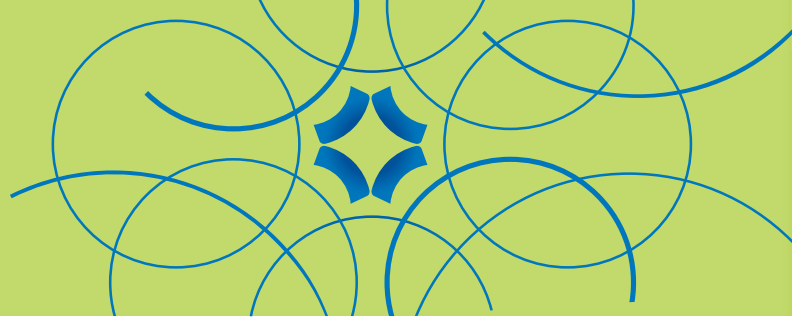


STREAMLINED LIFE CYCLE ASSESSMENT*



STAND-UP POUCH COMPARISON

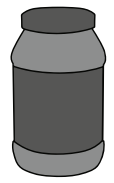
Protein powders are often sold in a rigid package, but can also be found sold in flexible packaging formats such as Stand-up Pouches (SUP). For this comparison, 2 separate SUPs were evaluated with the rigid HDPE canister as the standard to which other packages are compared. A product weight of 584g was used for the comparison.



TRADITIONAL
SUP



RECYCLABLE
SUP

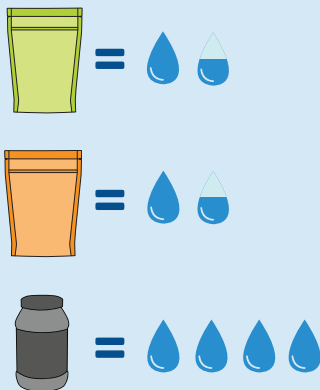


HDPE
CANISTER



Water Consumption

The stand-up pouches result in substantial reduction in water use (-64.49%) vs. the rigid canister. Since less material is being used, it would make sense that water use would also be reduced.



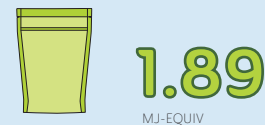
Greenhouse Gas Emissions

All stand-up pouches resulted in far less GHG emissions than the canister across the material manufacture, conversion (manufacturing) and end of life phases.



Fossil Fuel Consumption

The SUP options result in a significant reduction in fossil fuel use compared to the current canister. This is largely driven by the canister weighing 4-5 times (108.3g vs. 20.73g/ 24.92g) that of the pouches. The recyclable pouch uses more fossil fuel than the traditional SUP since it is a heavier structure (24.92g vs. 20.73g) to get the necessary performance.



END OF USE SUMMARY

SOURCE REDUCTION BENEFITS

According to the U.S. EPA Waste Hierarchy, the most preferred method for waste management is source reduction and reuse.

A major benefit of flexible packaging is the high product-to-package ratio that it offers.

RECOVERY BENEFITS

TRADITIONAL
STAND-UP
POUCH



1x

amount of material ending up
as municipal solid waste

STORE
DROP-OFF
RECYCLABLE
SUP



1.2x

amount of material ending up
as municipal solid waste

HDPE
CANISTER



4.6x

amount of material ending up
as municipal solid waste

High product-to-package ratio:



96.6%

Product weight

3.4%

Package weight

Low product-to-package ratio:



84.4%

Product weight

15.6%









Package weight

The rigid HDPE canister results in substantially more material being discarded at the end of life (162,442g vs. 35,219g-42,394g of packaging for 1000 kg of product) when taking into consideration estimated current recycling rates for HDPE canisters (18%).

The recycling rate for the PE based store drop-off recyclable pouch is 13%. With the movement toward greater investment in recycling systems, potential EPR legislation and brand owner goals driving toward a circular economy, it is likely that investment in the recovery system to drive higher recycling rates and better integrated packaging into a circular economy model will occur over the next decade.

IMPLICATIONS

The results show that the stand-up pouch (SUP) variations all have lower environmental impacts including fossil fuel usage, GHG emissions, and water usage in this scenario than the rigid HDPE container. The table below shows the results when current recycling rates are considered, as well the product-to-package ratio, which is a measure of the resource efficiency of the materials used.

FORMAT	 FOSSIL FUEL CONSUMPTION (MJ-EQUIV)	 GHG EMISSIONS (KG-CO ₂ EQUIV)	 WATER CONSUMPTION (L)	 PRODUCT-TO-PACKAGE RATIO (%)	 PKG LANDFILLED (G)/1,000 KG PRODUCT
TRADITIONAL SUP 	1.89 (-82.55%)	0.0761 (-82.22%)	54.05 (-64.49%)	96.6% : 3.4%	35,219 (-78.3%)
STORE DROP-OFF RECYCLABLE SUP 	2.31 (-78.67%)	0.0904 (-78.88%)	52.95 (-65.21%)	95.9% : 4.1%	42,394 (-73.9%)
HDPE CANISTER 	10.83	0.428	152.22	84.4% : 15.6%	162,442



For more information and methodologies of assessments, please visit www.flexpack.org or www.glenroy.com to download Glenroy's "A Streamlined Life Cycle Assessment Comparison for Glenroy® Stand-up Pouch Options vs. Rigid HDPE Canister" report.