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for a healthy and sustainable future"

Converting Coffee By-products to a Promising Renewable Fuel for the Coffee Processing Sector

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Abstract

and Asia and an important beverage for most cultures in the world. Interest in increasing sustainability in the coffee value chain is high throughout the world. So besides having to meet the demand for high coffee quality from customers, coffee farmers and producers currently have to face the challenge of how to sustainably deal with coffee by-products from coffee processing: (1) from coffee berries to beans; and (2) from beans to final products such as brewed coffee and instant coffee. Disposal amounts and methods for coffee by-products depend on the region and the processing step in the value chain. About ten million tons of green coffee beans are worldwide produced annually in processing facilities from coffee berries, leaving behind approximately three times that amount as by-products. Coffee consumption or processing to instant coffee produces spent coffee grounds as a waste. Recovery of the by-products as a renewable fuel in the coffee value chain is an important strategy for sustainability. This study investigates the potential of substituting the fossil fuels used in coffee processing with a carbon-rich material (hydrochar) produced by thermos-chemically converting coffee by-products. In lab experiments with hydrothermal carbonisation (HTC), coffee by-products were treated at various process conditions (temperature from 160°C to 240°C, holding time from 1 – 5h, solid content from 15 % to 20 %) and post-treatment steps. The energetic and chemical properties of coffee by-products and their hydrochars were determined in terms of calorific value, ash content, major elements (e.g. C, N, S), minor elements (e.g. Cu, Ni, Zn, Cd, Cr, Pb, As, Hg) and compared with quality requirements for biomass and thermally treated biomass fuels in private stoves and industrial boilers. The presentation will discuss how the HTC-process can be optimised to increase the energetic properties of hydrochar from coffee by-products and the substitution potential of these hydrochars for use as solid fuel in coffee processing. The outcome of this project will support farmers and producers to improve the sustainability of the coffee value chain in Vietnam, and also provide a basis for its adaptation to other coffee production regions.

Keywords: Coffee by-products, coffee value chain, fuel, hydrochar, hydrothermal carbonisation (HTC), sustainability

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