

Abstract

Lignin: A Valuable Lignocellulosic Feedstock for an Eco-Sustainable and Circular Bioeconomy [†]

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Abstract: The term circular bioeconomy refers to the situation in which non-renewable fossil resources are being replaced by renewables and other naturally generated resources, which is now encouraging economic growth and development in order to become more sustainable. The importance of bio-based materials grows by the day due to their positive life cycle assessment (LCA) and carbon footprint. Unlike fossil-based raw materials, lignocelluloses derived from wood and forests are renewable raw materials. Lignocellulosic materials are valuable feedstock for the transition from a petroleum-based economy, also known as black gold, to a green gold economy. There has been a lot of interest in using lignin as a bio-based alternative to fossil-based products. Lignin is the second most abundant organic polymer in nature and is playing an increasingly leading role in the forest-based bioeconomy. Each year, the pulp and paper industry produces around 50 million tons of lignin, only 2% of which is used commercially for added-value applications, while the remaining 98% is directly burned to generate energy in the pulping and biorefinery industries. It is significant to unlock the potential of lignin and utilize it in sustainable products. LCA analyses indicated that lignin-based products generally outperform fossil-based products in terms of environmental performance, especially when it comes to climate change. This review focused on the potential, valorization, and role of lignin in the bioeconomy as well as LCA analyses.

Keywords: carbon footprint; circular bioeconomy; life cycle assessment; lignocellulosic feedstock; lignin; sustainability

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