

# STREAMLINED LIFE CYCLE ASSESSMENT\*

## E-COMMERCE LAUNDRY DETERGENT PACKAGING CASE STUDY

### LAUNDRY DETERGENT PACKAGE COMPARISON

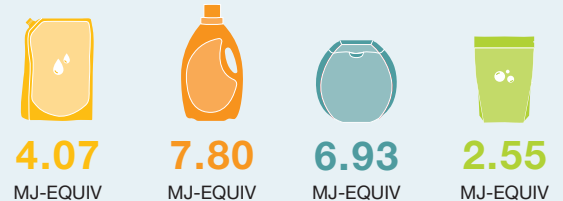
Laundry detergent is available in wide-ranging packaging formats and product types, which include concentrated liquids and single-use pods. For this evaluation, four popular packaging formats were evaluated with a cradle-to-grave boundary and two additional format comparisons can be found in the full report. All comparisons were based on using loads of laundry due to the combination of liquid and pod-based product solutions. Formats included:



### FOSSIL FUEL CONSUMPTION

Primary packages with flexible structures generally use less fossil fuel than those with rigid structures. The two package formats that use the most fossil fuel are the HDPE bottle (+91.5%) and pods in a rigid PET container (+70.1%).

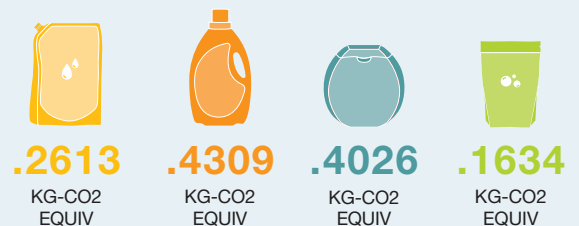
The format that uses the least fossil fuel is the flexible pouch of pods shipped without an overbox, a standard corrugated box used in e-commerce (-37.4%)



### GREENHOUSE GAS EMISSIONS

Overall greenhouse gas (GHG) emissions are lower with the lighter packs, which generally consist of more flexible structures.

The highest GHG emissions come from the rigid HDPE bottle (+64.9%) and pods in a rigid PET container (+54.1%). Both systems use approximately double the amount of plastic material for their primary package compared to the flexible pouch while containing less product.



### WATER CONSUMPTION

It takes a lot of water to cool HDPE bottles and rigid PET containers during the molding process, so water consumption is highest for these formats compared to the standard.

All scenarios use a significant amount of corrugated, which in turn uses more water.



## 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:

**92.2%**

Product weight

**7.8%**

Package weight



**89.6%**

Product weight

**10.4%**

Package weight



**LOW** product-to-package ratio:

**87.2%**

Product weight

**12.8%**

Package weight



**81.9%**

Product weight

**18.1%**

Package weight



### RECOVERY BENEFITS



**1x**

amount of material ending up as municipal solid waste



**~2x**

amount of material ending up as municipal solid waste

All formats use corrugated cases as a shipping container, which has a high recycling rate of 92.3%. The two rigid formats, the HDPE bottle and PET container, are generally recyclable in most curbside programs; however, they yield **double** the amount of packaging discarded compared to multi-layer flexible pouches.

While many multi-layer flexible materials are not yet recovered in any significant amount, they still result in a substantial reduction in the amount of material sent to landfill. These materials also help limit the amount of material needed in e-commerce shipping because of the robustness and lack of denting/damage/leaking that can be seen in rigid packaging.

## IMPLICATIONS

The study shows that several multi-layer flexible formats are well-suited for e-commerce. Flexible-based options boast numerous sustainability benefits—including reduced fossil fuel usage, carbon impact, water usage and municipal solid waste—when compared to primary packages using a rigid format. The toughness and flexibility of multi-layer flexible structures in e-commerce applications make flexible packaging ideal for product categories where leaks or a crack/puncture could be detrimental to consumer use, such as laundry detergent.

### LAUNDRY DETERGENT PACKAGING COMPARISON SUMMARY

FORMAT		FOSSIL FUEL CONSUMPTION (MJ-EQUIV)	GHG EMISSIONS (KG-CO <sub>2</sub> EQUIV)	WATER USE (l)	PRODUCT-TO-PACKAGE RATIO AND PERCENT WT.	PKG LANDFILLED (G)/1,000 KG LAUNDRY DETERGENT
LIQUID DETERGENT IN STAND-UP POUCH W/ FITMENT		4.07	.2613	69.61	11.9:1 <b>92.2%:7.8%</b>	1,350
LIQUID DETERGENT IN HDPE BOTTLE		7.80 <b>(+91.5%)</b>	.4309 <b>(+64.9%)</b>	91.16 <b>(+31.0%)</b>	6.8:1 <b>87.2%:12.8%</b>	2,380 <b>(+76.3%)</b>
LAUNDRY PODS IN PET CONTAINER		6.93 <b>(+70.1%)</b>	.4026 <b>(+54.1%)</b>	118.25 <b>(+69.9%)</b>	4.5:1 <b>81.9%:18.1%</b>	1,919 <b>(+42.1%)</b>
LAUNDRY PODS IN FLEXIBLE POUCH (NO OVERBOX)		2.55 <b>(-37.4%)</b>	.1634 <b>(-37.5%)</b>	60.11 <b>(-13.7%)</b>	8.7:1 <b>89.6%:10.4%</b>	865 <b>(-35.9%)</b>

For more information and methodologies of assessments, please visit [www.flexpack.org](http://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](http://www.flexpack.org/resources/sustainability-resources).