

Microplastic Pollution: Microbeads in the context of plastic litter

A presentation to the joint committee on Housing, Planning & Local
Government

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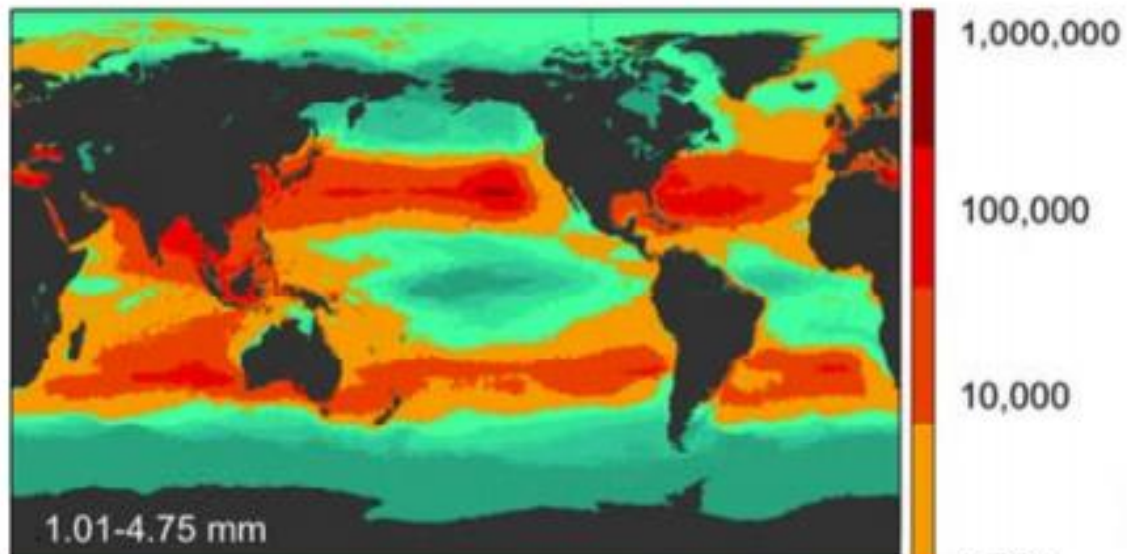
G7 Summit, June 2015 Plastic litter was referred to as a “Global challenge, directly affecting marine and coastal life and ecosystems and potentially human health”

- 10 percent of all plastics globally, either through mismanagement or littering, end up in the environment (Cole *et al.* 2011).



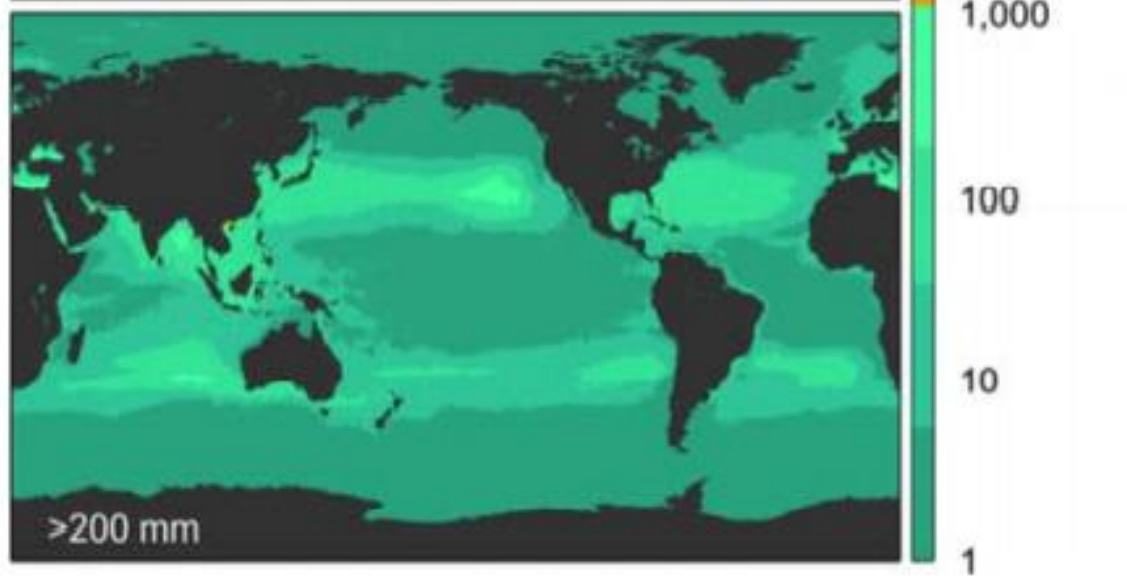
number of particles/items

Microplastics



Approximately 25 percent of the total mass of plastic debris estimated to be present in the North Atlantic subtropical gyre (Gouin *et al.* 2011)

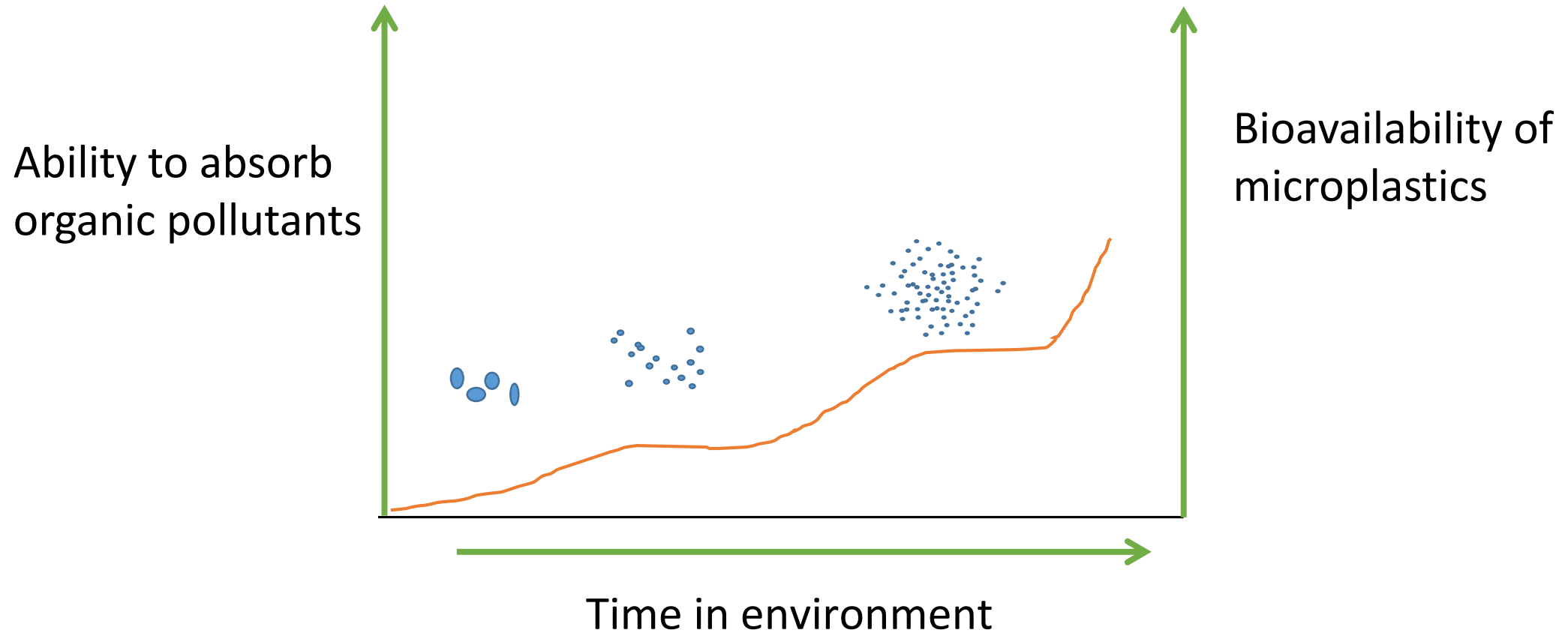
Macroplastics



Erikson et al, 2014

Microplastics- what they are and why the concern

- MPs absorb and release contaminants (e.g. PAHs and PCBs)
- Some plastics release chemical additives



Types of microplastics

Litter

Fragments



Machining

Fragments



Clothes washing

Fibres



Personal care

Microbeads



AstroTurf/ Roads

Fragments



Construction

Fragments



Recycling

Fragments



Converters

Nurdles



What Microplastics are found?

Fibres: 96 %

Fragments: 4%

Microbeads: 0.2 %

JPI BASEMAN, Galway Bay, 2015

Fibres: 38%

Fragments: 47%

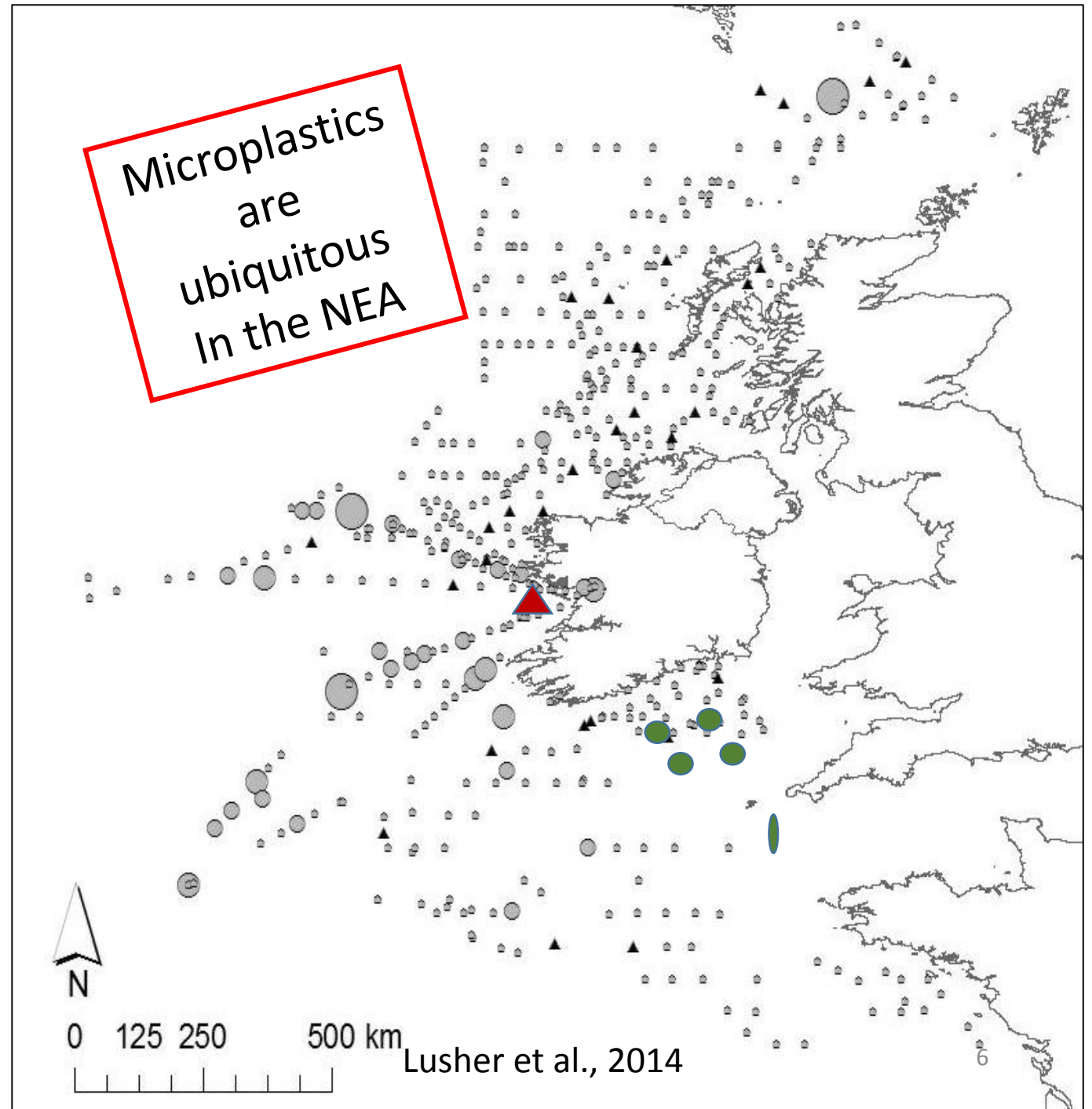
Microbeads: 4 %

JPI BASEMAN Fish stomachs, 2016

Fibres 89%

Fragments 1%

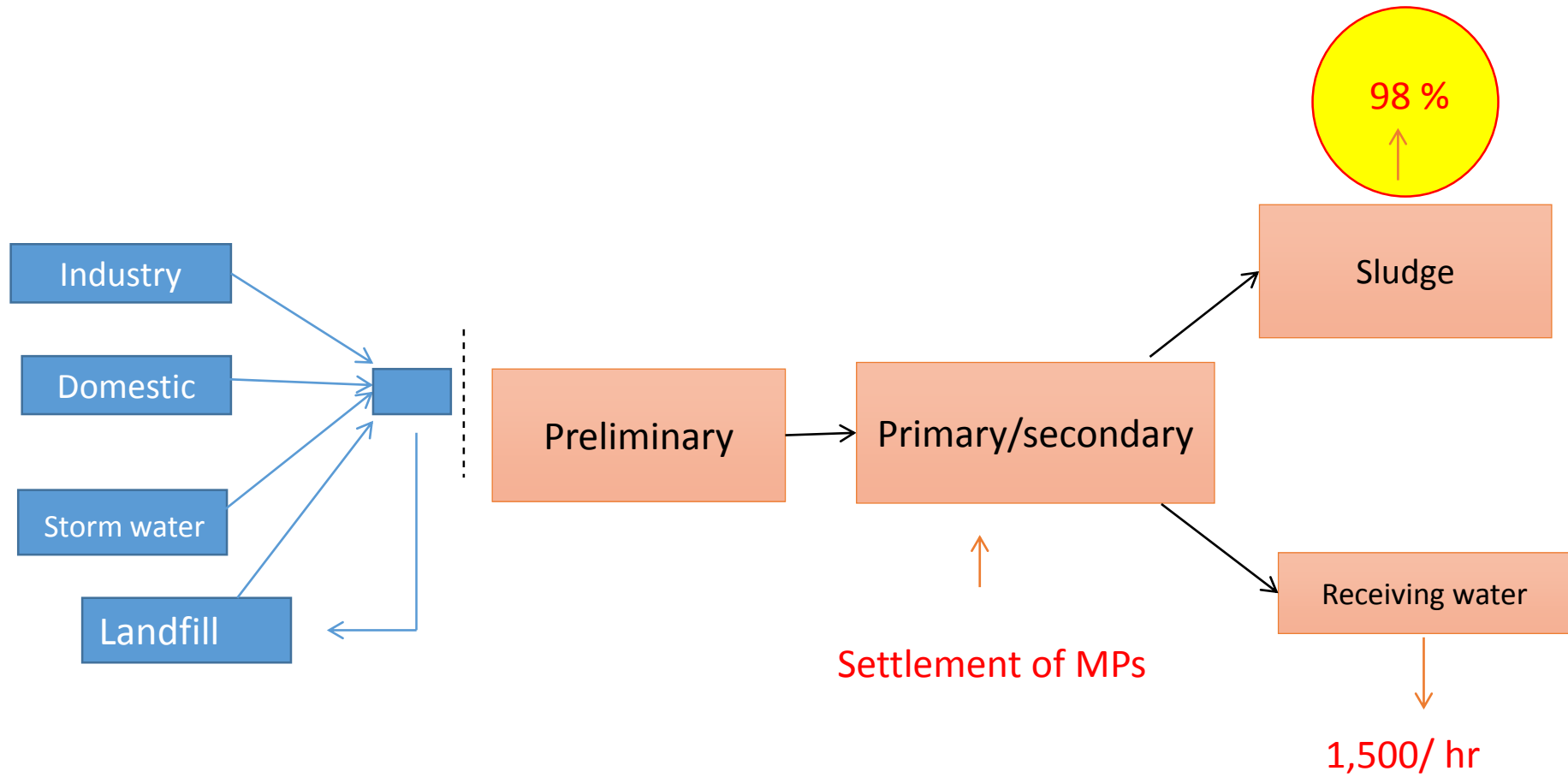
Film 10%



More microbeads in some freshwater studies

Study	Microbeads	Source
Rhine	58.4 %	Mani et al, 2015
The North Shore Channel, Chicago.	2.5%	McCormack et al., 2014
Manchester City Basin	33%- 77% (pre-post flooding)	Hurley et al., 2018

Urban Waste Water Treatment Plants (UWWTPs) are receptors for the cumulative loading of microplastics



Impacts of microplastics to biota

Mytilus edulis (edible blue mussel)



Inflammation- cross over to circulatory system (Brown *et al.*, 2008)

Common Gobi



Confusion with prey items
Reduced fitness affecting predatory performance,
Sá *et al.*, 2015

Short-tailed shearwater



Gut transfer of PBDE (polybrominated diphenyl ethers) flame retardants from plastic material to fatty tissue
Tanaka *et al.*, 2013

Microbeads used in personal care products

- **Composition:** Polyethylene, Polypropylene, Polystyrene polytetrafluoroethylene Polyester, Polyurethanes
- **Size range:** 2 μ m (toothpaste) and 1 240 μ m
- **Functions:** Exfoliants/abrasives (Leslie, 2014)
 - Bulking agents
 - Glitters
 - Sorptive phase for delivery of fragrance, vitamins, oils, moisturisers, insect repellents, sun filters and other active ingredients
- **Quantities:** A single cosmetic product can contain up to 95,000 microbeads (Napper et al. 2015)

Quantity of microbeads in products

Sector	Product types	Total EU tonnage of microplastics (tonnes/year)	Source
Personal care	Scrubs, toothpastes. etc.	1,254-1,834	DG Environment Report (2017)
Detergents	Soaps, detergents	190-200	DG Environment Report (2017)
Paints and coatings	Waterborne buildings and non-water borne buildings	22,220- 38,220	DG Environment Report (2017) Danish Environmental Protection Agency (2015)
Abrasives	Sandblasting	1,000-5,000	Danish Environmental Protection Agency (2015)

Source: DG Environment Report (2017)

Alternatives

Company	Alternatives
Colgate-Palmolive	Natural materials like Jojoba beads
Henkel	pumice • walnut shells • silica
Clarins	Cellulose
Unilever Group	apricot kernels, cornmeal, ground pumice, silica, walnut shells
Oriflame Cosmetics	poppy seeds, almond shells, silica and sugar

Source: DG Environment Report (2017)

Thank you

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