ECONOMIC ANALYSIS OF BUSINESS MODELS WITH MULTIPLE POTENTIAL VALUE STREAMS: APPLICATION TO THE BIOCHAR SYSTEM

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Biochar is made from organic materials and plays a crucial role in carbon sequestration to realise the net-zero target. Related business models of biochar are not yet implemented on the market. Understanding the viability and feasibility of demand-side policies and the role of producers and farmers in the nascent market will be the key to the successful deployment of biochar. This work analyses a possible biochar business model to achieve a common positive net present value on both the producers' side and the farmers' side, and to identify which economic, technical, and policy factors are important for the success of implementation. Producers' side includes feedstock supply, transportation and biochar production, while farmers' side mainly consider transportation and soil application. The impact of the biochar production cost, the carbon credit and changes in the input parameters such as production scale on profitability are assessed. The results show that producer-centred business cases can be already profitable with the current high fertilized biochar price if considering the carbon credit benefits. However, farmer-centred business models still have negative net present values and the net present value is worsened when carbon credit benefits are given to producers. Key parameters for the negative result are high biochar price and uncertain co-benefits such as crop yield increase. Nevertheless, it must be considered that lower biochar prices have a negative impact on the producer-centred business model. To allow for profitable business cases, the carbon credit benefits need to be reasonably distributed to ensure positive profit from both sides. Given these facts, it is necessary to create the required framework conditions, such as further subsidies on biochar production and application, to ensure the commercialization of biochar.