

LIFE CYCLE ASSESSMENT BABY FOOD PACKAGING CASE STUDY

BABY FOOD PACKAGE COMPARISON

Baby food packaging has evolved over the past decade from glass jars to plastic thermoformed tubs and flexible stand-up pouches with fitments. The flexible stand-up pouch's rise in popularity can be traced to several attributes: it is easy to use, less messy, shatterproof, and a boon to parents as toddlers can access the contents themselves without the use of utensils.



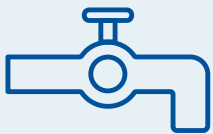
FLEXIBLE STAND-UP POUCH WITH FITMENT



THERMOFORMED TUB



GLASS JAR



WATER CONSUMPTION

The glass production process involves significant water usage to cool the molten glass that is then formed into a jar. The thermoformed tub uses less water overall than the flexible stand-up pouch with fitment, which is due to the additional water needed in the injection molding process for the fitment and cap. Other environmental indicators such as fossil fuel use and the amount of material that ends up in municipal solid waste must also be taken into consideration to provide a more holistic environmental impact of package formats. These are areas where the flexible pouch with fitment has more favorable results than the thermoformed tub.

The water consumption impact of the glass jar is **1,294%** more than that of the flexible stand-up pouch.



GREENHOUSE GAS EMISSIONS

While the flexible stand-up pouch with fitment and thermoformed tub both emit similar levels of greenhouse gas, the glass jar has a significantly higher carbon impact due to the amount of material and energy required to produce glass.

The glass jar uses approximately **10X** more material than the other two packaging formats.

The glass jar has a carbon impact **3X** higher than the low carbon impact of the flexible stand-up pouch with fitment.



7.7
GRAMS of material



10.1
GRAMS of material



89.2
GRAMS of material



FOSSIL FUEL CONSUMPTION

Because of the laminating process and lightweight nature of the flexible stand-up pouch, it results in lower fossil fuel consumption than the thermoformed tub or glass jar.

Thermoforming requires considerable heat energy to form a plastic sheet into a tub. As a result, the thermoformed tub uses less overall fossil fuel/energy than the glass jar because it's much lighter, but neither format can match the reduction in fossil fuel seen with the flexible stand-up pouch.

The glass jar has a fossil fuel usage roughly **2X** that of both the flexible stand-up pouch with fitment and thermoformed tub. This is because glass jar production requires significant energy to heat the materials during the forming process, particularly on the material processing side.



0.73
MJ-EQUIV



0.78
MJ-EQUIV



1.46
MJ-EQUIV

END OF USE SUMMARY

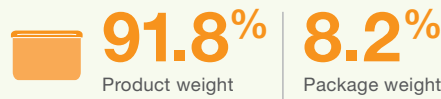
SOURCE REDUCTION BENEFITS

When comparing product-to-package ratios, a high ratio like that of the flexible stand-up pouch with fitment is a good measure of source reduction and packaging efficiency.

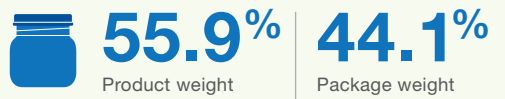
High product-to-package ratio:



High product-to-package ratio:



Low product-to-package ratio:



RECOVERY BENEFITS

STAND-UP FLEXIBLE POUCH



1x
More material in municipal solid waste

Of the three baby food packaging formats evaluated, the flexible stand-up pouch has the least amount of material that ends up in the municipal solid waste stream.

THERMOFORMED TUB:



30%
More material in municipal solid waste

Thermoformed tubs contain a barrier layer that is difficult to process, which results in a **0%** recycling rate. Because of this, thermoformed tubs contribute to about **30%** more material in municipal solid waste than flexible stand-up pouches.

GLASS JAR:






7x
More material in municipal solid waste

Even though glass containers are recycled at a rate of just over **30%**, **7x** more material ends up in municipal solid waste than the flexible stand-up pouch with fitment.

IMPLICATIONS

The glass jar has significantly larger sustainability impacts than the other two packaging options, even considering the recyclability of glass. While the flexible stand-up pouch with fitment and the thermoformed tub have fairly similar profiles for fossil fuel usage and greenhouse gas impacts, as well as high product-to-package ratios, the flexible stand-up pouch with fitment results in less material to municipal solid waste.

FORMAT	FOSSIL FUEL CONSUMPTION (MJ-EQUIV)	GHG EMISSIONS (KG-CO ² EQUIV)	WATER CONSUMPTION (L)	PRODUCT-TO-PACKAGE RATIO (%)	PKG LANDFILLED ((G)/1000 KG BABY FOOD)
FLEXIBLE STAND-UP POUCH W/ FITMENT 	.7349	.03098	.0753	93.6:6.4	68,142
THERMOFORMED TUB 	.7832 (+6.57%)	.03305 (+6.68%)	.04587 (-37.6%)	91.8:8.2	89,381 (+31%)
GLASS JAR 	1.46 (+98.8%)	.1245 (+302%)	1.05 (+1,294%)	55.9:44.1	513,699 (+654%)