Greenhouse Gas Mitigation and Renewable Energy Production through Farm-scale Anaerobic Digestion – Potential for Flanders and the European Union

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The development of farm-scale anaerobic digesters is recently gaining more interest due to its ecological and financial benefits. Such installations allow the conversion of proprietary biomass to biogas and digestate and thus contribute to the mitigation of greenhouse gas (GHG) emissions by avoiding uncontrolled emissions during long-term biomass storage (Marañón et al., 2011; Mesa-Dominguez et al., 2015; Miranda et al., 2015). The produced biogas, usually burnt in a combined heat and power (CHP) unit, will provide electricity and heat for farmers to become (partly) self-sufficient in their energy demand. However, most of the current farm-scale installations only use cattle slurry as input. Other agricultural sectors can still not benefit from the (partial) fulfillment of the energy requirements this technology can offer while rising energy prices become a more and more determining cost. Within the context of the Pocket Power project a sector scan for agricultural subsectors is ongoing for the region of Flanders, Belgium. This sector scan explores the possible transfer of the positive experiences with small-scale anaerobic digestion of cattle slurry to other agricultural streams (e.g. pig manure, crop residues). By means of data from the BIOSURF project, funded by the Horizon 2020 research and innovation program of the European Union, the results obtained for Flanders will be extrapolated to an overall potential for Europe. The BIOSURF project itself aims to describe opportunities and potential environmental burdens associated with biomethane production and consumption (Kirchmeyr, 2016).

The sector scan for Flanders is based on a multi-criteria analysis in which not only the amount of available biomass on the farm and the technical feasibility to digest new feedstocks will be important but also the legal restrictions, economic and ecological impact. The coherence of the different criteria will be crucial to decide on the sectors with the highest potential for a farm-scale digester. Using the emission factors researched from National Inventory Reports (NIR) for different animal categories and the number of livestock in EU Member States from FAO (2015) and EUROSTAT (2015), real emissions and energy potentials per animal category are calculated and extrapolated for the European Union in the BIOSURF project. The results can be used to estimate a potential for small-scale anaerobic digesters across Europe while taking the unique specialties of farm-management in each region into account and incorporating the differences in the overall analysis.

The calculation of GHG emissions described in the EU Renewable Energy Directive (RED) lacks options to include the various specialties of biomethane compared to conventional liquid biofuels. Providing an alternative calculation model with accurate statistical values at European level thus highlights the importance of this study. Furthermore, quantifying the potential for farm-scale digestion in Europe will help (potential) end-users, policy makers and constructers in their decision making. Moreover, by investigating specific trends in Europe, countries could learn from each other on how to improve their farm-management to fully benefit from this technology.

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BIOSURF is funded by the Horizon 2020 research and innovation programme of the European Union. The objective of the **BIOSURF project** (BIOmethane as Sustainable and Renewable Fuel) is to increase the production and use of biomethane (from animal waste, other waste materials and sustainable biomass), for grid injection and as transport fuel, by removing non-technical barriers and by paving the way towards a European biomethane market.

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