



Sludge to energy recovery treated with selected trace metals additives in anaerobic digestion processes

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The energy demand is ever rising with population increase and technology evolution. Coal consumption in South Africa is estimated to be 86% of the total energy demand. It has a high magnitude of environmental pollution and contributes to climate change. This calls for cleaner, reliable, sustainable, decarbonized, decentralized, affordable, digitized with the diversification of energy mix. The study aimed at investigating the impact of dosing selected trace metals (Ni, Co, Cu) as an additive to the substrate in the sludge to energy recovery using anaerobic processes. Sewage sludge and cellulose were used as a substrate. The biomethane potential study was carried from a 500 mL batch automated bio-digester at a mesophilic temperature of 37 °C and a substratum-to-inoculum ratio (2:1) of the organic load rate. The dosed micro-nutrients acted as microbial-agents responsible for the anaerobic digestion of the feedstock. Cellulose and sludge at 0.25 mg/L (Ni) recorded the highest production of the biomethane. Cellulose inoculated with cobalt had better biomethane production at 0.02 mg/L until 0.05 mg/

L. High production of biomethane was observed at the substrate with a copper concentration of 4.5 mg/L. Adding trace metals to microbial cell surroundings stimulated microbial activity and prevented the accumulation of the fatty acids. However, high concentrations beyond threshold resulted in inhibition, toxicity to the microbial- growth, which was reflected in the reduction of the production of biomethane.