ABSTRACT BOOK

SESSION # 18

S18.02

Nutrient and energy potential for sustainable biorefineries based on wastes of agrifood systems: two regional cases

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Increases in energy prices, emission and waste regulations, and the trend towards responsible consumption, together with innovative business models, are enhancing relative competitiveness of waste-based energy and fertiliser production. This can create new business opportunities. Bioenergy and waste-based nutrients can replace non-renewable energy sources and fertilisers, helping to mitigate climate change and reduce water eutrophication. Waste biomass provides bioenergy with high energy efficiency and does not contribute to increase of food prices. The return of biomass from watercourses to fields also contributes to recovery of eutrophied water ecosystems. The aim of our study is to identify business models and opportunities with corporate social responsibility (CSR) presented by biorefineries based on wastes and return flows of agrifood systems (Figure 1). Two regional cases are explored, and methods for generalisation are developed. This paper presents the framework of the overall study, and results of a sub-study on the nutrient and energy potential of the case agrifood systems to answer the following research questions: 1. What is the biomass potential of wastes and return flows of two different regional agrifood systems? 2. What is the NPC (nitrogen, phosphorus, carbon) and energy output of that biomass, if the most appropriate energy and fertilizer production technology for each biomass type is applied? In the present sub-study, regional flows, volumes, quality and locations of biomass were analysed using statistics, actor interviews and GIS methods, and appropriate technologies (Figure 2) by energy, mass and nutrient balance calculations. In the overall study, business models are analysed following the constructive approach where the scientific value added will be measured through success of the process. Alternative integrated biorefinery models are developed in collaboration with stakeholders, and their overall sustainability is assessed: environmental impacts using LCA, impacts on regional economy based on input-output models and equity of influence in actor chains through interviews (Figure 3).

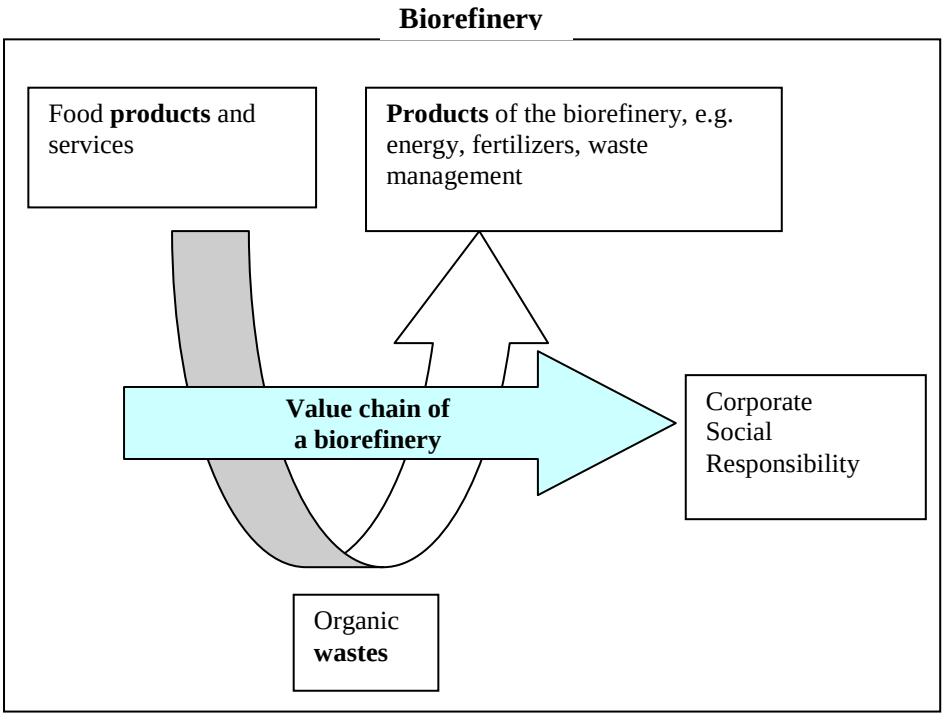

Figure 1. Conceptual framework for an agrifood waste based biorefinery

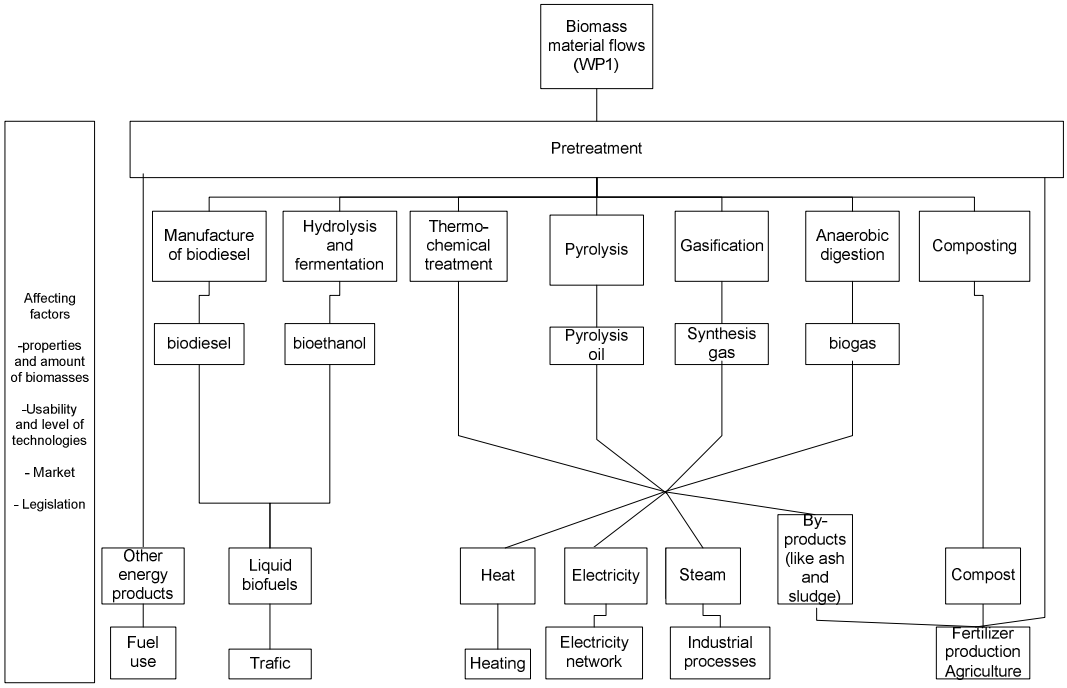

Figure 2**.** Conceptual framework for assessment of biomass treatment technologies and end products.

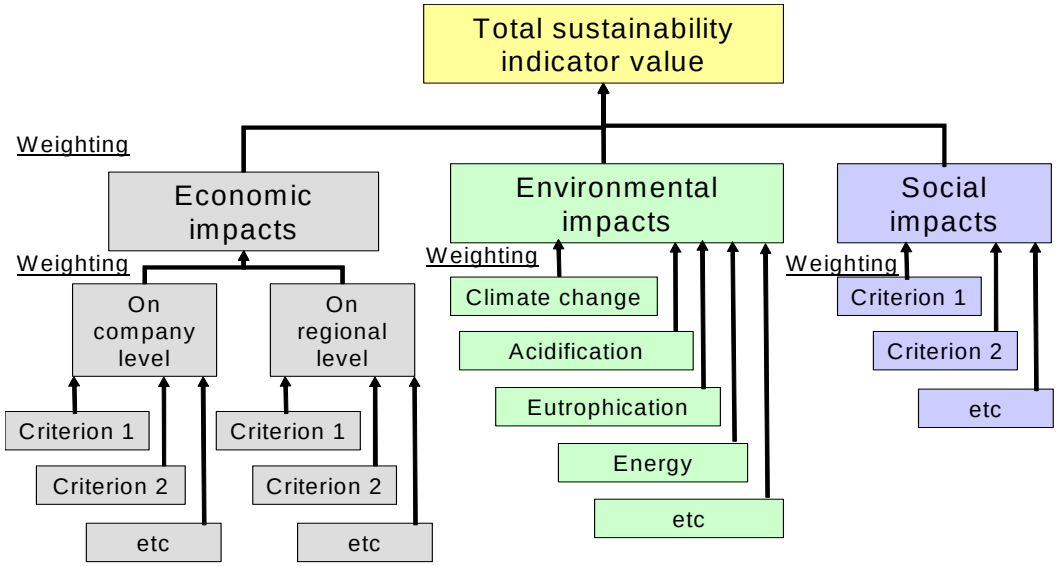

Figure 3. Conceptual framework for assessment of corporate social responsibility of alternative biorefineries based on the decision assessment method on the three dimensions of sustainability.