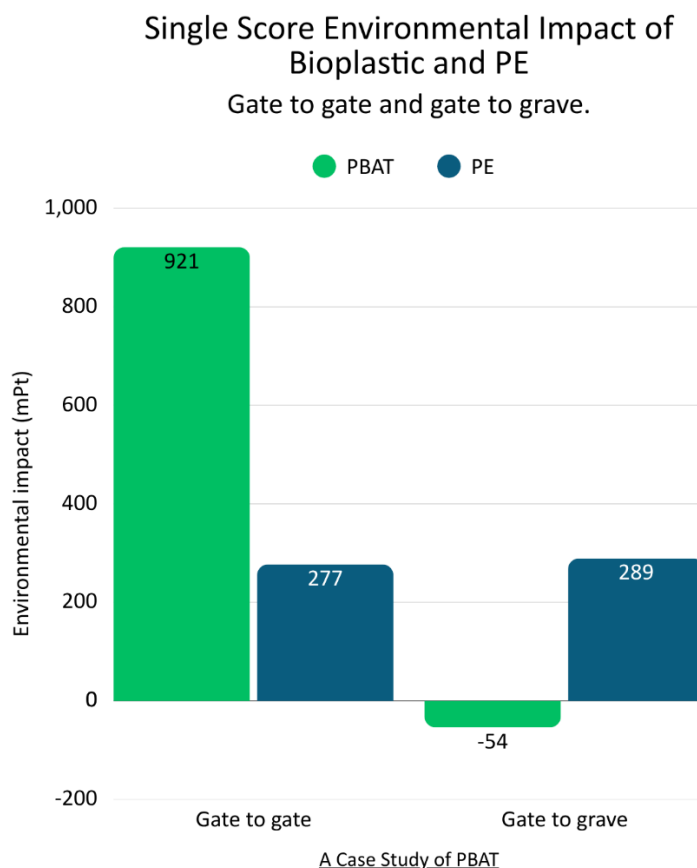


Life Cycle Assessment Sheds New Insights Toward Sustainable Management of Biodegradable Resin Blends Used in Packaging: A Case Study on PBAT

Polybutylene Adipate Terephthalate (PBAT) is an industrially compostable polymer. It can be used in applications like polyethylene (PE), such as food packaging. PBAT is manufactured from fossil fuels; an alternative biomass-based production process is under development. It is produced commercially and is often blended with other polymers (e.g., PLA) or fillers.

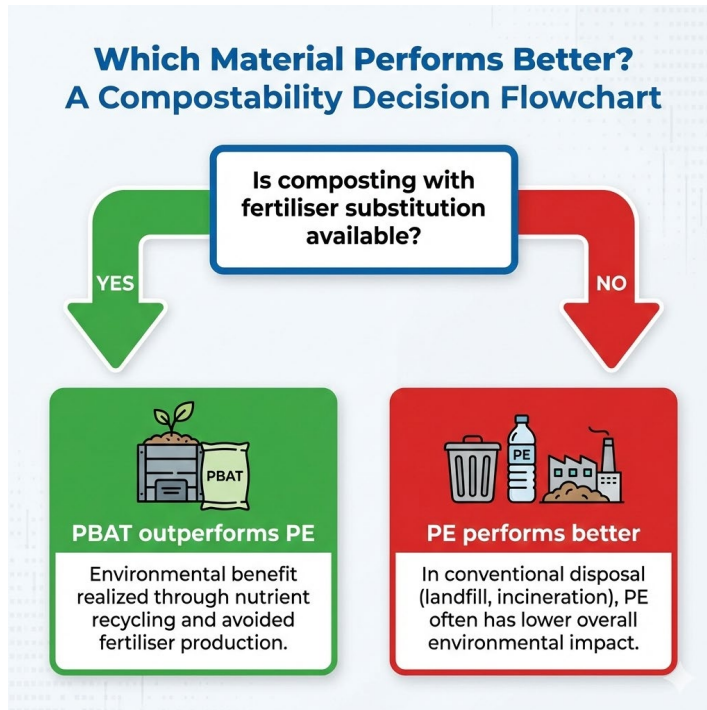
This study compared the production process of PBAT with inorganic fillers to that of PE, focusing on the gate-to-gate scope (from pellets to resin blend). It also looked at the end-of-life scenario: a comparison of composting and landfilling, calculating the gate-to-gate environmental impact.

The total greenhouse gas emissions associated with the gate-to-gate production of 1 kg of PBAT-based material are approximately 8.64 kg CO₂ eq, with mixing and drying alone contributing over 4.3 kg CO₂ eq. This highlights the significant role of energy use in early processing stages of PBAT, and the importance of developing energy-efficient processes fuelled by renewable energy.



In the gate-to-gate phase(from pellets to resin blend), PBAT's total environmental impact (921.09 mPt) is higher than PE's (276.97 mPt), primarily due to its resource-intensive production processes.

However, in the gate-to-grave phase, PBAT shows a net negative environmental impact (-53.95 mPt) because of composting. In contrast, PE shows a considerable impact (288.81 mPt) in this phase. Composting compostable materials such as PBAT maximises their environmental benefits. The benefits also depend on whether the composted product is suitable for use as a fertiliser to enrich the soil.



This study is part of our five-part Bio-based LCA Blog series. We will explore other topics in the upcoming blog posts. If you have any particular topic, you would like us to cover, please reach out at lca@recoup.org

Disclaimer: The summary reflects the article's findings, which apply only to the products or systems studied and are based on the data and assumptions used by the research team. A single LCA study's results do not represent a comprehensive comparison of materials or processes and are specific to the scenario analysed. For questions about these findings, consult the article and contact the research team directly. Always cite the original study when referencing it. BPF and RECOUP support independent research and recommend reading the full study.

Link: [Life Cycle Assessment Sheds New Insights Toward Sustainable Management of Biodegradable Resin Blends Used in Packaging: A Case Study on PBAT | MDPI](#)
