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# Hydrothermal carbonization as an all-inclusive process for food-waste conversion

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## Abstract

Food waste is highly energetic biomass but its recycling and disposal process is costly and time-intensive, and the wet, inhomogeneous waste is unwelcome in biomass plants. Searching for an alternative processing pathway, we studied the feasibility of a decentralized, small-scale hydrothermal carbonization plant. Restaurant food waste was converted at 200 °C for six hours into high-quality hydrochar that has fuel qualities similar to those of lignite and which could be used for co-combustion. We successfully treated the liquid phase with ultraviolet radiation to minimize the total organic carbon and chemical oxygen demand in order to facilitate conventional disposal. Such a plant would pay for itself and begin to generate profit within eight years. We see hydrothermal carbonization in the catering industry as a sustainable and convenient solution for food-waste conversion.

*Keywords:* Hydrothermal carbonization, food waste, process water, UV treatment, energy

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## 1. Introduction

Every year, in total six million tons of restaurant food waste are collected in Germany, France and the United Kingdom (European Commission). In most European countries the disposal process is regulated by law. In Germany and Austria, the food service industry is subject to strict regulations relating to hygiene and waste management standards: Food waste must be collected in dedicated, frequently cleaned and sterilized containers, and the waste must be cooled and drained. A collection service transports the waste to a central anaerobic digester to process biomass into biogas. This inhomogeneous, wet biomass, however, is inconvenient here, because it makes the delicate process of fermentation more difficult to control (Rosenwinkel et al., 2015; Levis et al., 2010). Restaurant

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