



Life Cycle Analysis (LCA)

COMPARATIVE ANALYSIS



PakTech 100% Recycled HDPE



Generic Paperboard Carrier



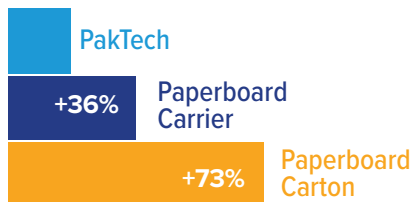
Generic Paperboard Carton

Cradle-to-Grave LCIA Results - 6 Pack - *Normalized to the rHDPE handle*

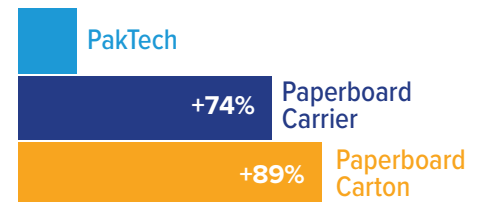
The charts below reflect the environmental impact % increase of paperboard vs. PakTech



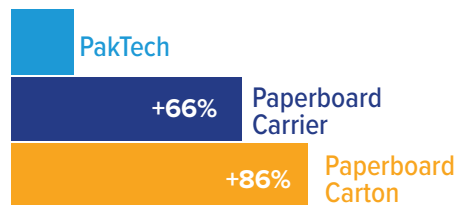
CLIMATE CHANGE



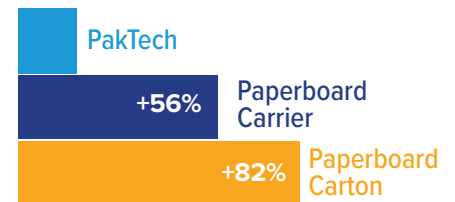
HEALTH IMPACTS



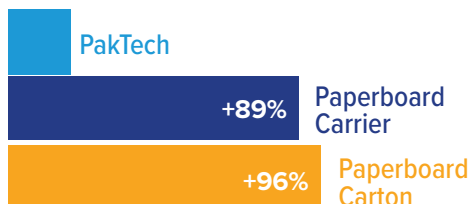
ACIDIFICATION



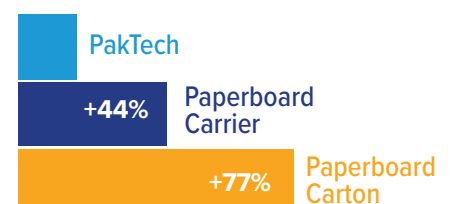
SMOG AIR



EUTROPHICATION



ENERGY DEMAND



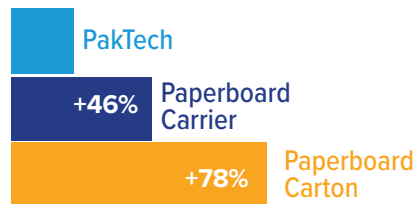
The life cycle assessment (LCA) study has been conducted according to the requirements of ISO 14044 (ISO, 2006) and compares the environmental performance of PakTech's beverage packaging handle designs to two competing paperboard designs.

Cradle-to-Grave LCIA Results - 4 Pack - Normalized to the rHDPE handle

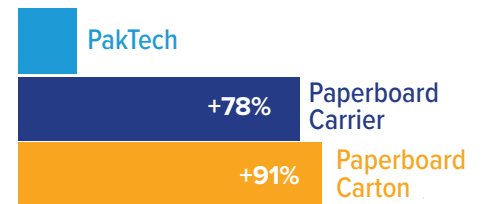
The charts below reflect the environmental impact % increase of paperboard vs. PakTech



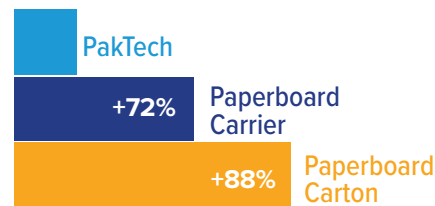
CLIMATE CHANGE



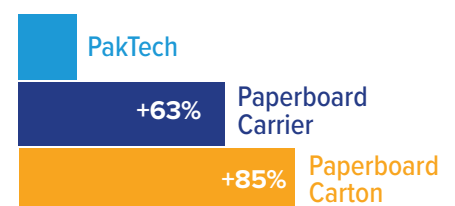
HEALTH IMPACTS



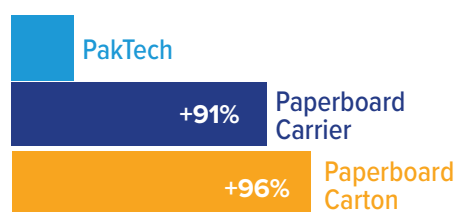
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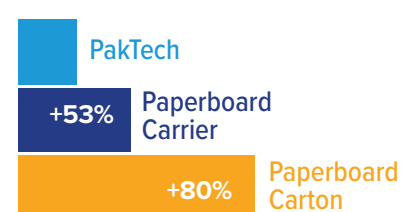
SMOG AIR



EUTROPHICATION

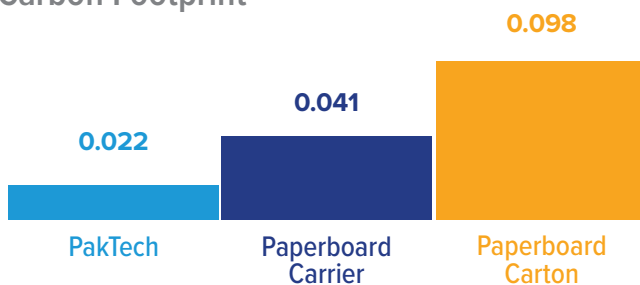


ENERGY DEMAND

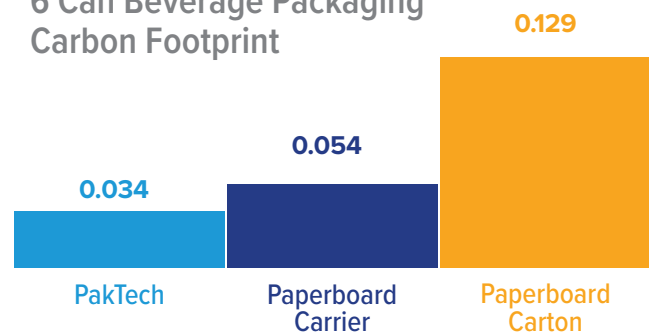


Global Warming Potential - {kg CO2 eq.}

4 Can Beverage Packaging Carbon Footprint



6 Can Beverage Packaging Carbon Footprint



Results:

The results show that if beverage manufacturers were to switch from paperboard carton or carriers to PakTech recycled rHDPE handles, they would reduce the potential environmental impacts of beverage can packaging.

The paperboard products measured are generally associated with the highest potential environmental impacts.

- PakTech products have the lowest potential environmental impacts.
- PakTech products have the lowest Carbon Footprint at .022 to .034 kg CO2 eq.
- The Global Warming Potential is ~2-5 times lower than the paperboard alternatives.

LCA Executive Summary

The life cycle assessment (LCA) study has been conducted according to the requirements of ISO 14044 (ISO, 2006) and compares the environmental performance of PakTech's beverage packaging handle designs to two competing paperboard designs.

This study considers the full life cycle of the beverage packaging product, from cradle-to-grave. This includes recycled HDPE pellet procurement, plastic handle production, forestry management and logging, paperboard production and conversion into finished beverage packaging, distribution packaging, filling, end of life, and transport at all stages in the life cycle.

Overall, the PakTech rHDPE handles have the lowest potential environmental impacts as this design has the lowest material mass and consists of 100% Recycled Content. The PakTech rHDPE handle, has the overall lightest weight packaging option, and is associated with the lowest climate change impact.

The results show that if beverage manufacturers were to switch from paperboard carton or carriers to PakTech recycled rHDPE handles, they would reduce the potential environmental impacts of beverage can packaging. The paperboard products measured are generally associated with the highest potential environmental impacts

- **PAKTECH PRODUCTS HAVE THE LOWEST POTENTIAL ENVIRONMENTAL IMPACTS.**
- **PAKTECH PRODUCTS HAVE THE LOWEST CARBON FOOTPRINT AT .022 TO .034 KG CO2 EQ.**
- **THE GLOBAL WARMING POTENTIAL IS ~2-5 TIMES LOWER THAN THE PAPERBOARD ALTERNATIVES**

CLIMATE CHANGE RESULTS PER FUNCTIONAL UNIT [KG CO2 EQ]

	4-can beverage packaging			6-can beverage packaging		
	PakTech rHDPE handle	Paperboard carrier	Paperboard carton	PakTech rHDPE handle	Paperboard carrier	Paperboard carton
Production	0.0159	0.0201	0.0482	0.0249	0.0264	0.0634
Packaging	0.0021	0.0108	0.0259	0.0033	0.0142	0.0341
Filling	0.0002	0.0006	0.0015	0.0004	0.0008	0.0019
Transportation	0.0005	0.0009	0.0023	0.0008	0.0012	0.0030
End-of-life	0.0032	0.0085	0.0205	0.0050	0.0112	0.0270
Total Carbon Footprint	0.0220	0.0410	0.0983	0.0344	0.0538	0.1290