Knowledge Hub

OCEAN WISE — Reducing EPS marine litter in the North East Atlantic

Expanded and Extruded Polystyrene Products and Applications

Report | Summary

Executive Summary

Expanded and extruded polystyrene (EPS and XPS) are also known as foamed plastics and they are part of our lives in many ways. There is little information available about volumes and types of these plastics, so OceanWise has addressed this gap by compiling a comprehensive report and database on this topic.

This desktop-based research project used internet resources to gather data about EPS and XPS manufacturers and transformers, applications, products, and users. Articles from newspapers, catalogues, brochures, online journals, and papers from scientific, environmental, and other magazines were checked and country statistics were analysed. Key stakeholders at the national level in each of the focus countries were identified and contacted with requests for specific data and information.

In order to try to estimate the volumes produced and recycling rates, it was necessary to try and gather production data. However for the production companies this is commercially sensitive information, therefore, this task was very challenging. Large amounts of EPS and XPS are imported as packaging of products and there are no figures per country that quantify this.

The following pages summarise:

- How much EPS and XPS is manufactured.
- Information about who the main manufacturers are.
- The products EPS and XPS are used to generate.
- The key customers for those products.

Find the full report and database:

www.oceanwise-project.eu

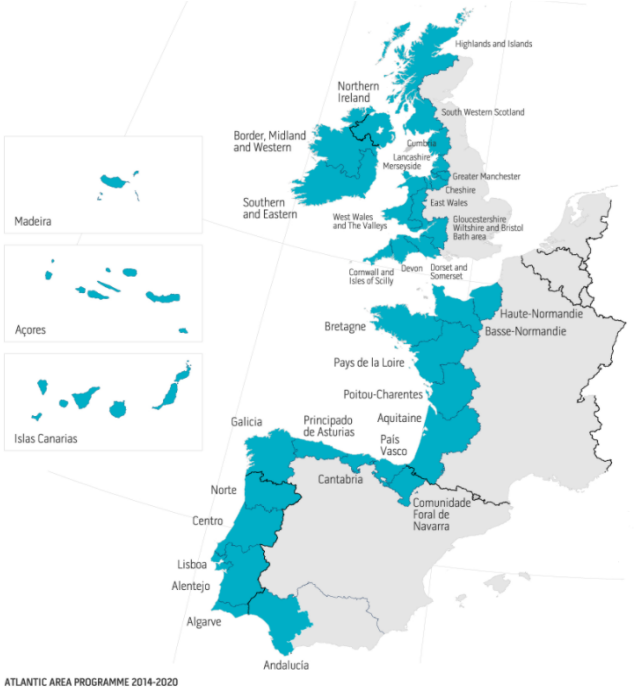

Figure 1: Map of countries participating in the OceanWise project

The OceanWise project covers the Atlantic Area which is shown in blue above. However, it is important to consider the movement of EPS and XPS for this action therefor, other EU countries were included.

Interreg Atlantic Area — European Regional Development Fund — EUROPEAN UNION

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Volumes Manufactured

In the EU (including the 28 members states, plus Norway & Switzerland) demand was about 51.2 million tonnes of plastics by converters in 2017. Going by resin type, EPS production demand was approximately 1.5 Mt, or about 2.93 % of overall demand. Polystyrene (PS) demand was approximately 3.7 %, or 1.9 Mt (this figure includes PS for the production of XPS)[1].

There are very wide variations in plastic production between the focus countries*, with Germany and Italy between them accounting for more than 38 % of all EU plastics demand.

A Plastics*Europe* Conversion report for European Manufactures of Expanded Polystyrene (EUMEPS) estimated the demand in Europe for EPS to be approximately 1,499 kilotonnes in 2017, which was an increase of 5.7 % on the previous year.

Table 1: EPS production demand in six of the focus countries

Country	Plastics Demand - Tonnes	EPS Production Demand - Tonnes	EPS Production Demand as % of overall Plastics Demand
Germany	12,600,000	315,000	2.50
France	4,920,000	152,000	3.09
Spain	3,940,000	42,793	1.19
Nether-lands	1,950,000	62,500	3.21
Denmark	770,000	30,000	3.90
UK	3,740,000	45,000	1.20

Figure 2: Graph - EPS demand in Europe 2017 by sector[2]

Knowledge Gaps

- A lot of the information has been difficult to acquire as it is commercially sensitive.
- There is not currently information available for each country or each material (EPS and XPS).
- It was not possible to gather any data on the quantity of XPS produced specifically. Databases available generally include XPS in overall polystyrene production.

Packaging

EPS packaging demand in Europe = 300 kilotonnes[3]

EPS waste packaging generated in Europe = 388 kilotonnes[3]

Suggests 88 kilotonnes of EPS packaging are imported into Europe annually

The Plastics*Europe* Plastic Facts 2018 report indicates that the demand for XPS packaging is approximately 60,000 tonnes annually in the EU.

Remember that EPS and XPS are mostly made out of air (98%) so whilst most figures available are by weights, it is more important to consider the volumes.

*Belgium, Denmark, France, Germany, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom (UK).

1. Plastics – the Facts 2018, An Analysis of European plastics production, demand and waste data. Published

2. Conversion report for PlasticsEurope, 2017 by Plastics*Europe* and EPRO, January 2019.

3. Conversion / Plastics*Europe* 2018, report for EUMEPS, "Post-Consumer PS and EPS/ XPS Plastics Waste"

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Manufacturers

EPS manufacturers and transformers are represented at EU level by EUMEPS, the Association for the European Manufacturers of Expanded Polystyrene. There are 23 national associations of EPS in Europe, which represent local EPS convertors, raw material and additive supplier, recyclers, and machinery providers. The organisation says it represents around 1,000 companies, most of them small and medium-sized enterprises (SMEs), which concurs with the research carried out of manufacturers across the focus countries.

Italy, with by far the largest number of EPS manufacturers of the listed countries, produces about 40% of the EPS packaging used in the EU[4].

According to Tridge[5], four of the 14 focus countries feature in the top ten exporters globally of Polystyrene, expansible in primary forms (which would include EPS and XPS but does not give a breakdown).

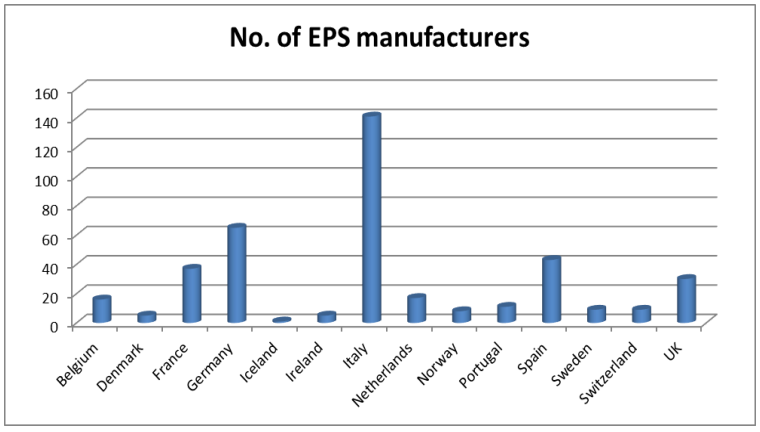
⇒ Germany is the top exporter, with a value of USD$496M (2016), giving it a global market share of more than 15 %.

⇒ The Netherlands is the number three exporter, with its Polystyrene exports valued at more than USD$340M, a 10 % market share.

⇒ France is ranked number five, at 5.6 % market share, valued at USD$180M.

⇒ Belgium comes in at number 7, with exports valued at more than USD$138M and market share of 4.3 %.

Figure 3: No. of EPS manufactures/transformers in focus countries



4. Figure provided by EUMEPS (Association for European Manufacturers of Expanded Polystyrene)

5. Tridge, Polystyrene, expansible in primary forms, available at: https://www.tridge.com/hs-codes/390311-styrene-polymers-expansible-polystyrene-in-primary-forms Accessed 02 May 2019

Manufacturers Database

A full database of EPS and XPS manufacturers and transformers, across the countries studied, has been compiled, and lists the locations of the sites and the types produced.

399 EPS manufacturers and 36 XPS manufacturers are listed.

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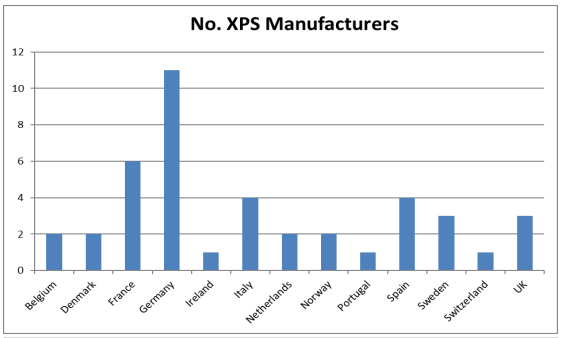
XPS manufacturers and transformers are represented at EU level by EXIBA, the Extruded Polystyrene Insulation Board Association. Membership consists of the major companies producing XPS across Europe. Their website states that there are approximately 40 manufacturing sites in Europe, making it a much more specialised product in a sense, than EPS. The organisation however, appears to represent those companies producing XPS for insulation purposes only; there are other uses for XPS, primarily in the takeaway/ disposable food container sector.

Figure 4: No. of XPS manufactures/transformers in focus countries



Concerns

Several EPS/ XPS manufacturers and other industries have concerns regarding policy measures being considered to reduce the use of EPS and XPS.

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EPS Applications

The number of different applications for EPS is significant, mainly due to its wide-ranging properties. The applications it is currently used for can be grouped under four main headings:

1. Construction

In the construction industry the main uses are in home insulation, noise/acoustic instillation, foundations, infrastructure, and building facade. In all cases of EPS used for construction there is a minimal risk of the EPS becoming marine litter, as the EPS is buried underground or in the fabric of buildings.

2. Packaging

EPS is popular for packaging as it is relatively cheap, protects items during transit, is lightweight, stabilises temperature, and doesn't leak. The main sectors where EPS is used in packaging are electronic goods, white good, E-Commerce, pharmaceuticals, and fruit, vegetables, fish and seafood production.

3. Component

EPS is commonly used as a component part in other items. The industries where this is most commonly found in the automotive industry and in consumer goods.

4. Products

This refers to EPS found in disposable products, customisable products, and other items. Examples of disposable products include EPS cups and takeaway food containers**.** The Single-Use Plastics Directive is designed to curtail the availability and sale of such products from 2021 onwards, however, EPS is the only material specified (XPS is not referenced in the text of the Directive).

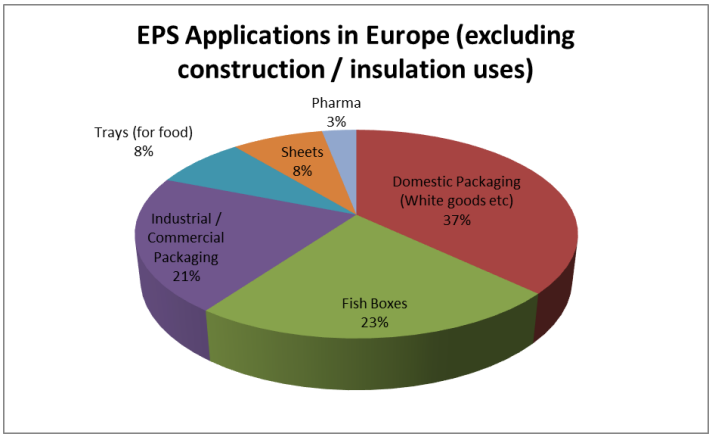

Figure 4: Percentage of EPS used for non-construction related applications.

EPS and XPS Disposal

- Larger operators are likely to have sufficient volumes of EPS to arrange good waste management practices or onsite recycling. It is smaller operators that may struggle to manage the EPS they collect.
- Disposable food containers are one of the Top 10 most common plastic items found on European beaches, per the European Commission publication[6].

XPS Applications

Primary demand for XPS is for use in the insulation and construction industries, with a percentage required for packaging and takeaway food containers.

The range of uses of XPS in construction is similar to that of EPS.

The types of take away food containers made of XPS are often referred to as clam-shell containers. Unlike the similar EPS takeaway food containers, these are not included in the Single-Use Plastic Directive.

EPS is 98 % air which make it attractive for packaging, but it becomes a distinct disadvantage once it has been used, as the air content makes little sense to transport once EPS is a waste product.

6. European Commission, Luxembourg 2018 "Changing the way we use plastics". Available here: https://publications.europa.eu/en/publication-detail/-/publication/e6f102e3-0bb9-11e8-966a-01aa75ed71a1/language-en/format-PDF Accessed 09 April 2019.

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Key Customers

As both EPS and XPS are used across a large range of applications, the array of users is also extremely diverse, ranging from construction and engineering companies, insulation installers, fish processors and fruit traders, seed and plant growers, electrical and electronic goods manufacturers, wholesalers and retailers, car manufacturers, fresh food markets, supermarket operators, takeaway food outlets, surf-board manufacturers, apiaries, and those listed above have found a myriad of uses for these materials.

As EPS and XPS move along the supply chain to their end use, it is also clear that those items, whose final destination is the consumer, are at a higher risk of becoming marine litter than the products supplied to and used by businesses.

Lack of Holistic Thinking

Many organisations using EPS/XPS do not have the data relating to EPS/XPS use and management, and/or that the materials used in their packaging were neither an area of focus or nor viewed as a priority. The organisations surveyed for EPS/XPS use were selected on the basis that they or their members may have had some input or insight into the use and management of EPS and XPS. There seemed to be a general attitude that managing packaging, in some cases specifically EPS/XPS packaging, was in the remit of another organisation or industry body.

Scale is one of the biggest challenges when it comes to segregating waste for recycling, and particularly for EPS and XPS, given the lack of weight of the materials. Too small a volume can mean it's often not viable to collect, compact and recycle both EPS and XPS.

Industry Concerns

Following industry consultation, it is clear that there are concerns about a knee-jerk reaction to the problem of plastics pollution in the marine environment. The Single-Use Plastics Directive specifically mentions expanded polystyrene. This material is, theoretically, 100% recyclable, many working in the area of plastics manufacture, transformation, recovery and recycling believe that improvements to the recycling infrastructure, particularly on the consumer side, would be the most practical way of stemming the flow of EPS and XPS products into the ocean. Replacing one polluting material with another, which may or not be recyclable, is not, in their view, a solution.

Other key findings

Many companies are committed to making their supply chains more sustainable, but do not appear to be including improved waste management of EPS and XPS in their deliberations.
There are a large number of projects aimed at tackling marine litter, but lack of coordination between them to identify possible synergies.
At both national and EU levels, there is a lack of communication between stakeholder organisations with aligned objectives.