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Simulation of forest energy chips provision chain from the stand to the heating plant – Characterisation of the energy efficiency and minerals exportation.

Authors: Nicolas Bilot, Meriem Fournier, Holger Wernsdörfer, Yann Rogaume

INRA Centre de nancy Lorraine, France, nicolas.bilot@nancy.inra.fr

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There is a growing need for renewable energy to prevent fossil fuels crisis and reduce the impact of energy production on our environment. In this context, there is an increasing pressure on forest biomass. Considering that, it is important to produce efficiently by sparing the energy consumption of the provision chain, and to ensure the sustainability by controlling the impact of the present exploitation on the later production.

We present here a simulator of the wood chips provision chain from forest exploitation, through biomass transformation, to chips delivery at the heating plant: ForEnerChips (contraction of "Forest Energy Chips"). It was implemented to the software platform CAPSIS ("Computer Aided Projection of Strategies in Silviculture"). CAPSIS is an open software platform implementing about 60 models for the simulation of growth and yield for several species and management strategies.

ForEnerChips can simulate any provision chain to produce wood chips. It provides informations about energy consumption detailed along the processes in the chain, minerals exportations, and final produce characteristics such as higher and lower heating values, ashes value, and quantities in terms of mass and quantities of energy.

The outputs of this tool show the parallel between the production of fuel in terms of quantity and quality, and the impact on forest nutrients pool in terms of organic material and minerals exportations. The application presented here is the balance of the use of forest residuals for fuel (small woods with cut diameter inferior to 7cm) with the increase in exportation of nutrients.