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Liquid biofuels - can they meet our expectations?

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Liquid biofuels are one of the options for reducing the emission of greenhouse gases and the dependence on fossil fuels. This is reflected in the DIRECTIVE 2003/30/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of biofuels or other renewable fuels for transport. The promotion of E10, an automotive fuel containing 10 percent bioethanol, is based on this directive. At present almost all bioethanol is produced from agricultural crops such as maize, corn or sugar beet and sugar cane in suitable climates. In view of shortages and rising prices of food, in particular in developing countries, the use of food and feed crops for biofuel production is increasingly criticized. Alternative sources of biomass are perennial grasses and wood, whose cellulose fraction can be converted to alcohol by the so called “second generation” processes, which seem to be close to commercial deployment. The use of the total plant biomass increases the biofuel yield per hectare as compared to conventional crops. Of special interest for biofuel production is woody biomass from forests as this avoids competition with food production on arable land. Historically woody biomass was for millennia the predominant source of thermal energy. Before fossil fuels came into use, up to 80 percent of a forest was used for fuel wood, charcoal and raw materials such as potash for trade and industry. Now forests are managed to yield up to 80 percent of high grade timber for the wood industry. Replacing sophisticatedly managed forests by fast growing biofuel plantations could make economic sense for land owners when a protected market is guaranteed by politics, because biofuel plantations would be highly mechanized and cheap to operate, even if costs for certified planting material and fertilizer are added. For forest owners the decision to clear existing long rotation forests for biofuel plantations would still be weighty because of the extended time of decades required to rebuild a timber forest if alternative fuel sources would outcompete biofuels in the future. Because second generation bioethanol plants are technically complex and will require substantial amounts of biomass – at least at current perception – the impact of large scale conversion of arable and forests to biofuel plantations on biodiversity, ground water, rural communities, tourism as well as traffic and transport, just to mention a few, must be considered. Another factor is storability of biomass. Whole plant and woody biomass is much more difficult to store than grains and a steady flux from the plantation to the mill might be difficult to sustain under adverse weather conditions.