EPS Packaging

Sundolitt®

The Environmental Benefits of a Sustainable Packaging Solution

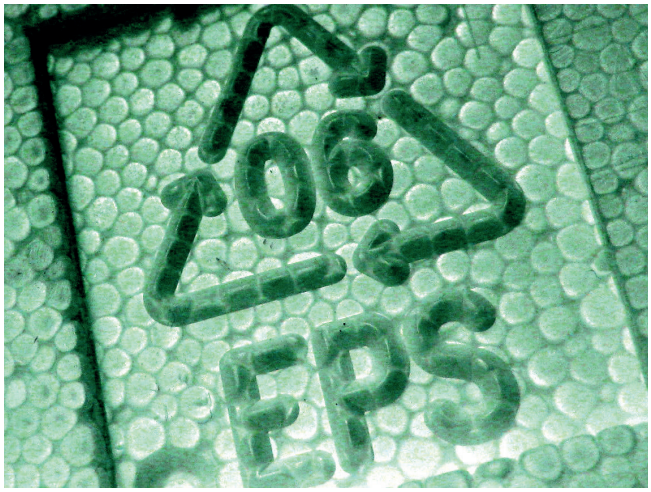
EPS packaging has been used for the transportation of fresh fish for decades across the UK and in Europe due to the material's inherent characteristics making it the most viable solution today. With high thermal performance, outstanding impact resistance, EPS offers a hygienic, safe and lightweight packaging solution that is waterproof and non-hygroscopic.

The features of EPS are well-documented and there is really no question that for the transportation of fresh fish the material out-performs other materials. This document outlines the environmental benefits of EPS and its use as a cost effective and sustainable fish box solution.

EPS – Environmental Benefits

Produced from completely inert gases, EPS has no chemical influence on the environment and does not contain CFCs or HCFCs. At 98% air, it is a resource-efficient packaging material with a small carbon footprint, offering a positive contribution to the environment at every stage of its life cycle. It is extremely lightweight, making it easy to handle and transport which ensures reduced fuel consumption when compared to the transportation of other heavier packaging materials.

EPS is inert and innocuous. It does not leach chemicals into the water system or gases into the air that could contribute to global warming.



EPS Manufacture – The Facts

EPS packaging has a significantly lower impact on the environment during production than cardboard products, in terms of atmospheric pollution, energy consumption, water pollution and global warming potential.

Low water use

EPS uses a significantly lower proportion of water in its manufacture than other packaging materials such as cardboard. The over-use of water in manufacturing processes can have significant impact on the natural environment leading to unstable ground conditions with streams and rivers running dry, affecting the local habitat.

No eutrophication effect

EPS contains zero phosphate and eutrophication is not an issue. Eutrophication is the process by which a body of water becomes overly enriched with minerals and nutrients which induces the excessive growth of algae, which in turn is damaging to the local natural environment. Cardboard creates high levels of phosphate in processing, which is collected in the water used for production, thus has an eutrophication effect.

Clean manufacturing technology

EPS adopts clean manufacturing technology, ensuring minimal energy and water inputs with no production waste. Any CO2 and Photochemical Ozone Creation Potential (POCP)created in the production of EPS is offset in its EPD (Environmental Product Declaration) through end-of-life recycling; recycling EPS into an insulating product creates a positive environmental impact.

	EPS 20kg	PP 20kg	Cardboard 20kg
Water consumption (m^3)	1	1	4.1
Water eutrophication (in g eq. PO43-)	1	0.9	2.4
Total waste production (kg)	1	1.5	2.4

Based on packaging 20kg of fresh salmon and transport 1200km from Danish fisheries to professional fish market in Paris.

EPS Packaging – The Benefits

Lightweight

An EPS fish box is significantly lighter when compared to a cardboard box. An EPS 20kg Salmon box weighs 526g versus cardboard at 2650g. This benefit in weight minimises the impact of transportation cost and maximises the volume of product delivered.

Packaging construction

With no requirement for other coatings or additional materials, EPS is totally food safe. Cardboard requires a “plastic” coating to make it food safe, such as HDPE (high density polyethylene), which involves an additional manufacturing process.

Transport

One of the largest impacts on the environment is CO2 emissions from transport. Sundolitt’s EPS manufacturing plants are located close to their customers so ideal for minimising these emissions; any cardboard equivalent will have a higher impact due to the further distances travelled.

Thermal characteristics

The thermal insulation characteristics of EPS are unrivalled when compared to other packaging materials.

When using cardboard transit boxes more ice is required to keep fresh produce at the required temperature, as the cardboard does not offer any insulating properties.

Comparison of large shipping systems for temperature sensitive products

EPS, waxed-corrugate and corrugated twin-wall polypropylene large systems were tested to the predetermined criteria to confirm their comparability of maintaining a product temperature range of below +5.0°C for the required duration of 72 hours.

The EPS large shipper maintained a product temperature of below +5.0°C for the full 72 hours duration when tested on cold profile, significantly outperforming the wax-corrugate and corrugated twin-wall polypropylene large shippers and outperformed both when tested to the warm profile. Therefore, the EPS large shipper can be a more effective choice for shipping fish products through cold and warm ambient conditions.

Source: SCA Cool Logistics on behalf of BPF EPS Group

Shipper Type	Ambient Profile	Time to >+5.0°C
EPS	Cold (+5.0°C)	>72 hours
	Warm (+15.0°C)	40.20 hours
Waxed-corrugate	Cold (+5.0°C)	63.30 hours
	Warm (+15.0°C)	18.50 hours
Corrugated twin-wall polypropylene	Cold (+5.0°C)	32.30 hours
	Warm (+15.0°C)	20.50 hours

Independent Study – Packaging Life Cycle Assessment (LCA) Comparison

Study objective

An independent research study was commissioned by EUMEPS (The European Manufacturers of Expanded Polystyrene Association, Packaging section) and carried out by PWC, comparing the life cycle assessment of three fish box solutions.

1. Expanded polystyrene (EPS)
2. Corrugated polypropylene (PP)
3. Corrugated cardboard with polypropylene film on both sides

The key objective was to assess the true environmental impacts of EPS packaging with a “cradle to grave” study reflecting the full life cycle of each of the packaging systems and considering different market scenarios in France, Spain and Denmark.

Study conclusions

The comparison revealed that EPS is a competitive and sustainable packaging material for fresh fish, with similar or even better results than the investigated alternatives. Generally, the production of raw materials and the transformation into packaging have the greatest impact on the environment. Thus, the main improvement option for EPS fish boxes is the reduction of energy consumption during the transformation process. Furthermore, the establishment of a broad recycling system increases the environmental performance of EPS fish boxes.

The main results of the LCA are that production of the raw materials and transformation of the main packaging have a significant environmental impact. Also, the weight of the packaging is a key parameter in the fish packaging system, with each weight reduction having a significant effect. Transport requirements (fuel, ice) linked to packaging only plays a secondary role, even over long distances.

The study did not link the thermal insulation parameters of the boxes with the energy needed to refrigerate the trucks, which was assumed constant whatever the packaging solution chosen. Integrating this aspect in the result would probably be in favour of EPS packaging, due to the high thermal performance of the material and its ability to maintain the constant required temperature.

EPS Recycling

Energy from waste

EPS is successfully recovered and recycled where facilities exist. Where the infrastructure for recycling is not currently in place EPS is ideal to be submitted to energy from waste (EfW) schemes due to its high calorific value (46,000 kj/kg) not dissimilar to natural gas at 48,000 kj/kg.

In this method of waste management, EPS does not produce any toxic emission, as it is incinerated in modern plants at very high temperatures; steam, carbon dioxide and very low levels of non-toxic ash are the biproducts. These emissions are less contaminating than a typical campfire and in fact there is no credible evidence that EfW schemes have any impact on public health.

Compaction

Both clean and contaminated EPS packaging are recycled. EPS packaging is collected for recycling either as it is or after compaction, where it can be compacted to one-fortieth of its original size for easy, cost-effective transportation and further recycling.

EPS is also recycled into pellets, whereby the recycler granulates the material into smaller pieces. The material is passed into a blender for thorough mixing with similar granules, then extruded and melted. Colour is added and the extruded material is then moulded into other products.

Future of recycling in UK and Europe

There is much discussion in the UK and across Europe to address the recycling of expanded polystyrene and other expanded plastics, with the relatively low recycling rate due to difficulties in removing food residues and odours from waste PS. However, the three-year (2017-2020) LIFE EPS SURE project, co-financed by the European Commission, aims to offer a technically, environmentally and economically viable solution that allows waste EPS fish boxes to be collected, stored, pre-treated and converted into new PS food contact packaging, thus closing the loop and managing one of the most difficult packaging flows in Europe.

Sundolitt currently recycle EPS within their construction products and are developing routes for packaging customers to allow for the recycling of their products into pellet form. Sundolitt consider that the aim of 30% recycled material within the final product, whether directly or by mass balance, should be the minimal aim.

Sundolitt will be publishing more information on the recycling of EPS fish boxes and the initiatives the Sunde Group are developing.