

Biotechnomy System Dynamics Modelling: Sustainability of Pellet Production

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Abstract : The paper discovers biotechnomy development analysis by use of system dynamics modelling. The research is connected with investigations of biomass application for production of bioproducts with higher added value. The most popular bioresource is wood, and therefore, the main question today is about future development and eco-design of products. The paper emphasizes and evaluates energy sector which is open for use of wood logs, wood chips, wood pellets and so on. The main aim for this research study was to build a framework to analyse development perspectives for wood pellet production. To reach the goal, a system dynamics model of energy wood supplies, processing, and consumption is built. Production capacity, energy consumption, changes in energy and technology efficiency, required labour source, prices of wood, energy and labour are taken into account. Validation and verification tests with available data and information have been carried out and indicate that the model constitutes the dynamic hypothesis. It is found that the more is invested into pellets production, the higher the specific profit per production unit compared to wood logs and wood chips. As a result, wood chips production is decreasing dramatically and is replaced by wood pellets. The limiting factor for pellet industry growth is availability of wood sources. This is governed by felling limit set by the government based on sustainable forestry principles.

Keywords : bioenergy, biotechnomy, system dynamics modelling, wood pellets

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