

Vacuum fry-drying and torrefaction of organic waste sludge for bio-solid fuel production

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The organic waste sludge (OWS) has been conventionally disposed of to the land and the ocean. One of the problems of landfilling is the unsteady physical and chemical nature of sludge, namely odors, gas emissions (CH<sub>4</sub>), and leachate transport into neighboring subsoils. Since the organic sludge can be converted to a carbon-neutral energy, its thermal oxidation process results in the best global warming balance from an energy perspective. This study presents process modeling and simulation of a commercial-scale fry-drying and torrefaction plant, where torrefied and pelletized bio-solid of 9 t/d is produced from 45 t/d OWS provided by a meat processing industry. Two double-effect evaporations in series are applied to the fry-drying area. The mass and heat balances are calculated with the aid of plant data using ASPEN Plus. The overall energy consumption including steam and electricity is analyzed.