Policy brief
EPS/XPS in buoys, floats and docks

Looking for solutions to both professional and recreational uses

Baltic Marine Environment Protection Commission

The problem

Littering of expanded plastics, especially in the form of expanded polystyrene (EPS) and extruded polystyrene (XPS), is a growing environmental concern due to the unique set of properties of these materials and the frequency in which they are found during beach litter clean-up operations and monitoring. Due to the low density of EPS/XPS and other foamed plastics as compared to other plastics, it is expected that a high share of these types of plastics ends up on the beaches.

In addition, due to its buoyancy, when released to the aquatic environment. EPS/XPS is easily transported over long distances by rivers and sea currents. EPS/XPS is, like other common plastic types, practically non-biodegradable, but due to the foam structure, easily fragmented into increasingly smaller pieces, leading to large numbers of EPS/XPS particles. EPS/XPS is non-toxic as a material; however, marine feeding organisms such as birds may mistake the EPS/XPS particles for food items and ingestion may result in malnutrition etc. Also, additives to the EPS/XPS foam as well as styrene oligomers may be released through fragmentation and thereby potentially causing harm in the environment.

In practice, two types of polystyrene foam are used[1]: expanded (EPS) and extruded (XPS). As the environmental fate and possible effects of the two types are similar, no distinction will be made between them.

EPS/XPS foams are called many things by the public (tradenames), where the most common used ones are Flamingo and Styropor. Other commonly used names are Sunpor, Jackopor and Air-pop.

1 Please note that only products used nearby or at the marine environment are addressed in this policy brief. Products used elsewhere could also be an important source in some areas e.g. riverine transport, wind etc., but these sources are not addressed here.

Articles made of EPS/XPS are produced from expandable polystyrene (PS) which is expanded during production of articles. The final EPS consists approximately of 98% air and 2% polystyrene. The particles do not sink in water and can therefore be transported over long distances and end up on the beaches or being ingested by biota.

The most important uses of EPS/XPS in Europe are in construction and packaging with around 70% of EPS/XPS produced in Europe used in this category, 25% is used in packaging and the rest in other products. It is to be noted that these data are pre-covid figures, thus, they might have changed. The fraction used in construction was in even reported higher for some HELCOM countries. And these fractions do not cover the use in imported articles.

Actual uses in the marine environment with high risk of release to the sea, and which this policy brief addresses, is limited to a relatively small amounts of types of products bearing in mind that the numbers of the specific individual products can be very high.

Among the uses are buoys of different types for e.g. flag buoys and fishing nets, floats for marinas, aquaculture, barriers for e.g. swimming areas. For aquaculture and pontoons for marinas and jetties, the EPS is typically, but not always, covered with rigid plastics or concrete and releases to the sea from these sources may therefore be small.

Floats for fishing nets are usually not made from EPS. It is more common to use air-filled floats made from co-polymeric polypropylene or PVC, floats of EVA foams or, on some float lines, the buoyancy is provided by a core of small polyethylene floats. EPS was more common 20 years ago. It might be that EPS is not currently used for this application, but if this is true for imported products is not known.

Angling equipment is another use, and in this sector, there are many types and the numbers of floaters are estimated to be quite high.

Most of the sea-based sources of EPS/XPS originate from wear and tear, insufficient mooring or deliberate/accidental losses, not just on ships but also in e.g. harbours when handling the products.

Prevention can in general be achieved through better design and maintenance of products, including prevention of escaping/losses of the products, robust covering of materials and products; raising awareness to fishermen, both commercial and recreational, marinas and boat-owners on how to handle or replace these products; legal requirements and/or economic incentives could also promote the use of other more environmental friendly products which might be more expensive (e.g. coated vs noncoated products). A careful selection of other materials can be a way forward as long as the alternatives do not contain e.g. higher loads of or other more problematic chemicals.

Restrictions seem not to be in place in any HELCOM country.

Alternative materials for buoys can be PE (polyethylene). It also seems that, depending on the actual use, alternatives are used. Some of the alternative products to EPS/XPS buoys are made of soft PVC and thereby can cause challenges in the waste handling systems as well as the possible use of certain chemicals. For EPS used as flag buoys, which are a main use of this type of material, there are alternatives available on the market.

Aquaculture: According to producers and suppliers of EPS floats for nets, these floats are not used in aquaculture in the Baltic Sea region. Cages are usually made with pipe buoys made of HDPE (high density polyethylene) or MDPE (medium density polypropylene).

Fish boxes of EPS/XPS have been commonly used for many years, as they provide good insulation being, at the same time, easy to handle. Direct use of the fish boxes at sea is limited. However, some small fishing vessels still use EPS fish boxes because of their insufficient cooling conditions onboard.

For hygienic reasons, EPS fish boxes are non-reusable; fish boxes and their service life therefore tend to be very short. Best practice in many countries is to rinse the boxes, compact them into blocks and send them for recycling into other types of products, mainly insulation. They are more commonly used in transportation on land, but may be used close to or at harbours. The potential pathways for direct releases of EPS from fish boxes to the sea are: 1) small pieces broken from boxes by transport before and after the boxes are filled with fish; 2) Small pieces broken from fish boxes temporarily stored in containers or cage boxes close to harbours before disposal; 3) fish boxes accidently lost to the sea.

Hard fish boxes have been on the market for a long time and used both on ships and in harbours and for transportation. In some countries there are take-back schemes in place covering more than one country. Another alternative to fish boxes made of EPS is a cardboard-like box based on wood fiber.

Key messages

Policy options to reduce balloon and confetti litter in the Baltic Sea.

Buoys, floats and pontoons made of EPS/XPS used in the water are to be encapsulated. The covering layer could be hard PS, metal, concrete etc., depending on the purpose and use of the product. Legal actions or economic incentives alongside with information campaigns and voluntary agreements with producers/importers could be considered to support the implementation of this action.

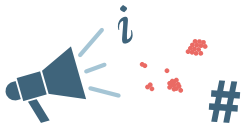
Products, and in particular floats, used by anglers should be covered by a protective layer. Information campaigns could assist in reaching this user group, as internet trade is common for this application.

EPS floats replacement with alternative materials could potentially remove the major releases from fisheries in the long term. As alternative materials are not readily available for all applications, promotion of innovation and development of better alternatives is to be encouraged.

Replacement of EPS/XPS used in pontoons. Floating pontoons can be made of e.g. polyethylene with air-filled chambers.

Promote the use of fish boxes made of alternative materials to EPS, such as hard plastic or wood fiber . These materials are to be part of a take-back scheme in order to secure reuse (or at least recycling) as much as possible.

Improved collection, handling and temporary storing of fish boxes made of EPS/XPS at fishing harbours.



Information campaigns directed to the fishing sector, both professionals and recreational fishers, pointing at the release of small EPS/XPS particles from tear from non-encapsulated and older buoys and other products used.

Further information

- Lassen, C., Warming, M., Kjølholt, J., Geest Jakobsen, L., Vrubliauskiene, N., Novichkov, B., Strand, J., Feld, L., Bach, L., Survey of polystyrene foam (EPS and XPS) in the Baltic Sea, Danish Fisheries Agency / Ministry of Environment and Food of Denmark, COWI A/S, 2019. https://www.helcom.fi/wp-content/uploads/2019/10/Survey-of-polystyrene-foam-EPS-and-XPS-in-the-Baltic-Sea.pdf
- Measures to reduce littering of EPS. Mapping of production, use, recycling and disposal of expanded plastics in Norway, and evaluation of measures to reduce risk of littering from expanded polystyrene. Norwegian Environment Agency, 2022. https://salt.nu/assets/projects/M2189-1650544348.pdf
- OceanWise Project Reports: https://www.oceanwise-project.eu/project-reports/