

Case Study: Mills Industries, Inc. Product Life Cycle Assessment

Improving the ability to understand, address, and communicate product environmental impact.

SymbioSus® helped Mills Industries, Inc. to get a better understanding of the full environmental impact of its primary product and material, identify opportunities to further reduce its impact, and better communicate the relatively lower environmental impact of its product compared to several competitive alternative materials.

Mills Industries' Challenge

Mills Industries, Inc., a New Hampshire-based manufacturer of corrugated plastic shipping and storage containers for various industries, has taken a number of steps to reduce its overall environmental impact, including purchasing renewable electricity, increasing the energy efficiency of its facility, recycling and reducing waste, offering recycled-content versions of its products, and accepting products for recycling at the end of use, for customers who choose that option. Recently, Mills wanted to determine the life-cycle environmental impact of its primary product type, a corrugated polypropylene (PP) carton, as well as that of similar products in the alternative materials of corrugated paper (CP) and injection-molded high-density polyethylene (HDPE). Mills Industries' goals were to:

- Better understand the life-cycle environmental impact of its primary product type, in order to identify opportunities to further reduce that impact, and potentially reduce costs in the process.
- Better inform its current and potential customers of how the life-cycle environmental impact of its PP cartons compares to CP and HDPE alternatives.

With these goals in mind, Mills Industries engaged SymbioSus to:

- Assess, analyze, and report on the life-cycle environmental impact of a typical Mills PP carton, as well as that of a typical CP carton and HDPE tote, and any relevant comparisons.
- Recommend actions to further reduce the environmental impact of Mills' PP carton products.
- Help develop appropriate communication messages and materials to educate Mills' current and potential customers about the life-cycle environmental impact of its products and the comparison to alternatives.

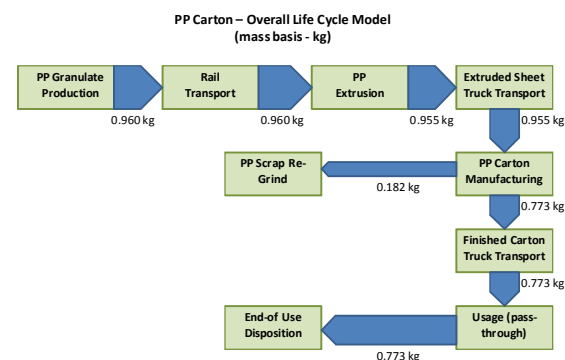


Products included in the LCA study (left to right): Mills' extruded corrugated polypropylene (PP) carton, typical corrugated paper (CP) carton, typical injection molded HDPE tote.

SymbioSus' Approach and Actions

To meet these objectives, SymbioSus:

- **Conducted a comprehensive comparative product Life Cycle Assessment (LCA) study**, using gold-standard ISO 14040 and 14044 LCA methodology guidelines and LCA software (GaBi Professional 4.0), of a typical Mills PP carton, CP carton, and HDPE tote. The products were assessed across each phase of their life cycle, from resource extraction to end-of-life disposition, excluding the use phase (in order to focus on the differences resulting from materials and manufacturing methods, and since the usage was assumed to be the same for each product).¹
- Reported the full results of the LCA study to Mills Industries, and **provided and discussed recommended actions to further reduce the environmental impacts** of Mills PP carton products.
- Is currently helping Mills **develop communication messages and materials** to educate Mills' current and potential customers about the lower life-cycle environmental impact of Mills' PP carton products compared to CP or HDPE alternatives.¹



Overall model for the assessment of the life cycle phases of the Mills PP carton, from raw material extraction through end-of-life disposition. Similar models were developed for the CP and HDPE products.¹

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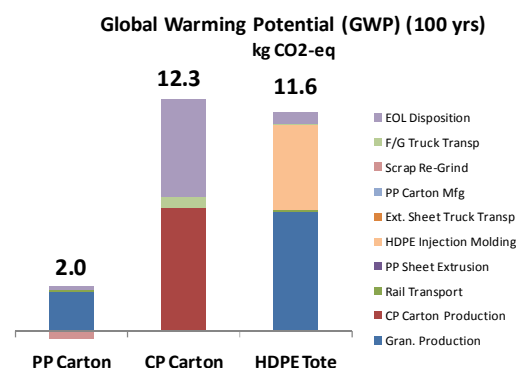
Results

The comprehensive LCA study implemented by SymbioSus found that:

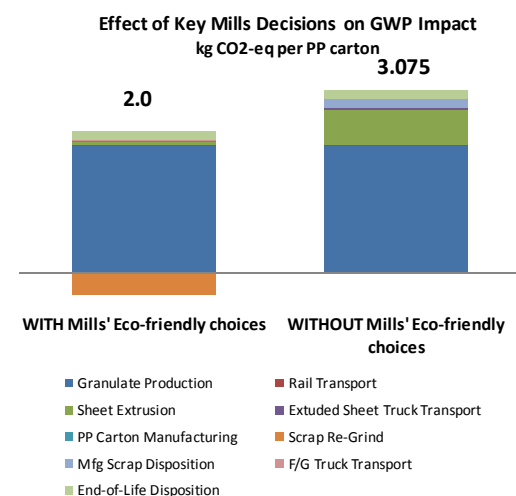
- The Global Warming Potential (GWP) impact of a Mills' PP carton over its useful life is 84% lower than that of a similar CP carton and 83% lower than that of a similar HDPE tote for an equivalent amount of usage.¹
- The Mills PP carton also had between 31% and 94% lower impact than the CP carton or HDPE tote on all 5 other key environmental impact categories assessed, including the potential for: water acidification; water over-nutrication; freshwater toxicity; soil toxicity; and smog formation.¹
- Key drivers of the lower impact of the Mills PP carton are its greater durability compared to CP options (less need for replacements), and its lighter weight compared to molded HDPE options (less raw material required).¹
- The main driver of the environmental impact of the Mills PP carton is the plastic granulate production process, which contributes from 42% to over 90% of the life cycle impact for the various environmental impact categories studied. Conversely, Mills' manufacturing process represents less than 1% of the overall life cycle impact of the product for each of the assessed impact categories.¹
- Key prior actions taken by Mills, including using a hydro-electricity-powered extrusion partner, purchasing green electricity for its facility, and re-grinding and recycling PP manufacturing scrap, have helped reduce the overall Global Warming Potential (GWP) impact of the Mills product by 35% compared to what it would be if industry-standard practices were used.¹
- Key areas for further reducing the impact of Mills' PP carton products are in the increased use of recycled PP material in manufacturing, encouraging more customers to recycle the products at the end of their useful life, and encouraging granulate producers to use more non-carbon-based energy.¹

As a result of working with SymbioSus on this project, Mills:

- Increased its detailed understanding of the level and key drivers of the life-cycle environmental impact of its primary products.
- Identified additional steps it could take to further reduce the environmental impact of its key products, and to in some instances simultaneously reduce costs.
- Improved its ability to clearly communicate to its current and potential customers about the environmental advantages of its key PP carton products compared to CP or HDPE alternatives.



Graph showing the 84% and 83% lower lifetime GWP impact of the Mills PP carton compared to similar CP carton or HDPE tote usage, respectively.



Graph showing the 35% reduction in GWP impact of Mills' PP cartons, due to Mills' use of hydro-powered extrusion, green electricity, and re-grinding and recycling PP manufacturing scrap, compared to what its impact would be with standard industry practices.

¹LCA information and results in this document are based on an LCA study and report commissioned by Mills Industries, Inc. and produced by SymbioSus Sustainability Consulting, Inc. in 2011. As with all LCA studies, the findings of this study are based on the specific products, methods, assumptions, and data used for this study and are not necessarily applicable for different products or assumptions. Detailed data as well as a summary report and full study report are on file with Mills Industries and SymbioSus and are available upon request.

SymbioSus Sustainability Consulting, Inc. is a sustainability consulting practice that helps small to medium sized businesses increase their profitability and competitive advantage by helping them to integrate sustainability strategies and actions into their core business operations. To learn more about how SymbioSus' services and approach can help your business reduce energy use, waste, cost, and environmental impact, and increase resource efficiency, profitability, and company brand value, visit www.symbiosus.com or call 774-285-6823.