

Sustainable Supply Chain Management Model for Residual Agroforestry Biomass Supported on a Web Platform

João Matias¹, Carina Pimentel², Ana Luísa Ramos¹, Helena Carvalho³, Leonel Nunes^{1,4}, Leonor Teixeira⁵, Margarita Robaina¹, Marta Ferreira Dias¹, Radu Godina³, Susana Garrido⁶

¹ – GOVCOPP & Department of Economics, Management, Industrial Engineering and Tourism, University of Aveiro.

² – Algoritmi Research Unit, Department of Production and Systems, University of Minho.

³ – UNIDEMI – Mechanical and Industrial Engineering Research and Development Unit, Department of Mechanical and Industrial Engineering, NOVA School of Science and Technology.

⁴ – Prometheus, Research Unit on Materials, Energy and Environment for Sustainability, Business School of the Polytechnic Institute of Viana do Castelo.

⁵ – IIEETA & Department of Economics, Management, Industrial Engineering and Tourism, University of Aveiro.

⁶ – CeBER, Faculty of Economics, University of Coimbra.

FIGURE 1

Some mockups of the Web Platform prototype of the Residual Agroforestry Biomass (mobile version).

FIGURE 2

Simulation model for analysis of different supply chain configurations.

The accumulation of biomass fuel loads in forests and the traditional practice of burning forestry and agricultural leftovers on-site are among the major causes and increased severity of rural fires in Portugal. In this context, the objective of BioAgroFloRes project is to present solutions to valorate Agroforestry Residual Biomass (BAFR – Biomassa Agroflorestal Residual, in Portuguese) in the generation of energy or as a raw material for other industries (e.g., wood pellets, biochar, or green chemicals, among others), while promoting the reduction of rural fire risk. These solutions should meet the difficulties and interests of everyone involved in the value chain: farmers/owners, potential users, transportation companies, or agro-forestry biomass collecting companies. A database of Portuguese biomass was prepared, with the availability and characterization of its properties, and the procedures and practices associated with residual agroforestry biomass, specifically, the traditional practices, and the value chains already implemented (biomass plants, pellet factories, manure production, vegetable charcoal, among others). Environmental problems associated with the use/energy recovery of biomass, such as gaseous emissions from its combustion, particle emission, ash deposition, were also identified. A proposal for sustainable business models for agro-forestry biomass waste was prepared, through the identification of barriers and motivations for valuing it, the identification of supply chain configurations and the selection of economic, environmental, and social performance indicators.

Finally, the research contemplates the design and development of a functional prototype of an intelligent Web platform called W@BioAgroFloRes (Figure 1) that will help to bring BAFR supply and demand closer, enhancing the exchange of information in real time and support the decision-making process (Figure 2). Future actions consist in testing and validating the prototype in a real environment.

