Ecovative Design Mushroom Packaging LCA Case Study

**Client:** Ecovative Design LLC

**Opportunity Areas**

Ecovative uses fungal mycelium (mushroom "roots") to bond together locally sourced agricultural byproducts into Mushroom® Packaging base material. This material is used in a variety of applications including as blocking and bracing packaging as modeled in this study. As Ecovative expands into its new 28,000 square foot manufacturing facility, they requested that NYSP2I’s Green Technology Accelerator Center compare the environmental impact of three different Mushroom® Packaging base material configurations to understand and help optimize their unique new biomaterials manufacturing process.

**Work Performed**

NYSP2I engineers mapped Ecovative’s new manufacturing processes through the use of a Life Cycle Assessment (LCA), a tool used to evaluate the full environmental impact of products and processes. The LCA purpose was to: evaluate the impact of competing Ecovative internal inoculation processes; understand the relative contribution of material changes, supplier locations, transportation impacts, energy use, etc. to environmental impact; and highlight specific manufacturing processes of interest in the results. Primary data was collected directly during multiple process runs. By doing a comprehensive cradle to grave LCA on their baseline process, priorities and opportunities for significant environmental improvement were uncovered.

**Results**

The LCA results are leading to process improvements and energy efficiency gains by comparing process alternatives, and process changes are being recommended for installation in Ecovative’s facilities. Results include:

- Two material configurations comparing inoculum processes showed that the inoculum type had an insignificant impact, directing Ecovative to shift its research focus away from developing new inoculum processes.
- An additional material configuration comparing a different structural feedstock showed that the material strength to weight ratio was critical shifting focus to higher performance feedstocks that could be grown locally to also reduce transportation impacts.
- The part drying process was shown to contribute over 50% of the entire life cycle carbon footprint. Additional impacts are highlighted in the neighboring chart. As a result, Ecovative is testing an alternate drying process that uses about 1/3 the energy and dries in minutes instead of hours.
- Ecovative continues to use the LCA model internally to compare to common alternative packaging foams.