Energy optimization of thermal hydrolysis processes to ensure energy self-sufficiency

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A number of pre-treatments have been proposed to overcome the main limitation of anaerobic digestion processes: the hydrolysis or solubilization step. Among them, thermal hydrolysis is becoming the pre-treatment of choice due to its techno-economic benefits. The main drawback of this booming technology is its high energy intensity.

While the yield improvements reported by commercial processes are all comparable, the key differentiator lies in their specific energy consumption. In order to ensure energy self-sufficiency, a thorough analysis of the key parameters impacting energy consumption, and their interactions, is carried out, comprising: i) the inlet concentration, that dictates how much sludge needs to be vaporised, ii) the hydrolysis mechanism, in particular the presence or absence of flash, that determines the generation of process vapours susceptible to be recovered iii) the pressure levels, that fix the temperature of the recovered streams iv) the heat recovery scheme and v) the cogeneration equipment.

Key themes: advanced anaerobic digestion, thermal hydrolysis, energy efficiency, sludge management

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