
Multidimensional sustainability framework to evaluate forest-based bioenergy systems

Karri Pasanen; Katja Lahinen; Pekka Leskinen

Finnish Forest Research Institute
P.O.Box 68, FI-80101, Joensuu, Finland
karri.pasanen@metla.fi

Abstract:

The increased production of bioenergy from forest biomass is raising the needs for sustainability evaluations of different bioenergy production systems. The BioSus-research project was established to create a multidimensional sustainability framework which will enable simultaneous examination of different ecological, economic, social and cultural effects of four forest-based bioenergy production chains: small-scale district heating with forest chips, combined heat and electricity production with wood and peat combustion in a large CHP plant, wood pellets production for domestic and international markets and biodiesel production with wood and peat.

The indicators of each sustainability dimension to be used in evaluations were defined in expert interviews. In addition, the views of different interest groups were integrated into the evaluation framework by separate interviews. The bioenergy production chains were described in detailed process charts and the indicator data were collected from each process step. Finally, the life-cycle effects of production chains were assessed within the evaluation framework with multi-criteria decision analysis and life-cycle assessment.

BioSus-project provides new information of forest-based bioenergy systems' sustainability effects. The results of the BioSus-project may be applied, for example, in business planning, in regional natural resources management and in framing national energy policy. The sustainability evaluation framework provides possibilities for identifying critical points in bioenergy production chains and for seeking ways of supporting sustainable use of natural resources.

Keywords: Bioenergy, LCA, sustainability

Remark: Full paper has not been submitted.