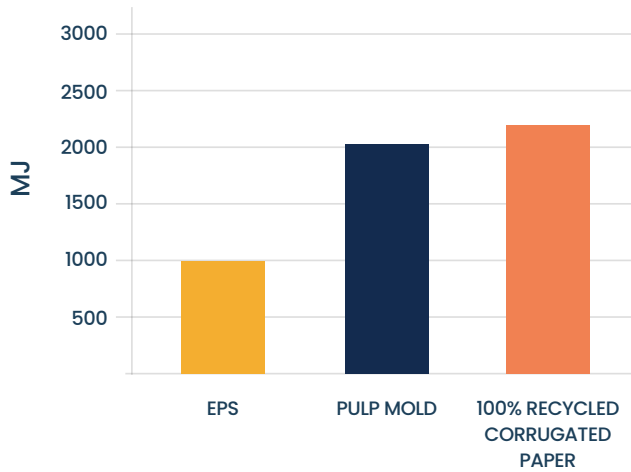


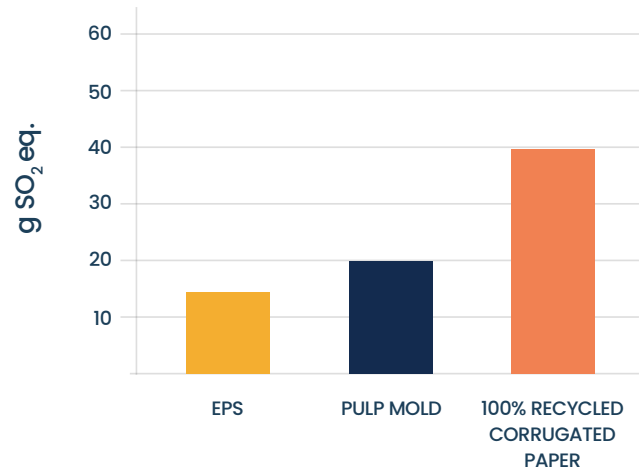
# Life Cycle Analysis Points to Environmental Trade-Offs for FishBox Shipping Materials

A life cycle analysis by InFo Kunststoff e.V.\* compared expanded polystyrene (EPS) to paper. The study quantified the energy use, global warming potential, air pollution and water pollution associated with 1 cubic meter of packaging. EPS packaging has lower energy consumption, acidification and CO<sub>2</sub> emissions than the paper counterpart. It demonstrates significantly lower water pollution.

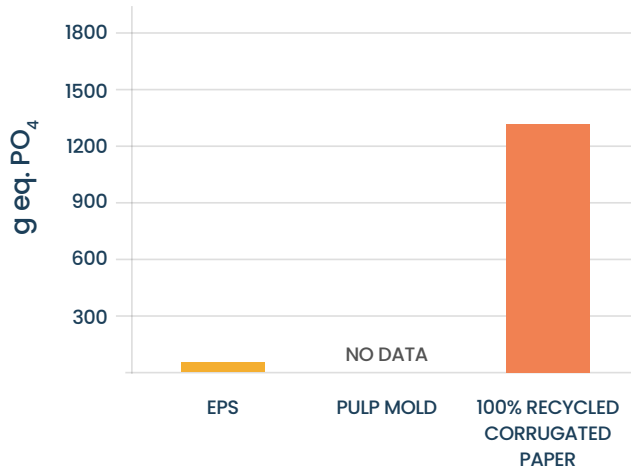
**ENERGY CONSUMPTION**



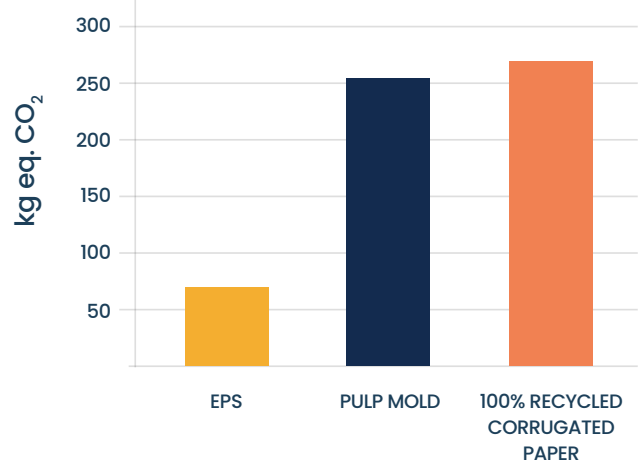
**AIR POLLUTION**



**WATER POLLUTION**



**GLOBAL WARMING POTENTIAL**



\*\*LIFE CYCLE ASSESSMENT OF THE INDUSTRIAL USE OF EXPANDED POLYSTYRENE PACKAGING IN EUROPE CASE STUDY: COMPARISON OF THREE FISHBOX SOLUTIONS\*, PRICEWATERHOUSE COOPERS AND ECOBILAN, NOVEMBER 2011

A peer reviewed study on a variety of fish box packaging systems covering three sizes (4 kg, 6 kg, 20 kg) illustrates how different materials compare across eight environmental impact categories:

- Paper and polypropylene both produce more solid waste during manufacture production than EPS;
- Paper manufacture results in higher water eutrophication & water consumption than EPS;
- EPS produces more photochemical oxidants than paper or polypropylene based packaging; and
- EPS compares favorably to other materials in the area of non-renewable resources and energy, air acidification and greenhouse gas emissions, with slight gains by paper for 20 kg.

This data only reflects the research parameters in this specific study. Results will vary for Life Cycle Analyses performed on other materials. **LIFE CYCLE ANALYSIS MUST BE ACCOUNTED FOR IN THE UNEP PLASTICS TREATY.**

LIFE CYCLE ASSESSMENT OF THE INDUSTRIAL USE OF EXPANDED POLYSTYRENE PACKAGING IN EUROPE: COMPARISON OF THREE FISHBOX SOLUTIONS

INDICATOR	FRANCE			SPAIN			SCANDINAVIA		
	EPS	PP	Cardboard	EPS	PP	Cardboard	EPS	PP	Cardboard
	4kg	4kg	4kg	6kg	6kg	6kg	20kg	20kg	20kg
Non Renewable Primary Energy in MJ	1.0	1.1	0.9	1.0	1.3	1.0	1.0	0.8	0.6
Depletion of Non Renewable Resources in kg q. SB	1.0	1.2	0.9	1.0	1.3	1.0	1.0	0.9	0.6
Emission of Greenhouse Gases in kg CO <sub>2</sub> eq. 100 yrs	1.0	0.9	1.0	1.0	1.0	1.4	1.0	0.8	0.7
Air Acidification in g SO <sub>2</sub> eq.	1.0	1.0	2.0	1.0	1.2	2.0	1.0	0.8	1.0
Photochemical Oxidants Formation in g eq. Ethylene	1.0	0.3	0.2	1.0	0.3	0.2	1.0	0.2	0.1
Water Consumption in m <sup>3</sup>	1.0	0.8	3.3	1.0	0.7	3.5	1.0	1.0	4.1
Water Eutrophication in g eq. PO4-3	1.0	1.3	5.9	1.0	1.2	5.3	1.0	0.9	2.4
Total Waste Production in kg	1.0	3.4	7.6	1.0	2.1	4.1	1.0	1.5	2.4

Where performance is within 20% of the EPS value, the two are considered equivalent.

Where performance is worse than EPS by more than 20%

Where performance is better than EPS by more than 20%

In another life cycle study comparing EPS to a paper-based alternative, expanded polystyrene production and transportation shows more favorable results when considering total environmental impacts.

EPS VS. MOLDED PULP COMPARISON

Oregon Dept of Environmental Quality, "Energy & Environmental Results for Packaging Options for Shipment of Retail Mail-Order Soft Goods." Franklin Associates, 2003

