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BIOMETHANE PRODUCTION FROM CO-DIGESTION OF SEWAGE SLUDGE AND CRUDE GLYCEROL FROM BIODIESEL PRODUCTION

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Abstract

Crude glycerol is a major by-product of biodiesel production, which represents about 10% of the biomass input to the process. Crude glycerol is an interesting raw material for at least a couple of anaerobic digestion applications. It can be used in a dedicated facility within the biodiesel production plant itself, supplying both electric and thermal energy to the biodiesel plant; moreover, being a liquid vector with relatively high energy content, crude glycerol can be conveniently dispatched to local anaerobic digestion plants (animal farms, wastewater treatment plants, etc.) and improve their productivity.

In the present study, a long-standing demonstration of crude glycerol co-digestion with sewage sludge is reported. A two-phase pilot plant was used to convert mixed sludge and crude glycerol into biomethane at the Bologna municipal wastewater treatment plant. The two-phase process was started up with sewage sludge as only substrate, as described elsewhere. Crude glycerol was introduced gradually in co-digestion with sewage sludge and had no impairing effects on process parameters. Moreover, phase splitting was stable even when crude glycerol represented more than 70% of the total COD loading rate. Biomass conversion exceeded 80%, leading to a very low amount of residues. Methane production rate was highly increased, thus raising overall productivity of the plant. The significant variation of C/N ratio, due to crude glycerol addition, led to a considerable decrease in ammonia concentration in the digestate when high amounts of glycerol were added. On the basis of this result we can infer that crude glycerol addition had an important consequence on ammonia metabolism.
