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CARBON FOOTPRINTS ASSOCIATED WITH ELECTRICITY GENERATION FROM BIOMASS SYNGAS AND DIESEL

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Abstract

The limited availability of fossil fuels, as well as the already proven effects of global warming, highlight the need for alternative, environmentally-friendly energy generation. Consideration of primary energy inputs from new and renewable energy resources and technologies represent a major scientific challenge, and a major innovation if realized. This will open up new opportunities for benefit and realized value, in the form of lower costs of energy supply, through the utilization of indigenous energy resources, with reduced carbon emissions. This work applied the Life Cycle Assessment (LCA) methodology to quantify the carbon footprint associated with electricity generation, comparing two different fuels utilized in an experimental generator group. The first fuel was diesel, which was fed to an internal combustion engine attached to a synchronous generator. The second fuel was biomass (woody residues), which was gasified and then utilized in the same combustion engine (after *ottolization* conversion). The functional unit considered herein was the production of 100 kWh of electricity. Diesel fuel presented unsatisfactory results, emitting higher levels of greenhouse gases (1.092 kg CO_2-eq/kWh). Woody biomass helped produce electricity more sustainably (0.269 kg CO_2-eq/kWh), evidencing a possibility of mitigating climate change, with overall avoided emissions of 0.823 kg CO_2-eq/kWh with fuel substitution.

Key words: biomass, carbon footprint, diesel, electricity, life cycle assessment

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