



## Potential of hydrochar in the treatment of pig farming effluents

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### ABSTRACT

Over the past few decades, global population growth and improved living standards have led to increased demand for livestock products. However, this has resulted in a significant rise in manure production, particularly in the pig industry. In the European Union, this sector generates 18 million tons of waste annually, reaching nearly 25 million tons of greenhouse gases in 2018. Approximately 70% of this waste is used directly as organic fertilizer without proper pretreatment, causing serious transboundary environmental and potential health issues. To address these concerns, hydrothermal carbonization technology has been applied to convert swine waste into a non-toxic, carbon-rich solid material called hydrochar. This approach allows for various applications of the resulting biomass. By adopting Circular Bioeconomy principles, the study of different product streams revealed that hydrochar derived from this waste mitigates some of the problems associated with composting, such as seasonal variations, large land requirements, and heavy metal contamination. As a result, it was proven to be a superior fertilizer with advantages in soil quality, serving as an amendment matrix, a remediation agent, a precursor to selective adsorbents, and a means to treat acidic soils. Furthermore, it exhibits a comparable energy content to coal, making it a viable energy storage device and solid biofuel. Its utilization also reduces the risk of eutrophication and uranium pollution in wastewater from nuclear fuel activities. Moreover, this hydrochar can effectively remove rotavirus and adenovirus from groundwater. Due to this, the application of hydrothermal carbonization presents an opportunity to address environmental hazards associated with waste management, contributes to renewable energy production, and enhances the recycling of animal waste. Therefore, it holds promise for a more sustainable and circular future.

**Keywords:** circular bioeconomy, effluents, hydrochar, swine, wastewater treatment