

**Biobased Chemicals: Today, Not Tomorrow**  
**The valorisation of functionalized chemicals from biomass resources compared to the conventional fossil production route**

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At some undisclosed point in the foreseeable future, cheap fossil fuels resources will become depleted and the industry will be forced to pursue more difficult reserves with increasingly high extraction costs. Most alternatives available and under research do not consider price as the main motivation for replacement, but focus solely on sustainability and environmental benefits. Sustainability is an interesting word as there are enough fossil resources scattered around the world to be sustainable in quantity but not sustainable in price. Seeing that fossil fuels are derived from prehistoric biomass it is not at all presumptuous to assume that every application and product can be replaced by the biomass of today. In fact, many highly specialised pharmaceutical chemicals already have a biomass origin. Yet, not all of the uses of fossil fuels need to be replaced by a comparable carbon based source, such as biomass. Energy and transportation in particular do not necessary need to rely on carbon cleavage, whereas practically all of the petrochemicals contain a carbon backbone. The main stipulation in substituting fossil-based chemicals with bio-based chemicals is availability and cost.

It is proposed that already today, by utilising existing, recently developed and developing technology, it is economically advantageous for many chemicals to derive from biomass, in particular the functionalized chemicals. The only way to validate this conjecture is to develop a complete comparative life cycle analysis. As opposed to a traditional LCA, the “multicriterion” developed here will revolve around energy flows and process efficiency in terms of exergy. The aim is to assess the optimum route with the best production options along the whole production chain while determining any possible limiting factors. Using this tool, a systematic production matrix relating several logical source crops and a few key chemicals of varying derivative levels can be created and compared to the conventional fossil routes. Combined with economic considerations and some unambiguous environmental factors, the investigation will provide all the information relevant to the industry. The goal is to create an objective and reliable simulation system ratifying the economic and environmental feasibility of exploiting biobased chemicals today and indicate the steps necessary for further improvement.