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Editorial: Land use impacts of bioenergy. Selected papers from the IEA Bioenergy Task 38 meetings in Helsinki, 2009 and Brussels, 2010

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Since 2008, bioenergy has come under criticism as to its sustainability, impacts on land resources, and the timing of the greenhouse gases emissions and emission reductions when land use change is considered. The initial criticisms were brought to the attention of the climate change mitigation and bioenergy communities in a few key papers [1e3]. To stimulate discussion on these issues, IEA Bioenergy Task 38 organized two workshops: firstly “Land Use Changes due to Bioenergy: Quantifying and Managing Climate Change and Other Environmental Impacts”, in Helsinki, Finland (March 30 - April 1st, 2009), then “Greenhouse Gas Emissions from Bioenergy Systems: Impacts of Timing, Issues of Responsibility” in Brussels, Belgium (March 8 - 10th, 2010). The seven articles in this Special Issue were presented at these workshops. They cover a diverse range of issues relating to land use impacts and sustainability of different products and bioenergy pathways with particular focus on greenhouse gas emissions, and include both estimates of impacts and suggested solutions.

Two papers have a broader (global) approach. The first one [4] estimates global bioenergy potential from agricultural land in the year 2050, following a “food first” approach. Food requirements for a growing world population strongly influence bioenergy potentials. Integrated approaches are needed to optimize food and bioenergy supply. The second paper [5] applies a global land-use model to assess N₂O emissions from fertilizing cellulosic bioenergy crops in connection with agricultural intensification.

Other papers consist of country-based studies which examine the impacts of bioenergy and land use. The third paper [6] assesses sustainability aspects of land use for the main industries and products in Finland based on three indicators (bio-capacity, human appropriation of net primary production and ecosystem degradation potential). The fourth paper [7] examined how greenhouse gas emissions of bioethanol from crops in Finland and the endogenous crop prices impact social benefits from ethanol production. The fifth paper [8] evaluates 70 modern and four traditional bioenergy pathways for Germany concerning greenhouse gas emission reductions and mitigation costs with special regard to land use change effects.

Finally, the Special Issue includes a pair of studies that propose approaches to managing land use impacts of bioenergy. The sixth paper [9] assesses the potential for linking the cultivation of biofuels with forest conservation in the context of the by UNFCCC proposed concept on “Reducing Emissions from Deforestation and Degradation (REDD)” for five case studies. His proposed policy model would leverage forest carbon with biofuel markets. The seventh paper [10] compares four European sustainability initiatives, focusing particularly on

approaches for direct and indirect land use change assessment. In keeping with the goals of IEA Bioenergy, we hope that the reader will find these articles both of scientific and policy interest.

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To be cited as:

Woess-Gallasch S, Bird N, Cowie A. Editorial: Land use impacts of bioenergy. Selected papers from the IEA Bioenergy Task 38 meetings in Helsinki, 2009 and Brussels, 2010. *Biomass and Bioenergy*, 2011, 35, 4751-4752. DOI: 10.1016/j.biombioe.2010.12.053.

This Special Section is published in *Biomass and Bioenergy* 2011, Vol. 35 and is available online at <http://www.sciencedirect.com/science/journal/09619534/35>