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Forest owner motivations and attitudes towards supplying biomass for energy in Europe

Kristina Blennow [a,*], *Erik Persson* [a], *Marcus Lindner* [b], *Sónia Pacheco Faias* [c], *Marc Hanewinkel* [d]

[a] *Department of Landscape Architecture, Planning and Management, Swedish University of Agricultural Sciences, SE-230 53 Alnarp, Sweden*

[b] *European Forest Institute, Yliopistokatu 6, 80100 Joensuu, Finland*

[c] *University of Lisbon, Centro de Estudos Florestais, Tapada da Ajuda, 1349-017 Lisboa, Portugal*

[d] *Swiss Federal Institute for Forest Snow and Landscape Research, Research Unit Forest Resources and Management, CH-8903 Birmensdorf, Switzerland*

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ABSTRACT

The European Commission expects the use of biomass for energy in the EU to increase significantly between 2010 and 2020 to meet a legally binding target to cover at least 20% of EU's total energy use from renewable sources in 2020. According to estimates made by the member states of the EU, the direct supply of biomass from forests is expected to increase by 45% on a volume basis between 2006 and 2020 in response to increasing demand (Beurskens LWM, Hekkenberg M, Vethman P. Renewable energy projections as published in the national renewable energy action plans of the European Member states. ECN and EEA; 2011. http://https://www.ecn.nl/docs/library/report/2010/e10069.pdf [accessed 25.04.2014]; Dees M, Yousef A, Ermert J. Analysis of the quantitative tables of the national renewable energy action plans prepared by the 27 European Union Member States in 2010. BEE working paper D7.2. Biomass Energy Europe project. FELIS – Department of Remote Sensing and landscape information Systems, University of Freiburg, Germany; 2011). Our aims were to test the hypotheses that European private forest owners' attitudes towards supplying woody biomass for energy (1) can be explained by their responses to changes in prices and markets and (2) are positive so that the forest biomass share of the EU 2020 renewable energy target can be met. Based on survey data collected in 2010 from 800 private forest owners in Sweden, Germany and Portugal our results show that the respondents' attitudes towards supplying woody biomass for energy cannot be explained as direct responses to changes in prices and markets. Our results, furthermore, imply that European private forest owners cannot be expected to supply the requested amounts of woody biomass for energy to meet the forest biomass share of the EU 2020 renewable energy target, at least if stemwood is to play the important role as studies by Verkerk PJ, Anttila P, Eggers J, Lindner M, Asikainen A. The realisable potential supply of woody biomass from forests in the European Union. For Ecol Manag 2011;261: 2007–2015, UNECE and FAO. The European forest sector outlook study II

* *Corresponding author*. Tel.: +46 40 41 52 30.
E-mail addresses: kristina.blennow@slu.se (K. Blennow), erik.persson@slu.se (E. Persson), marcus.lindner@efi.int (M. Lindner), soniapf@isa.utl.pt (S.P. Faias), marc.hanewinkel@wsl.ch (M. Hanewinkel).
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2010–2030. United Nations, New York and Geneva; 2011 [abbreviated to EFSOS II] and Elbersen B, Staritsky I, Hengeveld G, Schelhaas MJ, Naeff H, Böttcher H. Atlas of EU biomass potentials; 2012. Available from: http://www.biomassfutures.eu [accessed 14.10.2013] suggest.

1. Introduction

The European Commission expects the use of biomass for energy in the EU to increase significantly between 2010 and 2020 to meet a legally binding target to cover at least 20% of EU's total energy use from renewable sources in 2020 [1]. According to National Renewable Energy Action Plans (NREAP) reporting estimates made by the member states of the EU, today woody biomass is the most important source of renewable biomass [2–4]. Its use is expected to increase by 45% by volume between 2006 and 2020, corresponding to 8% of the expected total increase in renewable energy use in the EU [3,4]. In the NREAPs this direct supply of woody biomass from forestry for energy use is estimated in total from fellings, residues from fellings and landscape management and only few countries have reported the amount of feedstock in further detail [2].

Several studies have, however, estimated the future potential woody biomass supply from European forests also for different compartments. The most comprehensive study was carried out in the EUwood project [5,6] and the results have been used in follow-up work in the context of the European Forest Sector Outlook study EFSOS II [7]. The same results have also been used in the Biomass Future project [8].

According to EFSOS II [7], an ambitious bioenergy policy could mobilize 55% more energy wood by 2020, whereby the total wood use for energy would increase from 435 to 673 Mm^3 per year. The additional extraction of 238 Mm^3 woody biomass per year for energy could only be achieved by mobilizing a number of different biomass compartments. Besides a large contribution from harvest residues and stumps, also the extraction of stemwood would increase by 50.8 Mm^3 from 2010 to 2020. This is a substantial amount, considering that the 2010 level of roundwood removals from EU 27 forests was 418.7 Mm^3 [9]. However, as also the reference scenario of EFSOS II projected increased stemwood removals, the net effect of the 2020 20% renewable energy target was an additional 18.3 Mm^3 $year^{-1}$ of stemwood removals for energy generation by 2020. Another modeling study with slightly different scenario assumptions estimated 40.8 Mm^3 $year^{-1}$ additional stemwood removals for energy generation as a net effect of the 2020 renewable energy policy targets [10]. The larger share in the latter study was caused by considerable replacement of wood for material use, which was diverted to energy use (whereas in the EFSOS II scenario wood supply for material use increased as well).

In the study by Verkerk et al. [6] and in the subsequent work [7,10] prices for wood, forest products, and energy are assumed to show steady long-term growth and thereby act as a basic incentive for forest owners to increase the supply by intensifying forest management and expanding the land used for forestry. Because rotation periods of European forests are typically several decades long [11] contributing more stemwood for energy implies that the management objective of some forest stands that today are managed for stemwood for timber, pulp and material use would have to be changed to woody biomass (in any form) for energy before the end of the rotation period. Lacking empirical evidence of the motivations and attitudes of European forest owners to increase the supply of woody biomass for energy, Verkerk et al. [6] and UNECE and FAO [7] assumed that the availability of wood from privately owned holdings was lower on the very smallest private holdings and increasing rapidly when the holding size increased. The assumption is based on a positive correlation between management intensity of U.S. private forest owners and size of their holdings. This is explained to result from better financial situations of owners of large holdings [12]. The effect is implemented by multiplying the maximum harvest level with a factor derived from the size of the holding. The future change in forest area is expected to follow the observed trend of increasing forest area for the period 1990–2005 for all countries of the EU, except Finland where the trend is in the opposite direction [13].

Fifty percent of the forest land in Europe is privately owned [7,14,15]. Hence, private forest owners' use of the land and the way they manage their forests will strongly influence the future supply of woody biomass for energy in Europe. The aims of the present study were to test the hypotheses that European private forest owners' attitudes towards supplying woody biomass for energy

1. can be explained by their responses to changes in prices and markets.
2. are positive so that the forest biomass share of EU 2020 renewable energy target can be met.

Empirical consequences of the hypotheses are that forest owners are willing to change their current forest management objective and their land-use to supply more woody biomass for energy if it can be made at profit, and that they have positive attitudes towards meeting the expected supply of woody biomass for energy. The study was based on survey data collected in 2010 from 800 private forest owners in Sweden, Germany and Portugal.

2. Materials and methods

A questionnaire study was designed to assess land owner motivations and attitudes towards supplying more biomass for energy across the EU. The questionnaire was distributed