

## Sustainable waste management: Recovery and circularity.

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### Introduction

This review provides a clear look at using food waste to make biochar, covering its production methods, the challenges faced, and what's coming next. It highlights biochar's potential for soil improvement and carbon sequestration, pushing for more efficient and sustainable conversion technologies [1].

This comprehensive review examines the current obstacles and future possibilities in plastic waste recycling. It delves into various recycling methods, identifying key technological and economic hurdles while pointing toward innovations that could make plastic circularity a reality [2].

This review focuses on advanced oxidation processes for treating landfill leachate, offering an overview of recent developments. It pinpoints the challenges in applying these methods and suggests future research directions to improve their efficiency and cost-effectiveness for managing this complex waste stream [3].

This critical review explores circular economy strategies specifically for textile waste. It assesses existing practices, highlights policy gaps, and points towards technological and systemic innovations needed to transition the textile industry from a linear model to a more sustainable, closed-loop system [4].

This review covers sustainable waste-to-energy technologies, presenting the latest advancements and future outlook. It discusses various methods for converting waste into energy, emphasizing their environmental and economic viability, and identifies areas for further development to enhance efficiency and reduce impact [5].

This review summarizes technologies for recovering resources from wastewater, addressing current practices, challenges, and opportunities. It details how valuable materials like nutrients and energy can be extracted, advocating for integrated approaches to turn wastewater treatment into a resource generation process [6].

This review focuses on enhancing anaerobic digestion of organic waste, specifically through pre-treatment, co-digestion, and different reactor configurations. It evaluates how these methods improve biogas yield and process stability, offering insights into optimizing

waste-to-energy conversion [7].

This review examines life cycle assessment (LCA) for municipal solid waste (MSW) management systems. It critiques current LCA practices, points out methodological challenges, and suggests future directions to improve the environmental performance evaluation of different waste management strategies [8].

This review delves into the pyrolysis of agricultural waste for bio-oil production, outlining recent advancements and persistent challenges. It explores how converting agricultural residues into bio-oil can contribute to renewable energy and waste valorization, highlighting research needs for process optimization [9].

This critical review discusses sustainable approaches for plastic waste management, specifically pyrolysis, gasification, and chemical recycling technologies. It evaluates their potential to mitigate plastic pollution and contribute to a circular economy, emphasizing the need for robust infrastructure and policy support [10].

### Conclusion

Recent reviews across waste management highlight a concerted effort towards sustainability and resource recovery. Transforming food waste into biochar is gaining traction for soil improvement and carbon sequestration, pushing for more efficient conversion methods. Plastic waste recycling faces significant technological and economic hurdles, with innovations aiming for full circularity. Similarly, advanced oxidation processes are being refined for treating challenging landfill leachate, focusing on efficiency and cost-effectiveness. The textile industry is exploring circular economy strategies to move towards a closed-loop system, identifying policy gaps and technological needs. Resource recovery from wastewater is also a key area, detailing methods to extract valuable nutrients and energy, turning treatment into resource generation. Sustainable Waste-to-Energy technologies are being advanced, covering various conversion methods and emphasizing environmental and economic viability. Enhanced anaerobic digestion of organic waste, through pre-treatment and co-digestion, aims to optimize biogas yield and stability. Pyrolysis of agricultural waste for bio-oil production shows promise, though process optimization remains cru-

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cial. Finally, sustainable approaches for plastic waste management, including pyrolysis, gasification, and chemical recycling, are being evaluated for their potential to mitigate pollution and foster a circular economy, requiring robust infrastructure and policy support. Life Cycle Assessment plays a critical role in evaluating and improving these diverse waste management strategies.

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