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Guido A Reinhardt

IFEU-Institute for Energy and Environmental Research Heidelberg, Germany

How to improve the sustainability of 1st and 2nd generation biofuels for transportation

First generation biofuels are produced in an industrial scale from agricultural crops since a few decades. They include bioethanol from crops containing sugar (sugar cane and sugar beet) or starch (e.g. from corn or wheat) e. g. in Brazil, the USA, and Europe as well as biodiesel from vegetable oil such as from rape seed, soy bean, palm oil et cetera. Meanwhile a lot of concerns have been raised with the production of 1st gen biofuels such as the "food versus fuel" debate, negative implications due to land use changes associated with negative energy and greenhouse gas balances, water shortages in some areas, displacement of people and land gabbing etc. To avoid such negative implications, since quite some years biomass resources, which don't compete with food production, are investigated to produce second generation biofuels, especially bioethanol and BTL (biomass to liquids) from lignocellulose material such as straw. Numerous activities started in recent years to improve both, the production of 2nd gen ethanol from straw and other lignocellulose material especially in the USA and Europe, and second, the production of BTL from lignocellulose material especially in Europe. But also activities started to improve the production of 1st gen biofuels. To prove their sustainability, life cycle assessments (LCA) as well as integrated life cycle sustainability assessments have been performed (ILCSA). These include all implications of sustainability, namely on environment, economy and society. The presentation will give an overview about the present state of the art concerning the implications on sustainability associated with the production and use of 1st and 2nd gen biofuels. They include e.g., that numerous biofuels save greenhouse gases compared to fossil fuels considering the full life cycles, though increase impacts on ozone depletion and acidification. Based on these findings numerous options for improvements will be presented. They include e.g. to produce the biomass for biofuels via increasing yields on the same area or using marginal land. Other options are to use the co-products more efficiently e.g. by energy recovery or to consider long term contracts in rural areas. The detailed discussion and presentation of the scientific findings regarding these topics are rounded off by conclusions and recommendations for policy, industry, science, and consumers.

Biography

Guido A Reinhardt is Member of the Scientific Board of IFEU and Scientific Director of the Department of Sustainability of Renewable Energies and Biobased Systems. Since he joined IFEU in 1991, he has been working in the fields of life cycle assessment (LCA) and integrated life cycle sustainability assessment (ILCSA), covering several sectors such as industrial products, transport and environment, environmental assessments of food, bioenergy, industrial crops and biobased materials, these includes all existing and innovative biofuels for transportation. He has a broad experience in the acquisition and coordination of large-scale projects and is a Consultant for national and international institutions such as the European Commission, FAO, UNFCCC, UNIDO, etc. He is a member of several advisory panels. He is author and co-author of many books and 400+ publications.

guido.reinhardt@ifeu.de