

STREAMLINED LIFE CYCLE ASSESSMENT*

E-COMMERCE MAILER PACKAGING CASE STUDY

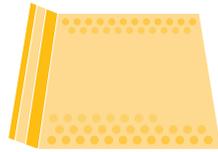
MAILER PACKAGE COMPARISON

While many e-commerce items ship in corrugated cases, there are a number of other formats in use, particularly for smaller items. The mailers include both polymer- and paper-based options, as well as hybrid options made from a combination of the two. For this scenario, four alternatives for mailing items such as magazines, books, clothing, and many others were evaluated with a cradle-to-grave boundary:

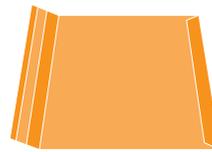


POLY MAILER

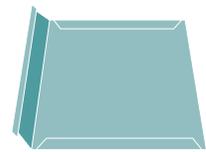
The standard against which all other formats were measured



BUBBLE MAILER



PAPER CUSHION



PAPERBOARD



FOSSIL FUEL CONSUMPTION

The poly mailer, which has the lowest weight, also has the lowest overall fossil fuel consumption when compared to the other formats.

The highest fossil fuel use comes from the paperboard document mailer, which weighs approximately **8X (139.07g vs. 17.33g)** that of the poly mailer. Even with the paperboard mailer using a paper-based substrate vs. the poly mailer, the production of paper still requires additional energy, which reflects the higher fossil fuel usage number **(+135%)**.



1.49
MJ-EQUIV



2.60
MJ-EQUIV



2.34
MJ-EQUIV



3.51
MJ-EQUIV



GREENHOUSE GAS EMISSIONS

For GHG emissions, the three lightest packaging options have the lowest impact. The poly mailer ranks the lowest by a wide margin, followed by the bubble mailer **(+68.9%)**.

The two paper-based options—the paper cushion mailer and paperboard document mailer—are by far the heaviest samples with the highest GHG emissions **(+430%** and **+595%)**.



.0646
KG-CO2 EQUIV



.1092
KG-CO2 EQUIV



.3425
KG-CO2 EQUIV



.4494
KG-CO2 EQUIV



WATER CONSUMPTION

Most plastic production, particularly flexible items like the poly mailer and bubble mailer, have low water usage in the material production and manufacturing stages. The paper cushion mailer **(+692%)** and paperboard document mailer **(+404%)** on the other hand, both contain a large amount of paper, which is generally a water-intensive production process.



END OF USE SUMMARY

SOURCE REDUCTION BENEFITS

Flexible packaging offers the ability to source reduce, which is one of the most preferred methods of waste management, according to the U.S. EPA Waste Hierarchy.

As a result, a major benefit of flexible packaging is the high product-to-package ratio that it offers.

HIGH product-to-package ratio:

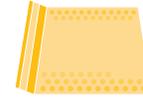
85.2%
Product weight

14.8%
Package weight



77.1%
Product weight

22.9%
Package weight



LOW product-to-package ratio:

43.3%
Product weight

56.7%
Package weight



41.8%
Product weight

58.2%
Package weight



RECOVERY BENEFITS

amount of material ending up as municipal solid waste



The results show that the poly mailer and bubble mailer use far less packaging than the other mailers. In fact, the total amount of packaging used for the poly mailer option equates to about 1/2 the amount of material recycled for the paper-based options, based on U.S. carton/paperboard recycling rates (25.6%).

The paper-based mailers, while having a higher recycling rate than the poly-based mailers, use much more material and result in approximately **5X** as much material going to landfill, based on current U.S. recycling rates.

IMPLICATIONS

In summary, the poly flexible mailer and the bubble mailer made from HDPE boast the lowest environmental impacts across a range of metrics, including fossil fuel use, greenhouse gas emissions, water use, material used, and the amount of material discarded. This is due to the much lower amount of material that the plastic-based options use when compared to the paper-based mailers. It should also be noted that, by undergoing How2Recycle® certification, both the poly mailer and bubble mailer can be labeled for recycling through store drop-off programs as long as the label is removed from the pack before recycling.**

MAILER PACKAGING COMPARISON SUMMARY

FORMAT	FOSSIL FUEL CONSUMPTION (MJ-EQUIV)	GHG EMISSIONS (KG-CO ² EQUIV)	WATER USE (l)	PRODUCT-TO-PACKAGE RATIO AND PERCENT WT.	PKG LANDFILLED (G)/1,000 KG MAILER
POLY MAILER 	1.49	.06467	24.70	5.8:1 85.2%:14.8%	166,400
BUBBLE MAILER 	2.60 (+74.0%)	.1092 (+68.9%)	36.68 (+48.5%)	3.4:1 77.1%:22.9%	284,975 (+71%)
PAPER CUSHION 	2.34 (+56.6%)	.3425 (+430%)	195.68 (+692%)	0.8:1 43.3%:56.7%	972,807 (+485%)
PAPERBOARD 	3.51 (+135%)	.4494 (+595%)	124.56 (+404%)	0.7:1 41.8%:58.2%	1,034,696 (+522%)

For more information and methodologies of assessments, please visit www.flexpack.org to download the "Sustainability and Life Cycle Impacts of Flexible Packaging in E-commerce" report. For additional findings on the impact of flexible packaging on dimensional weight and shipping costs, visit www.flexpack.org/resources/sustainability-resources.