Polystyrene Fish Boxes

Expanded Polystyrene (EPS) and Extruded Polystyrene (XPS) are often used to make the boxes used to transport fish products due to their ability to protect produce from impact damage, thermal protection to keep fish cool and its low cost and weight, making it cheap to buy and transport. In addition, neither material absorb scents and can be easily washed for reuse and recycling, making it the preferred option for many suppliers to package their fish.

Given the beneficial properties listed above, EPS and XPS are both approved food contact materials, and as a result are regularly used for food transportation. In the UK alone, 22 million[1] fish boxes are used each year to transport the UK's wild caught and farmed fish to the restaurants we eat in and the supermarkets we shop at.

Diving Deeper: Are EPS and XPS too good to be true?

Whilst EPS and XPS have a number of practical benefits, the environmental issues that they present are evident throughout their production, use and disposal.

In 2018, the total global oil consumption stood at 99.2 million[2] barrels each day. With 0.01%[3] of this oil (just under 10,000 barrels) going directly on the production of polystyrene products, it has a very significant climate and environmental impact.

In addition, the US National Research Council's 2011 National Toxicology Program confirmed that styrene, the precursor of polystyrene, was "reasonably anticipated to be a human carcinogen"[4], and therefore a potential occupational health hazard. Studies have shown that styrene can leach out of products into the food and drink they contain and as both EPS and XPS contain styrene, this presents an additional hazard to human health [5].

After use, polystyrene has an environmental impact as a major component of terrestrial and marine litter. Surveys conducted by the Marine Conservation Society highlight that it is a consistent component of coastal litter[6], with an average of 182.6 pieces of plastic or polystyrene turning up on every 100m of beach surveyed. Finally, a further concern surrounds the number of compounds and chemicals which

[1] http://www.eps.co.uk/adayinthelifeofafishbox/index.html
[2] https://www.statista.com/statistics/271823/daily-global-crude-oil-demand-since-2006/
[3] https://www.bpf.co.uk/plastipedia/polymers/expanded-and-extruded-polystyrene-eps-xps.aspx
[4] National Toxicology Program, Department of Health and Human Services: Report on Carcinogens, Fourteenth Edition. https://ntp.niehs.nih.gov/ntp/roc/content/profiles/styrene.pdf
[5] Yanagiba, Y., Ito, Y., Yamanoshita, O. & Nakajima, T. (2008) Styrene trimer may increase thyroid hormone levels via down-regulation of the Aryl hydrocarbon Receptor (AhR) target gene UDP-glucuronosyltransferase. *Environmental Health Perspectives*, **116**, 740-745.
[6] Marine Conservation society, 25th Great British Beach Clean 2018 Report

are incorporated during production as these can enter the environment either by leaching or through degradation of the material[7] [8].

Alternatives

To limit the negative impacts to our natural environmental and health, there are some alternative materials or processes that can be implemented. A selection of potential solutions from around the world are outlined below.

Reusable

As highlighted above, most of the negative impacts come from both the production and disposal of expanded polystyrene due to the use fossil fuels and leaching of chemicals in landfill. Therefore, where facilities are available, some companies are prioritising washing and reusing boxes, made from either polystyrene or hard plastics, to keep them in the supply chain and increase and improve their resource efficiency.

UK retailers, **Sainsbury's and M&S**, have worked with their farmed Scottish salmon producers, **Mowi Scotland and Scottish Sea Farms** respectively, to embed a system of reusable fish transportation boxes.

Compostable

Compostable packaging often uses raw and/or post-consumer natural materials. This means that such packaging can be disposed of with food waste and ultimately made into compost to be used on soils.

One US business, **Vericool Packaging**[9], has developed a product which meets industry standards allowing it to be disposed of in either a domestic composting or recycling waste stream. The company

[7] Manalac et al (2010) Leaching behaviour of sulfonated polystyrene (SPS) from recycled Styrofoam. *International Journal of Environmental Science and Development*, **1(4)**, 368-370.
[8] Rani et al (2014) Hexabromocyclododecane in polystyrene based consumer products: An evidence of unregulated use. *Chemosphere*, **110**.
[9] www.vericoolpackaging.com

works closely with its local state waste processors to ensure the facilities and infrastructure exist to process its packaging.

Recyclable

As a nation, the UK is familiar with recycling both its domestic and industry waste, recognising the benefits and ease of doing so. As a result, some companies feel that this is the best solution for limiting packaging waste. **Tri-pack's**[10] trademark product, **CoolSeal**, is specifically designed for cold chain transportation and all products are made with polypropylene which can be fully and easily recycled.

Aware of the environmental problems associated with polystyrene, Finnish fish company **Kalaneuvos**[11], packages their fish in corrugated board boxes. The wood fibre is sourced from renewable Finnish sites, is watertight and fully recyclable.

Responsibility

The producers, transporters and retailers of fish that are transported in polystyrene fish boxes are ultimately accountable for either disposing of the boxes responsibly, ensuring they are reused, or facilitating the use of alternative reusable/compostable/recyclable materials. Where single use materials are utilised this must be supported by appropriate collection and processing infrastructure. With a growing global awareness of the impact of single use plastic packaging on the environment, Fidra is asking companies to examine their use of polystyrene fish boxes and consider how fish and seafood can be contained in a more environmentally sustainable way.

Fidra's mission is to address specific environmental issues by developing pragmatic and proportionate responses through collaborative dialogue with the public, industry and government to ultimately achieve targeted and effective solutions. Fidra currently works on several projects relating to sustainable development and the environment, details of which are available on our website.

[10] www.tri-pack.co.uk

[11] http://www.kalaneuvos.fi