

## **Conversion of woody biomass to chemicals, energy and materials**

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Biomass was the main source of materials, chemicals and energy for humans until the industrial revolution. Fossil fuels have become the predominant energy source today. However, fossil deposits are limited, not renewable and on the way to depletion. Biomass is a reliable source of materials, chemicals and energy that can be replenished at the rate of our needs. The biorefinery is a concept for the collection of processes used to convert biomass to materials, chemicals and energy. The biorefinery is a “*catch and release*” way of using carbon that is beneficial to the environment and the economy. Discussions are made for the elements of the wood-based biorefinery as proposed at SUNY ESF (College of Environmental Science and Forestry): hot-water extraction, hydrolysis, membrane separation / concentration, biological conversion of sugars to biofuels, chemical, and materials. The residual woody biomass after hot-water extraction can be (1) further processed as if the woody biomass was subjected pretreatment; or (2) utilized for solid particle board, wood pellets, or GHG applications with improved properties. Hemicelluloses are the most easily separable main component of woody biomass and thus form the bulk of the extracts obtained in hot-water extraction of wood. Hydrolysis of hemicelluloses produces 5-carbon sugars (mainly xylose), 6-carbon sugars (mainly glucose and mannose), and acetic acid. Hemicellulose-extracted woody biomass is lighter and contains less ash. Therefore, niche products can be produced from the residual woody biomass.