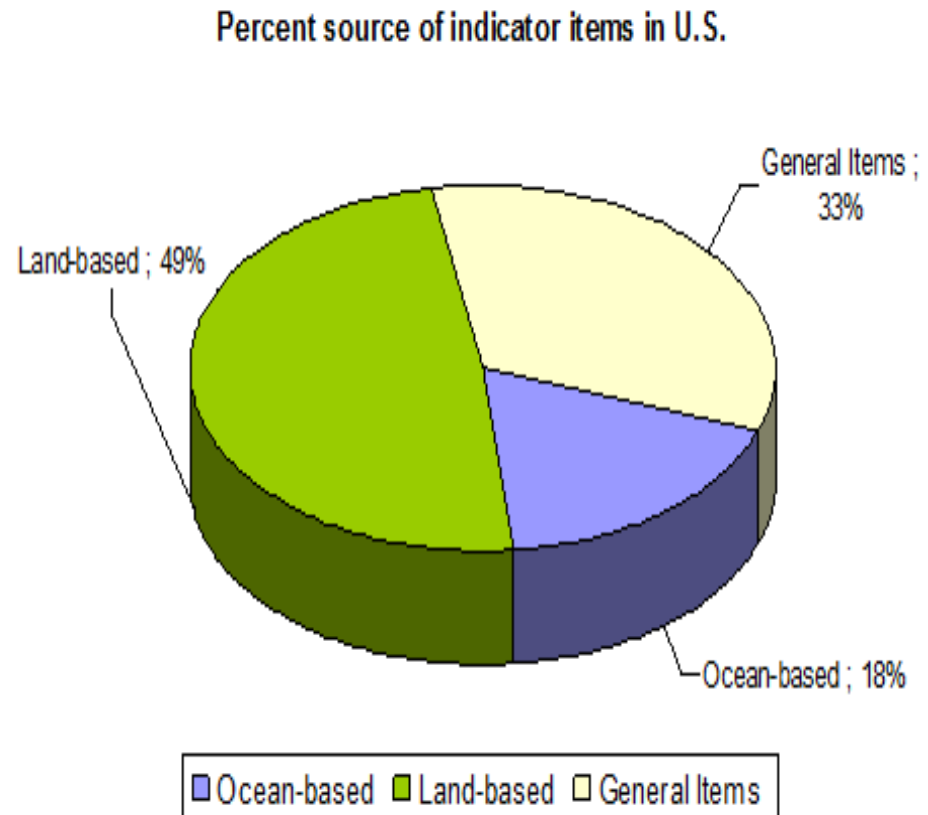
- References have been estimated that around 80% of marine debris is from LSL and the remaining 20% is from SSL
- Specific data on worldwide amounts of LSL and SSL are not available. There are only some aged worldwide figures on the annual input of marine litter
- Plastics dominate the debris;  
pre-production plastics (in the form of pellets, powders or production scrap) account for 10% of the total plastic amount but decreasing (*Source: Moore 2008*)
- No calculations examples or benchmarks.



# DATA ON MARINE LITTER

## Monitoring „Sources“ of indicator marine litter items – Example from U.S.

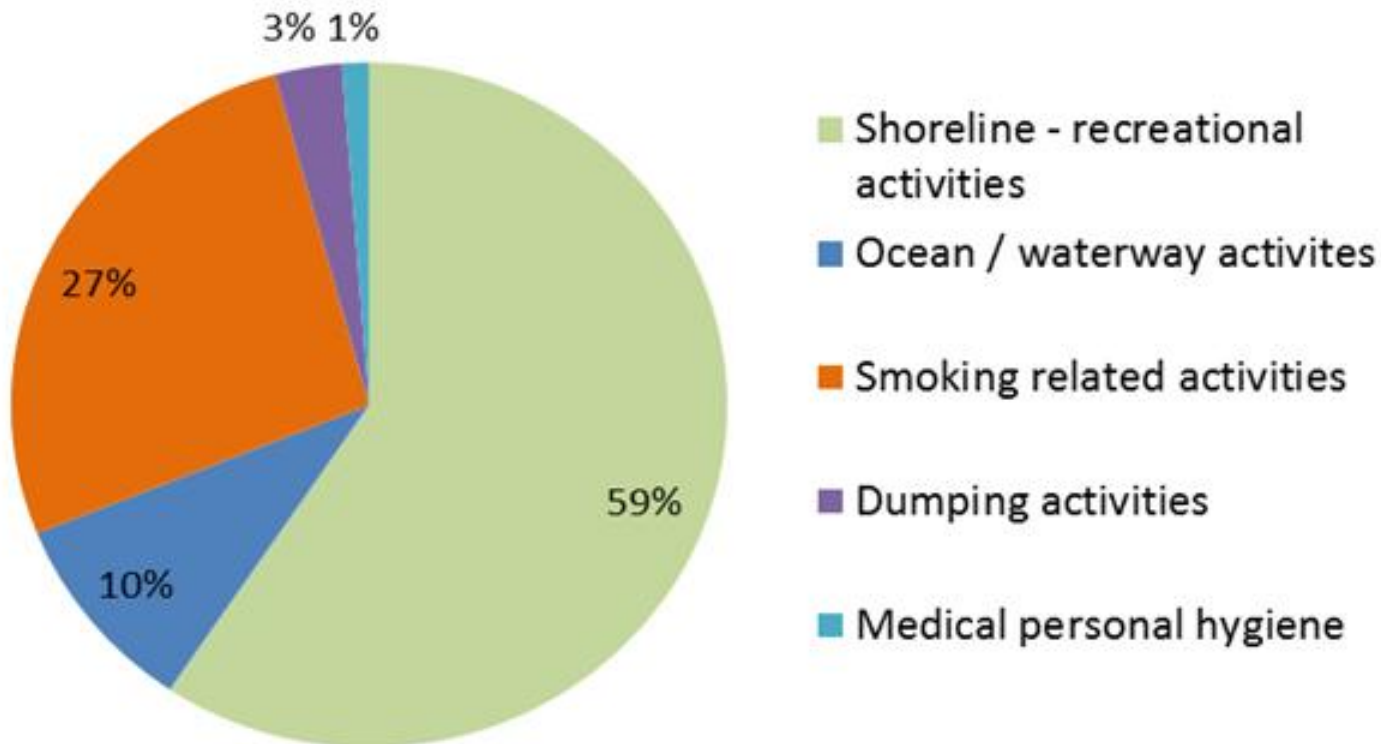
Probable Source	Indicator Items
<b>Ocean-based</b>	<ul style="list-style-type: none"> <li>◆ All gloves</li> <li>◆ Plastic sheets (</li> </ul>
Oil/gas platforms	◆ Pipe-thread pro
Commercial Fishing	<ul style="list-style-type: none"> <li>◆ Fishing nets (≥</li> <li>◆ Traps &amp; pots*</li> <li>◆ Fishing line*</li> <li>◆ Floats &amp; buoys*</li> </ul>
Cruise ships	◆ Cruiseline logo
<b>Land-based</b>	<ul style="list-style-type: none"> <li>◆ Syringes</li> <li>◆ Condoms</li> <li>◆ Metal Beverage</li> <li>◆ Motor Oil Conta</li> </ul>
Urban Combined-sewer Overflows (CSOs)	<ul style="list-style-type: none"> <li>◆ Tampon applica</li> <li>◆ Cotton Swabs</li> </ul>
<b>General</b>	<ul style="list-style-type: none"> <li>◆ Plastic bags wi</li> <li>◆ Strapping band</li> </ul>
Various Plastic Bottles	<ul style="list-style-type: none"> <li>◆ Beverage &amp; fo</li> <li>◆ Milk/water</li> <li>◆ Bleach/cleaner</li> </ul>



\* Indicates a debris form associated with biological impacts.



## Distribution of indicator items for LSL and SSL collecting on beaches



Source: Compiled from annual ICC data reports, Centre for Marine Conservation/Ocean Conservancy (1989-2007) in: UNEP 2009b

## Pattern considered:

- North Sea, Baltic Sea, Mediterranean Sea
- Beach litter, floating debris (column and surface), seabed
- Data for total litter and plastic litter
- Data for volume in (kg) and data for the items (in numbers)
  - Aggregated per 100 meter for beach litter
  - Other specification

# DATA ON MARINE LITTER

## Details: Baltic Sea; beach litter

BEACH LITTER		BALTIC SEA											
		Baltic Sea						Country specific					
								Estland	Finnland	Latvia	Poland	Russia	
Total [kg litter/area]	min	0.4						25.2		1			
	average	33				1.5		35.0		11		1128m <sup>2</sup> *	
	max	65.6						44.8		45			
Total [item litter/area]	min	6		4	6			9.3		21			
	average	603		92.5	603			14.1		260			
	max	1200		181	1200			18.8		691			
Plastic [kg litter/area]	min									0.3			
	average									3.6			
	max									14.9			
Plastic [item litter/area]	min	3.0			1.8			1.0		11.3			
	average	340.7			271.4			1.5	1.6	140.4	2.2		1.1
	max	756.0			720.0			2.0		373.1			
Percentage of plastics [% kg]	min												
	average									33%	48%		
	max												
Percentage of plastics [% item]	min	50%	50%		30%								
	average	57%	60%		45%			52%	57%	54%	42%		48%
	max	63%	70%		60%								
Type of plastics		Plastics	Plastic bags + Bottles		Plastics		Plastics	Plastic bags + Bottles	Plastics	Plastic Bottles	Plastics		Plastic bags + Bottles
References		UNEP (2009b), pp. 29-31	WWF, 1998- 2005. Naturewatch Baltic Report. <a href="http://www.naturewatchbaltic.org/">http://www.naturewatchbaltic.org/</a> . 13.2.2008.	Tuomisto (1994)	SAO (2010)	UNEP 2009b, 191	UNEP 2009b, 29-31	WWF (2006)	Tuomisto (1994)	WWF (2006)	UNEP 2009b, 31	UNEP 2009b, 30	WWF (2006)
Comments		Total highest amount 700- 1200 pieces/100m; lowest amount 6-16 pieces/100m. 58% litter attributed to shoreline activities. Values items from UNEP 2009b Figure 1 p.29	Plastic bottles: 31-43%; Plastic bags: 19-27%			ICC Data			Surveys in 15 beaches. 40% of the litter comes from Russia, Estonia, Latvia and Lithuania and 21% from Poland		Fisheries Protection Board of Poland	Over an area of 540m <sup>2</sup> in St. Petersburg collected in 2006	
Raw data		Calculated											

## Overview on data regarding marine litter in the Baltic Sea

Marine debris in the Baltic Sea	Range of beach litter per 100m <i>[Number of studies referring to the aggregated data]*</i>	Range of floating litter per area <i>[Number of studies referring to the aggregated data]*</i>	Range of sea floor litter per area (km <sup>2</sup> ) <i>[Number of studies referring to the aggregated data]*</i>
Total value			
in kg	0.4 – 66 [4]	n.a.	n.a.
in number of items	4 - 1 200 [5]	n.a.	44 – 208 [1]
Plastic value			
in kg	n.a.	n.a.	n.a.
in number of items	1 - 756 [3]	n.a.	16 – 74 [2]
Percentage of plastics items (in % of the total value)	30% – 70% [3]	n.a.	36% [1]

# Overview on data regarding marine litter in the North Sea

Marine debris in the North Sea	Range of beach litter per 100m <i>[Number of studies referring to the aggregated data]*</i>	Range of floating litter per area <i>[Number of studies referring to the aggregated data]*</i>	Range of sea floor litter per area (km <sup>2</sup> ) <i>[Number of studies referring to the aggregated data]*</i>
Total value			
in kg	10 – 345 [3]*	n.a.	n.a.
In number of items	200 – 3 073 [7]*	150 – 2 400 [1] [1]*	1 – 193 [3]*
Plastic value in kg			
in kg	2 - 45 [2]*	n.a.	n.a.
In number of items	150 – 2 219 [7]*	n.a.	1 – 94 [3]*
Percentage of plastics (in % of the total value)	44% – 95% [7]*	n.a.	38% – 89% [1]*

*n.a. = not applicable*

*For more details please refer to the full report. See last slide.*

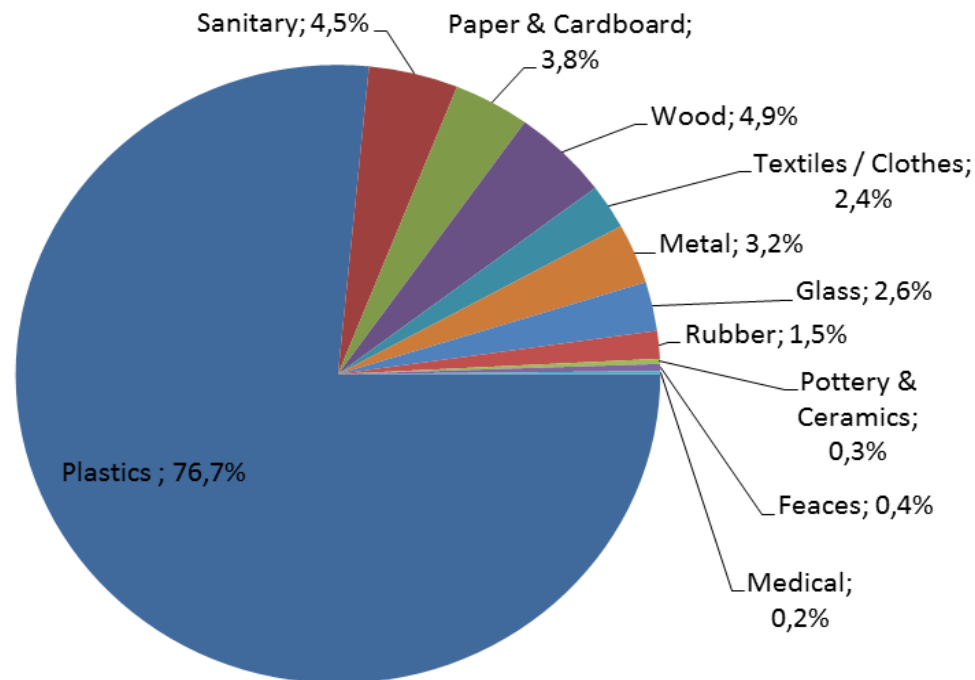


Most viable data based on standard OSPAR Monitoring)

## Data regarding the marine litter items (debris) in the North Sea

Type of litter based on various OSPAR beach monitoring results

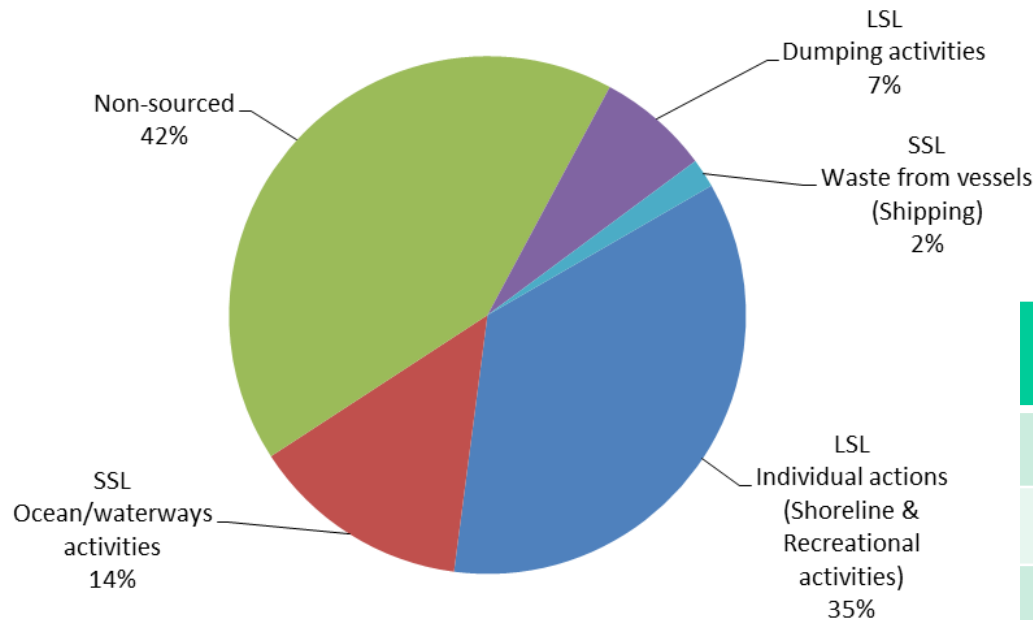
Average values of type of litter in the North Sea



Source: Authors' own illustration  
based on OSPAR 2009 and UNEP  
2009b

## Data regarding the marine litter items (debris) in the North Sea

**Sources of Marine Litter in the North Sea**



Source	North Sea	U.S. Monitoring
LSL	42 %	49 %
SSL	16 %	18 %
Non-sourced	42 %	33 %

Source: Authors' own illustration based on OSPAR 2009)



## **Data regarding the marine litter items (debris) in the North Sea**

### **OSPAR Monitoring Programme**

- Standard Guidelines
- Supports the implementation of the Marine Strategy Framework Directive (2008/56/EC)
- Provides information on amounts, trends and sources of marine litter
- Reference beaches (100 m stretch) surveys 4 times per year
- For each reference beach a questionnaire
- Description of 121 items and 11 main groups
- OSPAR approach is used in 4 other projects
  - But: limited / no information on volume (kg)

## Overview on data regarding marine litter in the Mediterranean Sea

Marine debris in the Mediterranean Sea	Range of beach litter per 100m <i>[Number of studies referring to the aggregated data]*</i>	Range of floating litter per area <i>[Number of studies referring to the aggregated data]*</i>	Range of sea floor litter per area (km <sup>2</sup> ) <i>[Number of studies referring to the aggregated data]*</i>
Total value			
in kg	1 – 314 <i>[16]*</i>	2.9 <i>[0 / 1]*</i>	7 - 47 <i>[1]*</i>
In number of items	640 - 23 100 <i>[7]*</i>	0.5 - 498 <i>[3]*</i>	0 – 8 500 <i>[11]*</i>
Plastic value in kg			
in kg	2 - 75 <i>[3]*</i>	n.A.	0.5 – 34 <i>[2]*</i>
In number of items	405 - 10 395 <i>[7]*</i>	0.12 - 1.74 <i>[2]*</i>	0 – 5 460 <i>[11]*</i>
Percentage of plastics (in % of the total value)	37% – 80% <i>[11]*</i>	60% - 83% <i>[3]*</i>	36% - 90% <i>[12]*</i>

- Inconsistent data and geographically restricted mainly to North Mediterranean.
- Information of Mashreq and Maghreb countries are barely existent

## Limitations of data regarding classification

- Some studies give each litter item different “**identification names**”
- Spectrum of litter items differs in the different studies
- **Plastic content** of some litter items (e.g. food packaging) is sometimes **not clear** and is also not discussed transparently in the monitoring reports;
- Items have **no unique correlation** to LSL and SSL;
- Thus, different classification approaches **make it difficult** to **aggregate data** from the various studies.

## Spot check character of data

- Data refers to a defined area at the time of the investigation thus constituting a spot check.
- Results depend on local conditions as
  - winds,
  - water currents,
  - beach conditions (sand or gravel),
  - on people taking part,
  - the classification of the litter items,
  - the difference in practise and
  - the frequency of the sampling.

**In result data on marine litter requires detailed information on local conditions and appropriate methodology to derive trends of discharge (e.g. for LSL). Up to now no effective trends can be observed due to dominating changes of other local conditions**

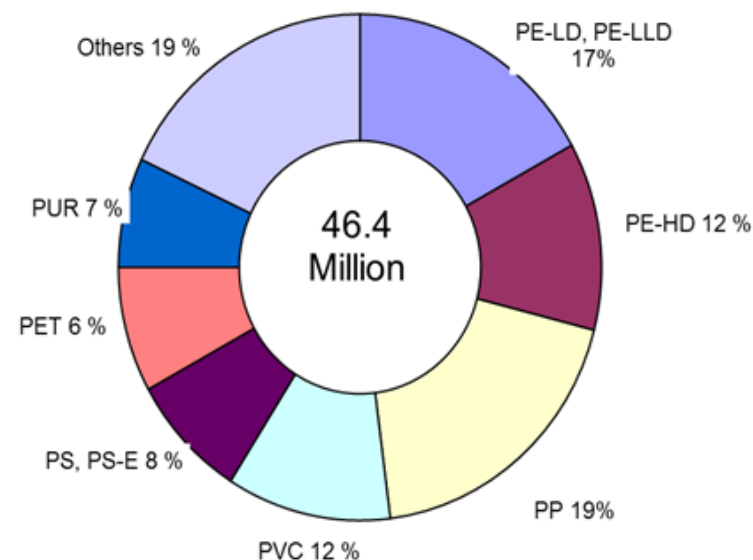
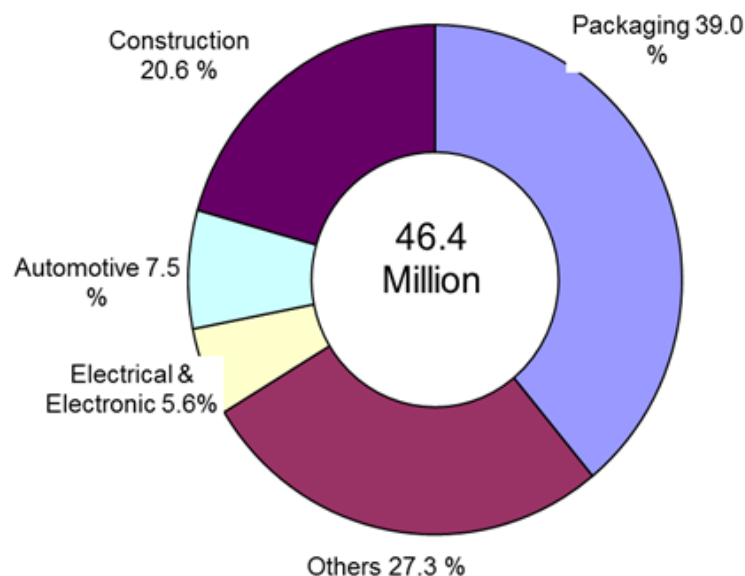
## Conclusions (bearing the limitations in mind)

- International data demonstrates that LSL has a share of 75% to 90% LSL of the total marine litter items at beaches. No valid data are available for volume in kg or for the water column or the sea floor.
- In result the volume of Waste the three Seas are receiving per year (or during the previous years) is not detectable.
- The patterns for the three European seas in question differ from the global picture as less plastic bags are detected (in per cent of all detected items).
- For the Mediterranean Sea and the Baltic Sea LSL is predominant; all “top ten” items are LSL
- For the North Sea LSL is also predominant but in contrast to the above-mentioned seas more than 20% of the detected items found on reference beaches of the North Sea are SSL, more specifically they are waste from fishing activities..

## Conclusions

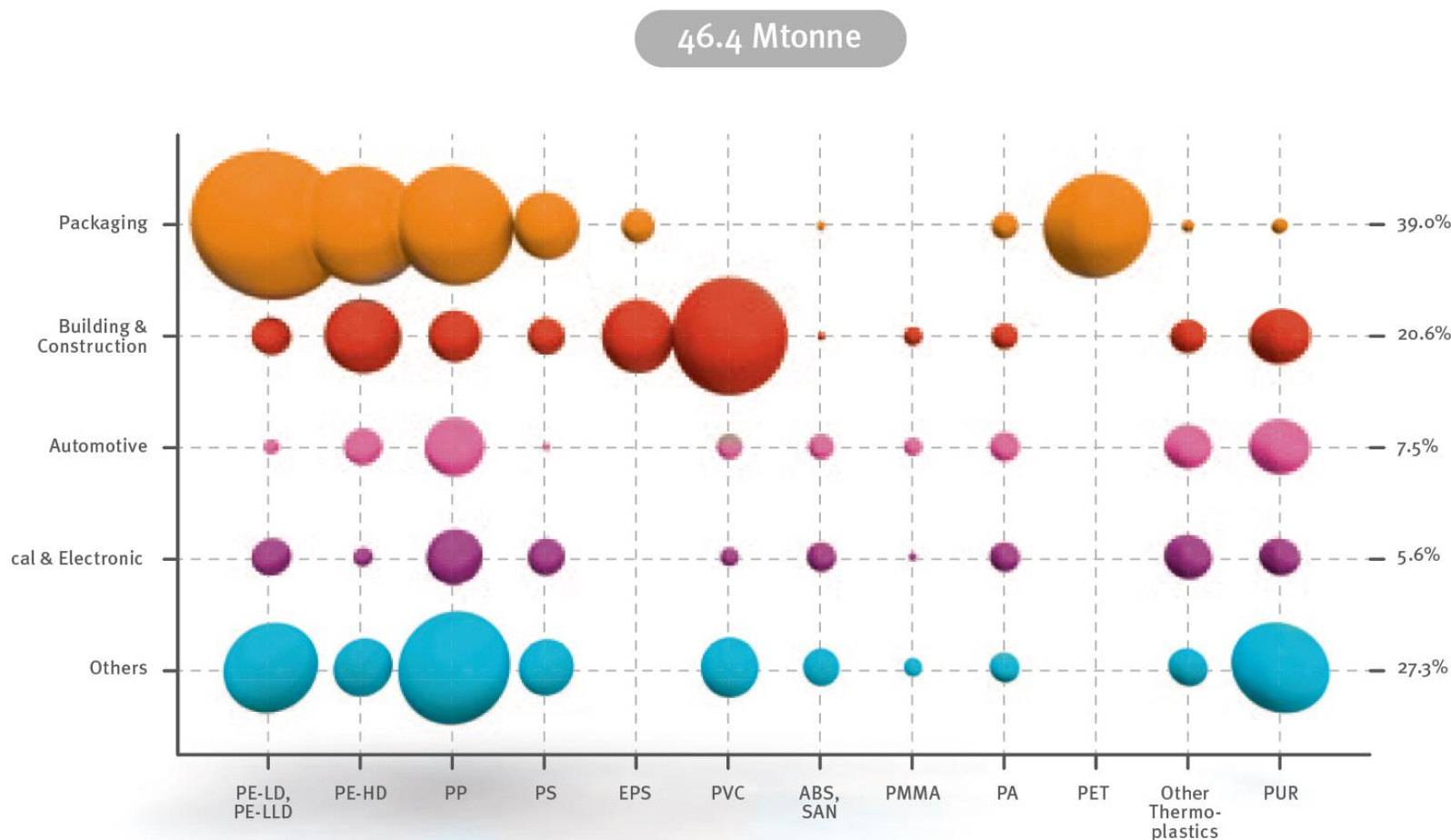
- In terms of marine litter, plastics is the predominant material. Regardless of whether reported as items or volume or for beach or water column or sea floor, no report refers to plastics having less than a 30% share; some refer to shares of up to 90%.
- Due to the prevailing local conditions it is very difficult to detect trends. However the German government reported that the plastic content in the total marine waste observed at beach of the German North Sea has increased from 68% in 2001 to 78% in 2006.
- Considerably more literature and details which might serve as a reference for future discussions are provided in the main report
- Harmonisation of monitoring programs is most advanced for the North Sea covered by the OSPAR convention. In order to ensure a better combination of different data sources it is strongly recommended that joint guidelines are developed, at least for a regional sea such as the Baltic Sea or the Mediterranean Sea.

Total plastics demand from European Converters in 2010 by segments (left) and resin types (right) in EU-27 + Norway and Switzerland;



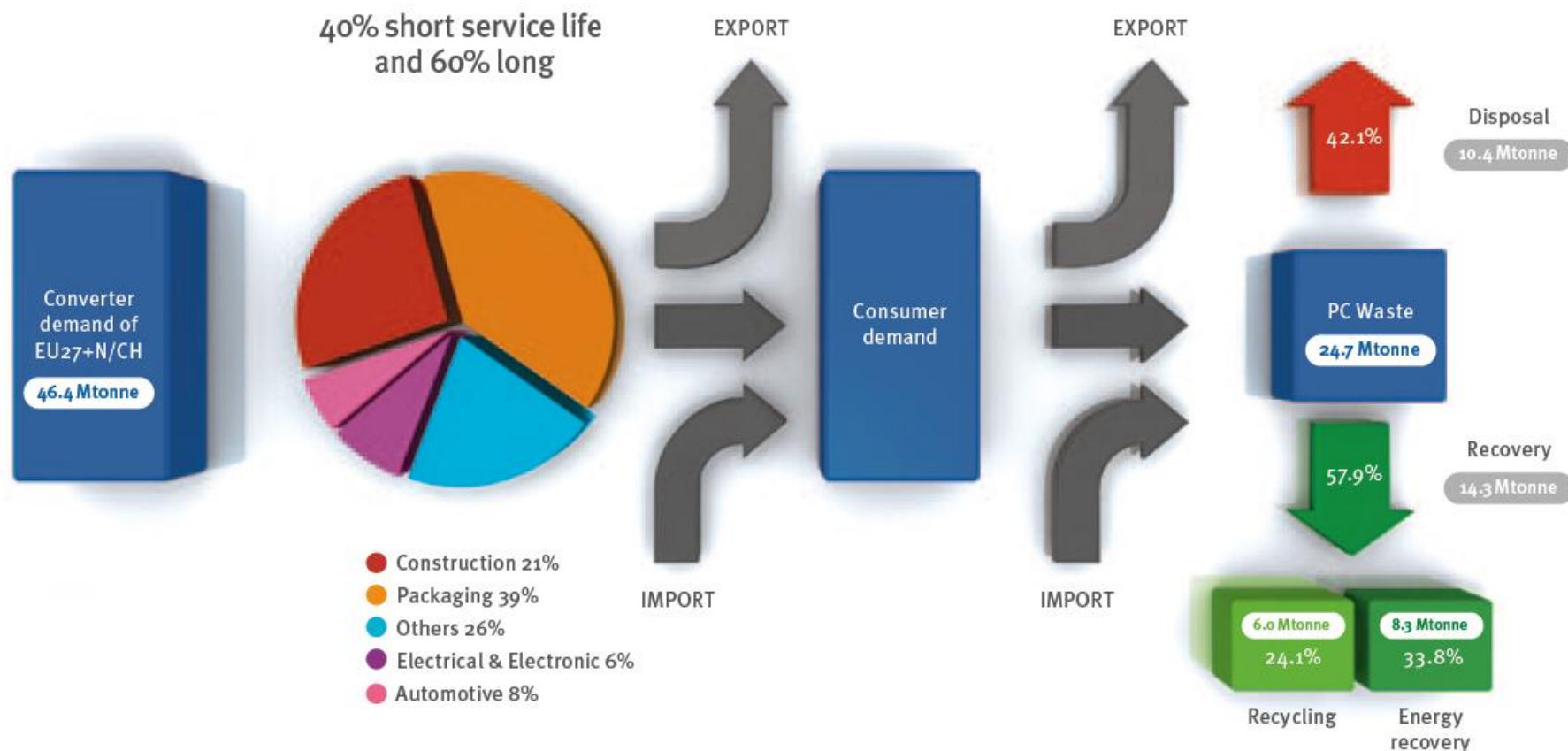


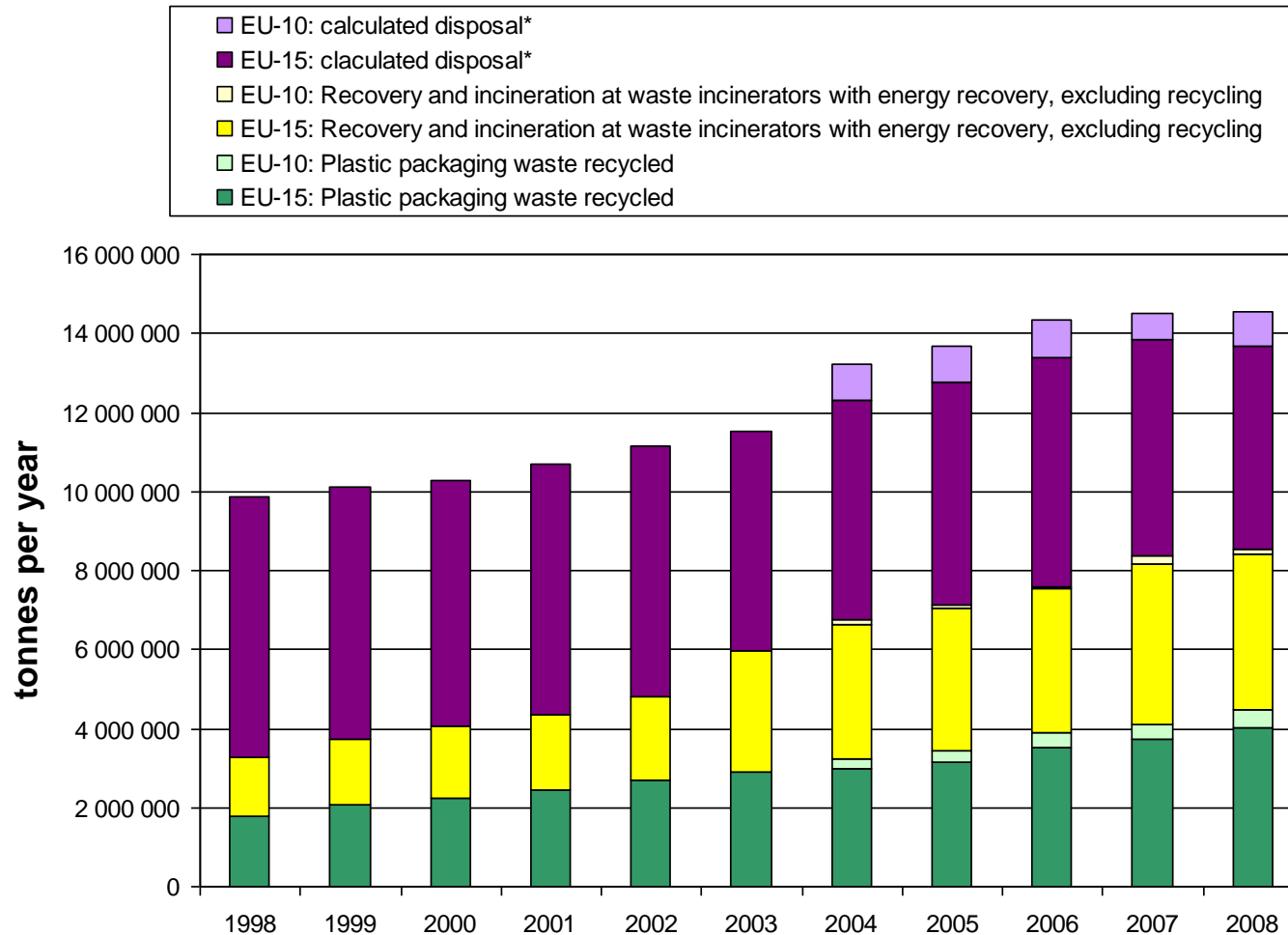
Break down of the plastics demand from European Converters in 2010 by segments and resin types in EU-27 + Norway and Switzerland;



Source: PlasticsEurope 2011

## Main steps in plastics' lifecycle for EU27 + Norway Switzerland in 2010

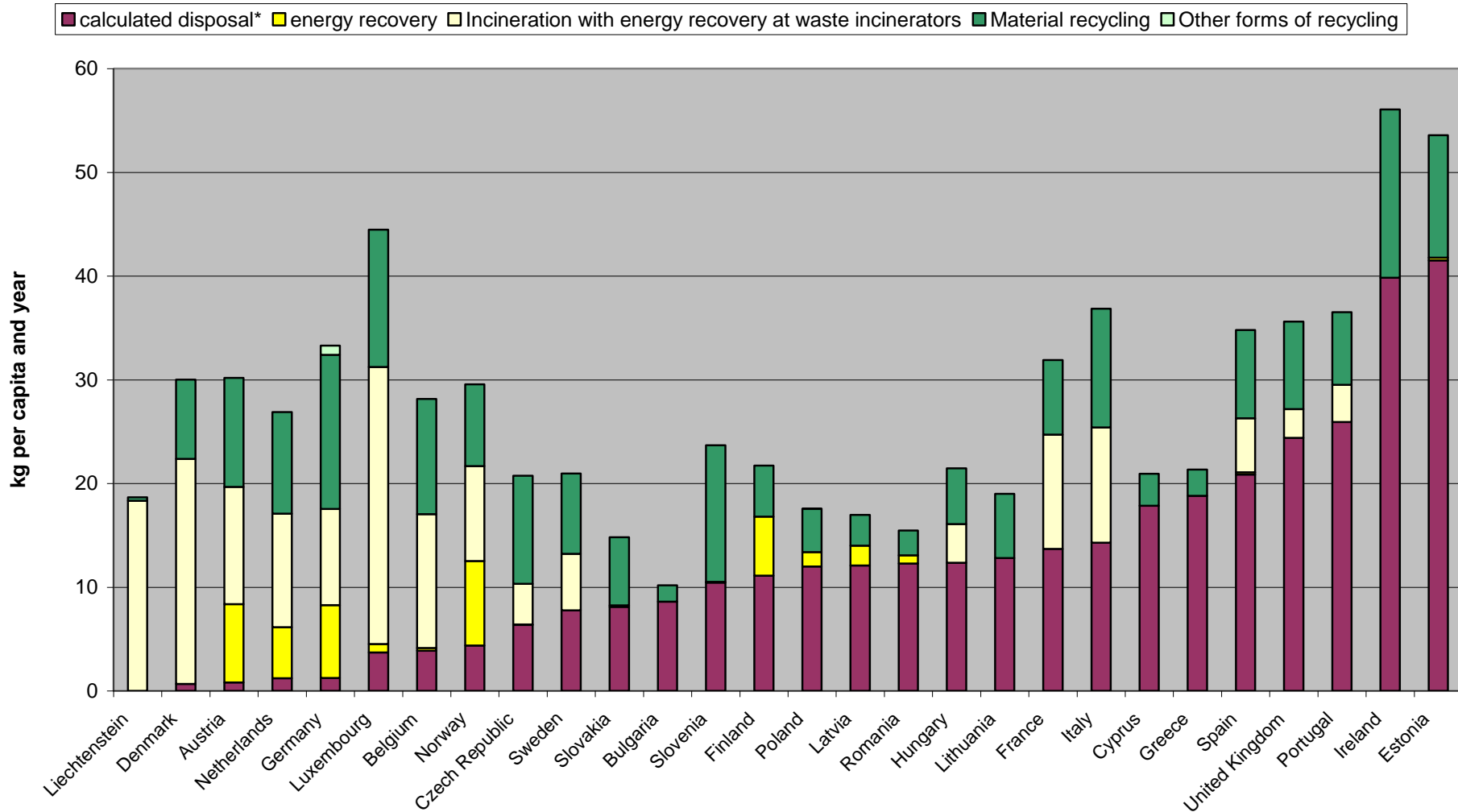




\* calculated disposal = Packaging waste generated minus total recovery and minus incineration at waste incinerators with energy recovery

EU 10 = New Member States accessing 2004

## Plastic Packaging Waste 2008



# Pressure indicator for the risk of pollution with LSL

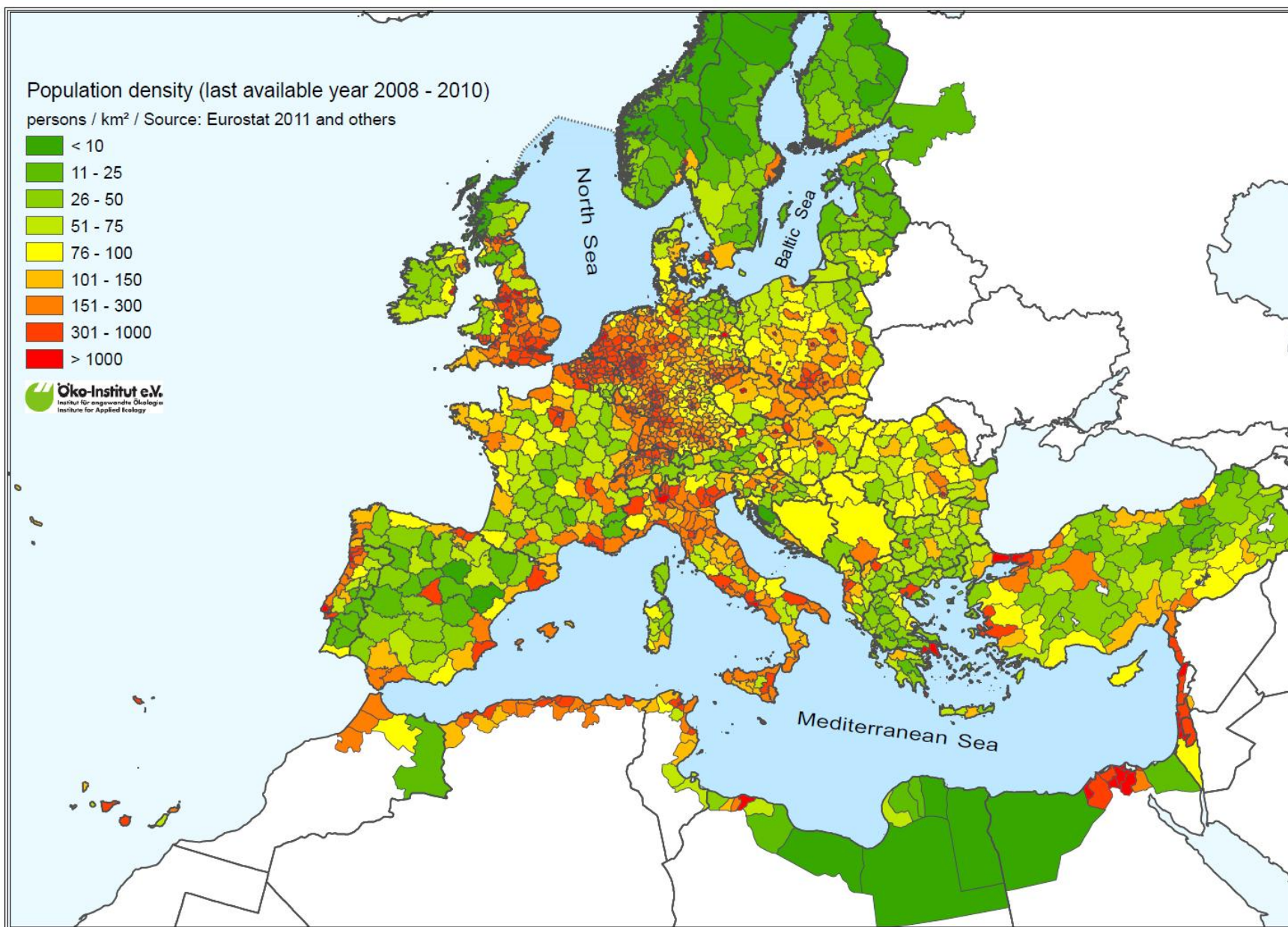
- **Population density**
- **Tourism / recreation**
  - Level of littering (inland / seashore)
  - Littering caused by tourism / recreational visitors / events to the coast
- **Activities at ports**
- **Solid waste management**
  - Collection and treatment of municipal waste
  - Wastes from dumpsites located on coast or riverbanks / river management
  - Plastic packaging waste management
  - Waste management of commercial and industrial waste
  - Waste management of agricultural plastic waste
- **Waste water treatment**
  - Coverage of collection (sewer) and treatment
  - Sewer overflow, combined sewer overflow

## Overview of impacts and related indicators for LSL

Pressure	Indicator
<b>Population density (4.1)</b>	Population density (4.1) - in combination with- groups for municipal waste management (4.4.1)
<b>Tourism / recreation (4.2)</b>	
Level of littering (inland / seashore)	-/-
Littering caused by tourism / recreational visitors / events to the coast	Nights spent by residential and non-residential in tourist accommodation establishments (4.2) - in combination with- groups for municipal waste management (4.4.1)
<b>Activities at ports (4.3)</b>	
Level of littering at ports	-/-
Littering caused by commercial activities at ports	Marine transport of freight; loaded and unloaded (4.3) - in combination with- groups for municipal waste management (4.4.1)
<b>Solid waste management (4.4)</b>	
Collection and treatment of municipal waste (4.4.1)	Groups for municipal waste management (4.4.1)
Dumpsites located on the coast or riverbanks (4.4.2)	Groups for municipal waste management (4.4.1)
Plastic packaging waste management (4.4.3)	Plastic packaging waste disposed off (4.4.3) - in combination with- groups for municipal waste management (4.4.1)
Waste management of commercial and industrial waste (4.4.4)	Groups for municipal waste management (4.4.1)
Waste management of agricultural plastic waste (4.4.5)	Groups for municipal waste management (4.4.1)
<b>Waste water treatment (4.5)</b>	
Coverage of collection (sewer) and treatment (4.5.1)	Groups for municipal waste management (4.4.1)
Sewer overflow, combined sewer overflow(4.5.2)	Groups for municipal waste management (4.4.1)

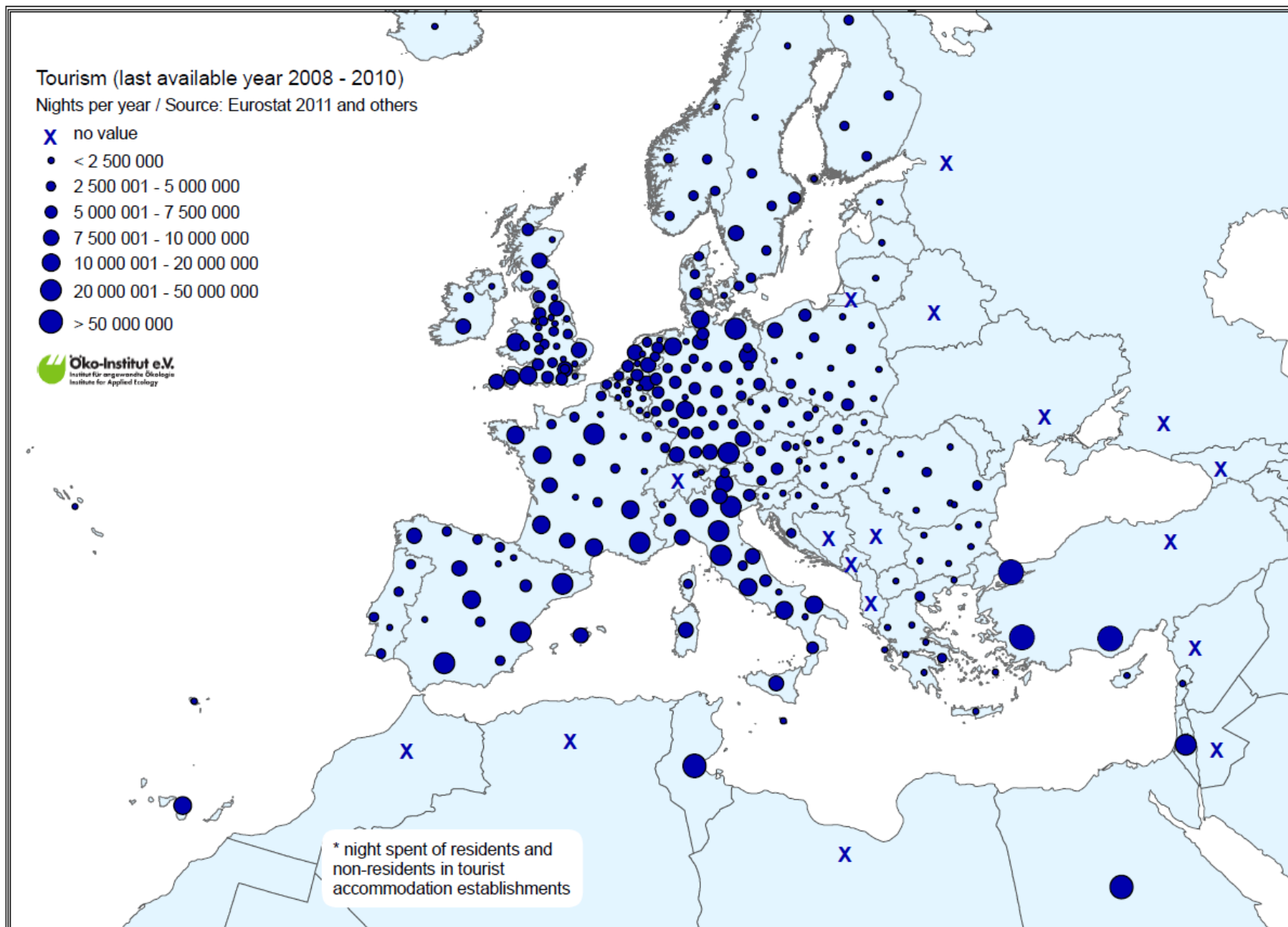


# PRESSURE INDICATORS FOR LSL

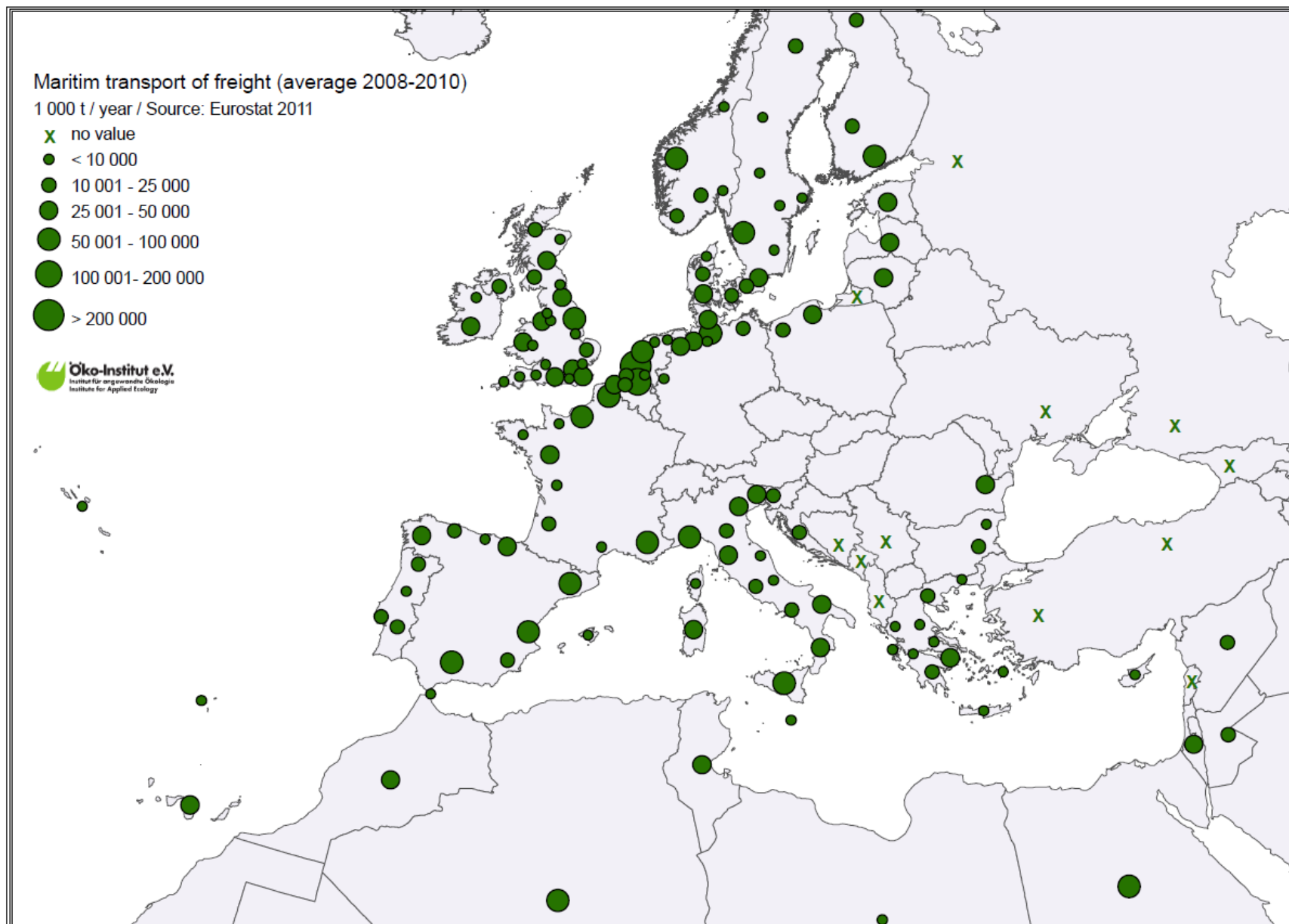




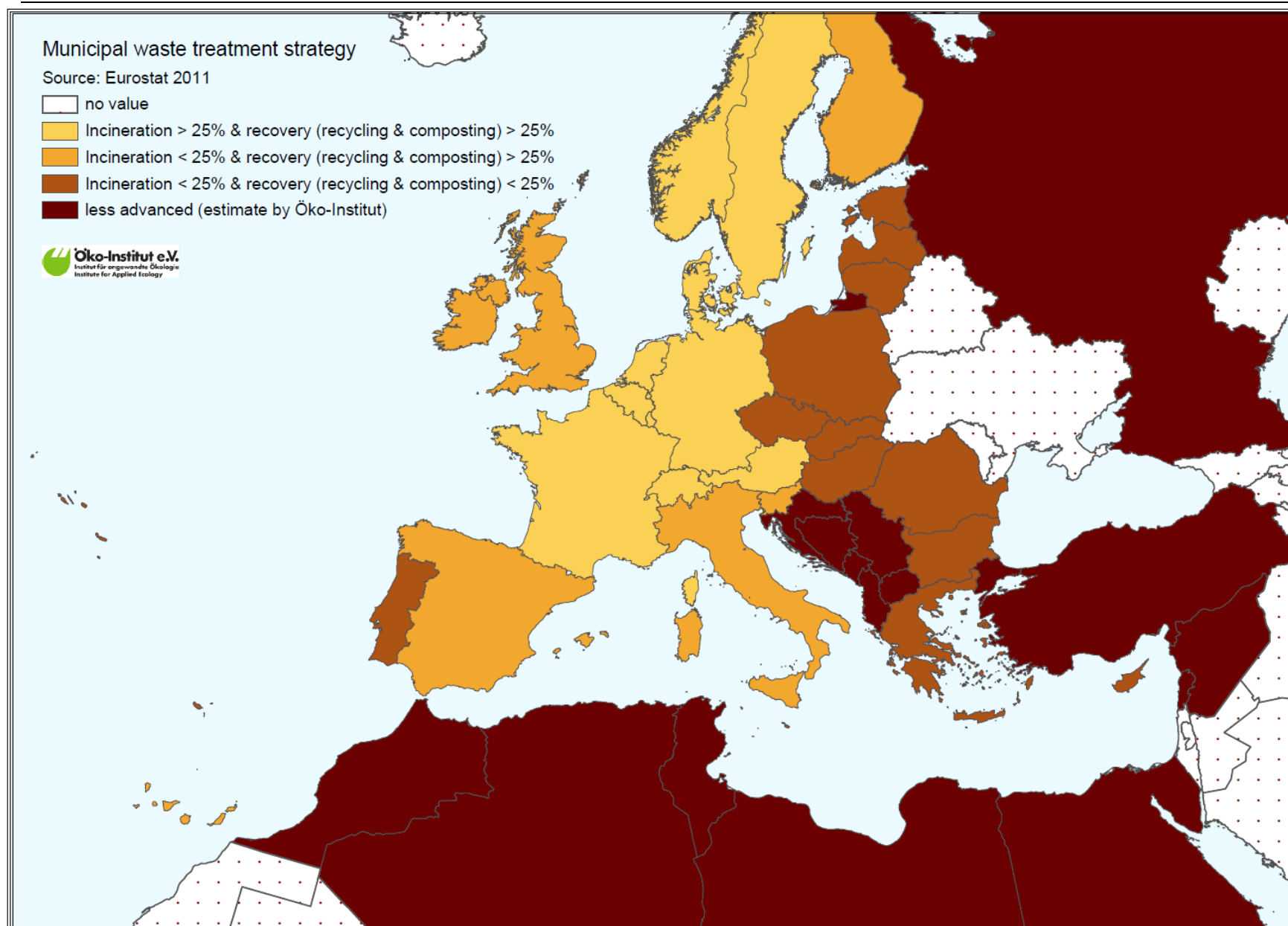
# PRESSURE INDICATORS FOR LSL



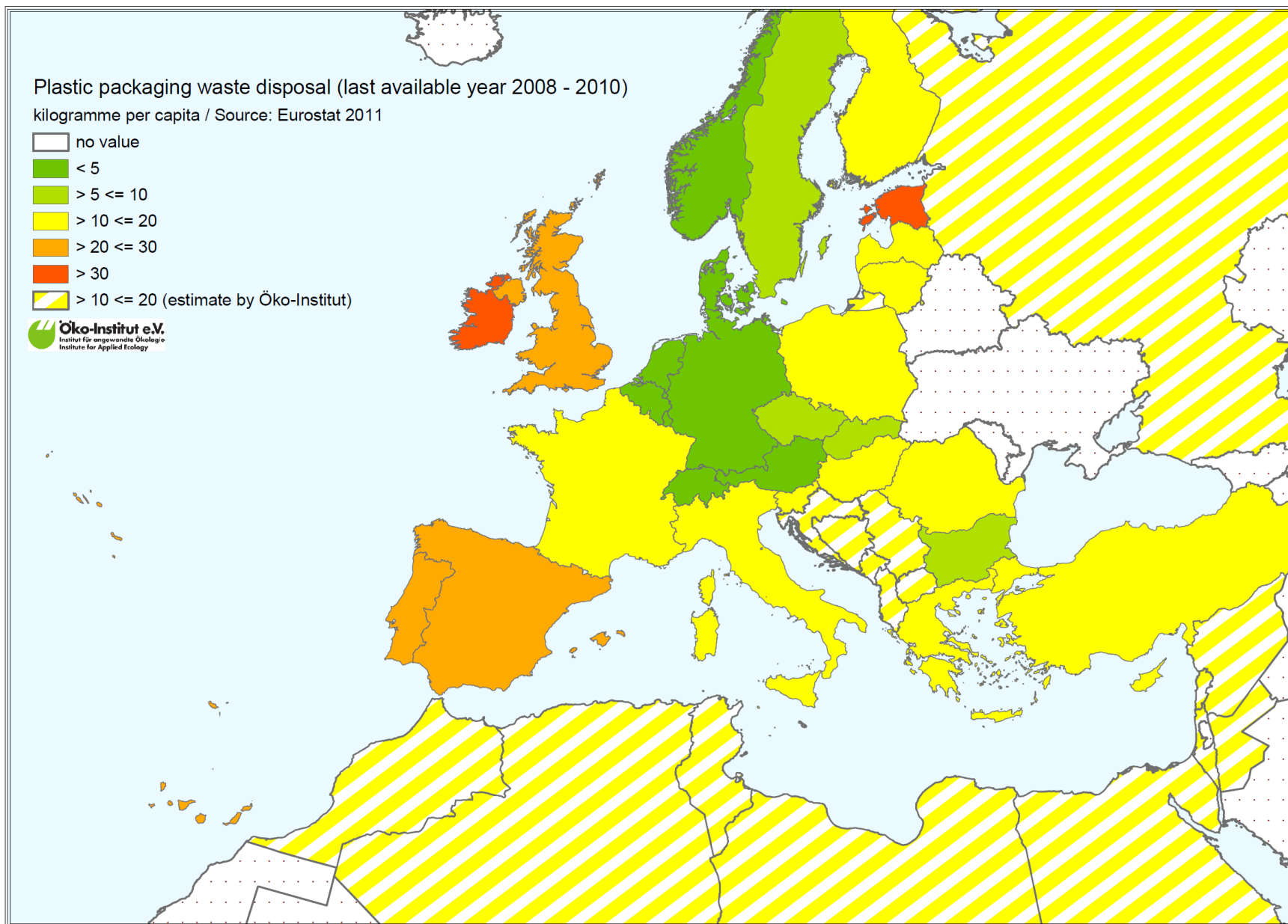
# PRESSURE INDICATORS FOR LSL



# PRESSURE INDICATORS FOR LSL



# PRESSURE INDICATORS FOR LSL



## Regional differences for the three seas

	Baltic Sea	North Sea	Mediterranean Sea
Coastline (km)	37 043	13 144	55 629
Volume (km <sup>3</sup> )	21 547	94 000	3 700 000
Average depth (m)	53	125	ca. 1500
Surface (km <sup>2</sup> )	374 000	750 000	2 500 000
Inhabitants in catchment area	85 million	184 million	460 million
People in the administrative area* bordering directly to the shore	27 million	26 million	77 million
Nights spent by residents and non-residents in tourist accommodations in the administrative area** bordering the shore	128 million	136 million	>650 million
Load and unloaded freight (Million tonnes) at ports	636	987	>1100

\* NUTS 3

\*\* NUTS 2

- Population density, tourism activity and activities at ports are, in relation to the length of the shore, at the lowest level for the Baltic Sea.
- The North Sea has the highest level (in relation to the shore) of the economic activities at ports.
- The Mediterranean Sea has the highest pressure from inhabitants and tourism compared to the other two seas.
- Waste management (and WWT) around the Mediterranean Sea is less developed, the same applies for plastic waste disposal.
- High population density and high level of tourism in combination with less developed utility services and a relevant level of plastic (packaging) waste indicate high risk for LSL.

**Thank you for your attention!**

**Download of the full report:**

<http://www>

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# Possible pressure indicator for the risk of pollution with SSL

- This study doesn't cover impacts and sources for SSL
- Similar systematic might be developed for SSL considering issues as
  - Marine traffic of freight, ferry boats, cruise ships;
  - Fishing activities;
  - Off-shore activities and constructions (e.g. oil platform / wind farms);
  - Type of waste services for vessels at ports.

## Outlook on Behaviour Aspects and Trends

### ➤ Phenomenon Littering

### ➤ Trends

- **Economic growth** have impacts across areas of society (e.g. economic fortune and prosperity, poverty, government debt, environmental impacts, etc.).
- **Demographic characteristics** (e.g. demographic differences between the European countries or household structure)
- **Tourism** (e.g. increase short trips)
- **Major events** (competition between the performance of the metropolitan regions)
- Biodegradable plastics and bio-based plastics
- Consumer trends
  - ✓ Increase in convenience products and take away
  - ✓ Increase in online-trading resulting to more packaging materials

## Main causative factors of littering behaviours

- Pedestrians drop garbage in the street or rivers
- Passing motorists discard garbage out of windows;
- Litter is thrown at a bin, it misses the bin and the person walks away;
- On arriving at a place where others have littered, waste is swept onto the ground;
- Litter is left and the person slowly moves away from it;
- Litter is buried, often under sand at the beach;
- Disposable mentality, relying that the garbage is collected.

## Structure of stakeholders

- **Organisations, activities and Institutions**
  - International Organisations
  - Global activities
  - Regional Institutions
  - Regional activities
- **EU COM & Riparian States & National Governments**
- **Plastic Industry**
- **Facilities and construction**
  - Industrial or manufacturing sites
  - Construction and demolition sites
  - Fishing industry activities
  - Harbours
  - Ship-breaking yard
  - Agriculture activities
- **Individuals**
  - Littering in general (inland and coastal)
  - Tourism (recreational visitors to the coast)
  - Events

## Example of identifying stakeholders

II			
No.α	Stakeholdersα	Websiteα	Commentsα
Aα Organisations, activities and Institutionsα			
A1α International Organisationsα			
A1.1α	United Nations Convention on the Law of the Sea (UNCLOS) and General Assembly (GA) -- Division for Ocean Affairs and the Law of the Seaα	<a href="http://www.un.org/Depts/los/index.htm">http://www.un.org/Depts/los/index.htm</a> α	Advices, studies, assists and researches on the implementation of the UNCLOSα
A1.2α	UNEP, Regional Sea Programsα	<a href="http://www.unep.org/regionalseas/">http://www.unep.org/regionalseas/</a> α	Aims to address the accelerating degradation of the world's oceans and coastal areas through the sustainable management and use of the marine and coastal environmentα
A1.3α	International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and Annex Vα	<a href="http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx">http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx</a> α	Main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes pollution by shipsα
A1.4α	London Convention 1972, Convention on the Prevention of Maritime Pollution by Dumping of Wastes and Other Matterα	<a href="http://www.imo.org/About/Conventions/ListOfConventions/Pages/Convention-on-the-Prevention-of-Marine-Pollution-by-Dumping-of-Wastes-and-Other-Matter.aspx">http://www.imo.org/About/Conventions/ListOfConventions/Pages/Convention-on-the-Prevention-of-Marine-Pollution-by-Dumping-of-Wastes-and-Other-Matter.aspx</a> α	Prohibits the dumping of certain hazardous materialsα
A1.5α	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposalα	<a href="http://www.basel.int/">http://www.basel.int/</a> α	Aims to protect human health and the environment against the adverse effects of hazardous wastes.α
A1.6α	FAO Code of Conduct for Responsible Fisheriesα	<a href="http://www.fao.org/docrep/005/v9878e/v9878e00.htm">http://www.fao.org/docrep/005/v9878e/v9878e00.htm</a> α	Sets out principles and international standards of behaviour for responsible practices to ensure effective conservation, management and development of ecosystems and biodiversityα
A1.7α	Convention on Biological Diversityα	<a href="http://www.cbd.int/convention/">http://www.cbd.int/convention/</a> α	Aims to recognize that biological diversity also includes populations needs and a clean and healthy environment to inhabitα

## 90 References available electronically (CD ROM)

#	Acronym	Title	Author	Date	Classification	Web-source
01	Aliani-2003	Floating debris in the Ligurian Sea, north-western Mediterranean	Aliani, S., Griffa, A., & Molcard, A.	Jun-05	Scientific-Paper	<a href="http://www.sciencedirect.com/science/article/pii/S0025326X03001929">http://www.sciencedirect.com/science/article/pii/S0025326X03001929</a>
02	Aquatic-2009	Recommendations for a coordinated plan to reduce litter in inland waters, ports, on coastlines and in the ocean	Grenelle de l'Environnement	2009	Report	<a href="http://www.robindesbois.org/english/Aquatic_litter_rdb.pdf">http://www.robindesbois.org/english/Aquatic_litter_rdb.pdf</a>
03	AUS-2011	Litter facts and impacts	Australian government	2011	Brochure	<a href="http://trashmyad.com.au/upload/documents/LitterFactsAndImpacts.pdf">http://trashmyad.com.au/upload/documents/LitterFactsAndImpacts.pdf</a>
04	Barnes-2005	Drifting plastic and its consequences for sessile organism dispersal in the Atlantic Ocean	D. K. A. Barnes and P. Milner	2005	Journal-Paper	<a href="http://www.springerlink.com/content/n1m1xr1wtwrgynqg/">http://www.springerlink.com/content/n1m1xr1wtwrgynqg/</a>
05	Barnes-2009	Accumulation and fragmentation of plastics debris in global environments	David K. A. Barnes, Francois Galgani, Richard C. Thompson and Morton Barlaz	2009	Scientific-Paper	<a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2873009/">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2873009/</a>
06	Bennet-2010	Marine litter: 'continents' of rubbish	Bennett, Oliver	Jul-10	Scientific-Paper	<a href="http://www.parliament.uk/briefing-papers/SN05622">http://www.parliament.uk/briefing-papers/SN05622</a>
07	BIOIS/AEA-2011	Plastic waste in the environment -- Revised version	Shailendra Mudgal, Lorcan Lyons, Jonathan Bain, Débora Dias, Thibault Faninger, et al	Apr-11	Research-Report	<a href="http://ec.europa.eu/environment/waste/studies/pdf/plastics.pdf">http://ec.europa.eu/environment/waste/studies/pdf/plastics.pdf</a>
08	Bundestag-2010	Plastikmüll in den Weltmeeren	Deutsche Bundestag (Vfr.: Dipl.-Chem. Susanne Donner und Dipl.-Biol. Angela Winter)	Nov-10	Presentation	<a href="http://www.bundestag.de/dokumente/analysen/2010/Plastikmuell.pdf">http://www.bundestag.de/dokumente/analysen/2010/Plastikmuell.pdf</a>
09	Consultic-2011	Post-Consumer Plastic Waste Management in European Countries 2010 - EU-27 + 2 Countries -- Final Report 2011 - September	CONSULTIC MARKETING & INDUSTRIEBERATUNG GMBH	2011	Report	n.A.
10	Derraik-2002	The pollution of the marine environment by plastic debris: a review	Jose G.B. Derraik	2002	Scientific-Paper	<a href="http://www.vliz.be/imisdocs/publications/99637.pdf">www.vliz.be/imisdocs/publications/99637.pdf</a>

## Further internet libraries

Website	Comments
<a href="http://dinrac.nowpap.org/MarineLitter.php?page=marine_litter_references">http://dinrac.nowpap.org/MarineLitter.php?page=marine_litter_references</a>	Reference materials listed here contain several categories such as NOWPAP (North-West-Pacific Action Plan) workshop proceedings, leaflets, sectoral guidelines for shipping, fishing and tourism, general information on marine litter including legal aspects, public education, marine litter monitoring and port reception ties
<a href="http://www.plasticdebris.org/bibliography.html">http://www.plasticdebris.org/bibliography.html</a>	A bibliography of research related to debris and trash
<a href="http://www.globalgarbage.org/blog/index.php/books-and-reports/">http://www.globalgarbage.org/blog/index.php/books-and-reports/</a>	A bibliography (books, reports and guidelines) of research related to marine litter
<a href="http://marine-litter.gpa.unep.org/framework/region-4.htm">http://marine-litter.gpa.unep.org/framework/region-4.htm</a>	Global marine litter information
<a href="http://www.gesamp.org/publications">http://www.gesamp.org/publications</a>	The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection GESAMP produces a number of reports and documents annually
<a href="http://www.unep.org/regionalseas/marinelitter/publications/default.asp">http://www.unep.org/regionalseas/marinelitter/publications/default.asp</a> <a href="http://www.unep.org/regionalseas/marinelitter/other/default.asp">http://www.unep.org/regionalseas/marinelitter/other/default.asp</a> <a href="http://www.unep.org/regionalseas/marinelitter/other/cleanups/default.asp">http://www.unep.org/regionalseas/marinelitter/other/cleanups/default.asp</a>	UNEP Marine Litter Publications