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SUSTAINABILITY ANALYSIS IN SHORT ROTATION COPPICE – INTEGRATING LIFE CYCLE THINKING IN THE SUPPLY CHAIN MANAGEMENT OF WOOD ENERGY CHIPS

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Abstract: *Existing life-cycle-analyses (LCAs) claim positive effects of increased use of biomass from cultivation of short rotation coppices (SRC) on agricultural cropland compared to extensive agriculture and use of fossil energy. Decentralised energy production, the use of local energy sources, increased security of energy supply, shorter transport distances and reduced energy transmission losses can be seen as benefits.*
Several studies show that results of LCAs can vary a lot, f.e. depending on the choice of system-boundaries or taking the change of land use into account. To avoid contradictionary results it's essential to analyse the object of investigation in a comprehensive way with well defined system-boundaries.
In the present study, which is part of the project "PROBIOPA" (Sustainable production of biomass with short rotation plantations of poplar on marginal sites), different harvesting systems of SRC on cropland for the production of chips as well as the down streaming processes are compared.
The full life-cycle, including all impacts between the changes of cropland to the conversion of the product into energy is taken into account while the main focus is lying on the impact of different harvesting operations. In addition to other LCAs, also social aspects of the cultivation of SRC are taken into account (e.g. creation of employment and income in rural area) as well as the costs of different supply chains.
The poster will highlight the methodological approach and the process chains analyzed in the study.

1. Introduction

Over the course of the last decades the idea of 'sustainable development' has appeared as a major topic on international policy agendas. As described in detail in Bürzle (2009) and Fundel (2009) the EU expects the forestry-wood sector - like all other sectors - to contribute to the aims set in the Lisbon Strategy and in the "Sustainable Development Strategy" which is based on the three pillars of sustainable development, namely the economic, social and environmental pillar. However, this sector faces intense challenges and adaptation constraints with regard to globalisation, changing trade relations and shifting in demography, live-style and consumers' behaviour. Additionally, the forestry-wood sector is land-based and at the same time embodies a high-tech industry. Due to these characteristics this sector "requires a careful balancing act between economic, social and environmental sustainability" (EFORWOOD 2007) to ensure its long-term stability and growth. When it comes to decision making and consultancy in policy and trade areas, stakeholders are often expected to deal with complex clusters of issues, sometimes with conflicting objectives and unexpected side effects.

Current debates on various issues such as climate change, boosting renewable energy-sources or saving and developing biodiversity have brought the forestry sector and the wood-working industry more and more into the focus of policy-makers: It is supposed that they can play an important role in improving the

situation in the named fields (EFORWOOD 2007). Recently, the support as well as the subsidies of renewable resources is discussed a lot, not at least because of the conflict between the production of crops for food of for energy.

The concept of a Sustainability Impact Assessment (SIA) can contribute to base political decisions on a rational basis. SIA can create opportunities for economic growth and for social development; the challenge is to maximise the positive side and to minimise the negative one.

For the use of timber from short rotation coppice for energy no SIA was undertaken yet. The objective of this study is to highlight the advantages and disadvantages of different supply chains as well as synergies and trade-offs. The poster presents the new methodological approach of SIA and shows how SIA could be implemented in the analysis of the impacts of a short rotation coppice.

2. Method

In this methodological approach, the impact of a specific supply chain towards sustainability is measured by aggregating indicator values of each process of a specific supply chain (Berg et al. 2010; Vötter 2009). Following the model approach, main steps to build a supply chain are firstly to identify processes and products (according to Lindner et al. (2009) are products mass-based inputs and outputs of processes and build the linkage among processes). That means the supply chains consists of a large amount of different processes, starting from land use, soil preparation; planting, growing, harvesting, followed by transporting of the material, drying, storage, ending with the consumption or waste treatment and - if possible- the use of the ash. Secondly, the material flow describes the amount of material that passes through the supply chain and describes dispersing flows by means of input and output product shares at process level. Indicators are calculated by multiplying the input material flow for a process in the chain with the indicator value occurring at a specific process (Wolfslehner et al. 2010). This is done for all individual processes and all indicators. Finally, indicator values can be aggregated per indicator along the chain in a way, that one specific value per indicator is the output. The result can be compared with those of alternative supply chains.

More information about Sustainability Impact Assessment can be found under Fischbach and Becker (2010): “Sustainability Impact Assessment in the Forestry-Wood-Chain- Impact of road transport compared to rail transport of wood in Baden-Württemberg” and Fischbach and Berg (2010): “Logging processes in the European Forestry-Wood-Chain – Efforts, gains and costs for sustainability” in this book as well as under the named references.

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