Integration of energy, GHG and economic accounting to optimize biogas production based on co-digestion

Fitamo, Temesgen Mathewos; Boldrin, Alessio; Baral, Khagendra Raj ; Vazifehkhoran, Ali Heidarzadeh ; Jensen, Ida Græsted; Kjærgaard, Ida ; Lyng, Kari-Anne ; Van Nguyen, Quan ; Nielsen, Lise Skovsgaard; Triolo, Jin Mi

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Authors: Temesgen Fitamo[1], Alessio Boldrin[1], Khagendra Raj Baral, Ali Heidarzadeh Vazifehkhoran, Ida Græsted Jensen, Ida Kjærgaard, Kari-Anne Lyng, Quan Van Nguyen, Lise Skovsgaard Nielsen, and Jin Mi Triolo

[1] Department of Environmental Engineering, Technical University of Denmark, Miljoevej, 2800 Kgs. Lyngby, Denmark;

Several countries have set a number of targets to boost energy production from renewable sources. Biogas production is expected to increase significantly over the next few decades and to play an important role in future energy systems. To achieve these ambitious targets, the biogas production has to be improved. The economic and environmental performances of the biogas chain must be optimised to ensure viable and sustainable solutions. Different types of feedstock materials will have to be considered, including agricultural residues, agro-industrial residues and, to some extent, dedicated energy crops.

In this study, we integrated three types of analysis - energetic, GHG and economic – in order to optimise biogas production from the co-digestion of pig slurry (PS) and sugar beet pulp silage (SB). We found that the energy and GHG balances are improved when utilising SB as a co-substrate, mainly because of increased energy production. However, the profitability of biogas production is negatively affected when utilising SB, because of the increased costs involved in feedstock supply. The scale of the processing plant is neutral in terms of profitability when SB is added. The results indicate that medium- to large-sized biogas plants, using low shares of SB co-substrate, may be the preferred solution.

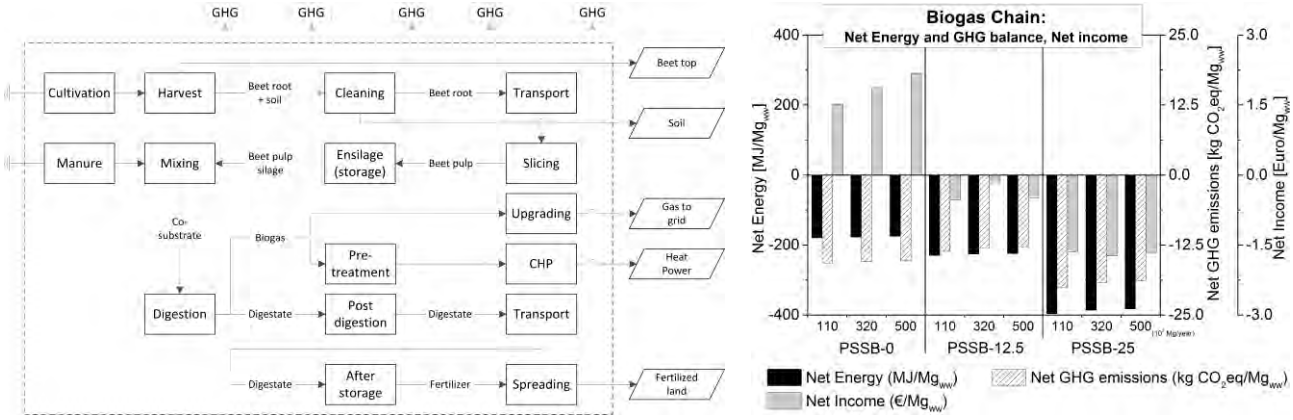

Figure 1 – Biogas production chain (left) and results for integrated energy, GHG, and economic analysis (right), taken from Boldrin et al. (2015).

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Boldrin, A., Baral, K.R., Fitamo, T., Vazifehkhoran, A.H., Jensen, I.G., Kjærgaard, I., Lyng, K-A., Nguyen, Q.V., Nielsen, L.S., Triolo, J.M. (2015) Optimised biogas production from the co-digestion of sugar beet with pig slurry: integrating energy, GHG and economic accounting. Submitted to *Energy*.