

# Green Biorefinery - Demonstration plant in Havelland/Germany



Prof. Dr. Birgit Kamm, Christoph Hille & Petra Schönicke  
Research Institute Bioactive Polymer Systems (BIOPOS) e.V. and  
Brandenburg University of Technology Cottbus,  
Teltow-Seehof, Germany  
kamm@biopos.de

Oil refineries currently generate a lot of products for almost every sphere of life at very high efficiency. However, fossil raw materials are only available in limited quantities. The development of comparable BIOREFINERIES is necessary to make a variety of biological products that are competitive with equivalent products based on fossil raw materials. The product range of a Biorefinery comprises both products that can be manufactured on the basis of crude oil and products that cannot (B. Kamm *et al*, 2007, 2011). GREEN BIOREFINERIES (GBR's) are complex systems of sustainable, environment- and resources-friendly technologies aiming at a comprehensive use of materials and energy or recovery of renewable raw materials in the form of green and waste biomasses from a sustainable land use (B. Kamm *et al*, 2009).

Green Biorefineries are also multi-product systems and act with regard to their refinery

cuts, fractions and products in accordance with the physiology of the corresponding plant material, i.e. they preserve and use the diversity of the synthesis generated by nature.

In addition to the Biorefine-

ry concept, GBR's are strongly based on principles of sustainability (sustainable land use, sustainable raw materials, gentle technologies, autarkic energy supply, etc.) as reported in Figure 1.

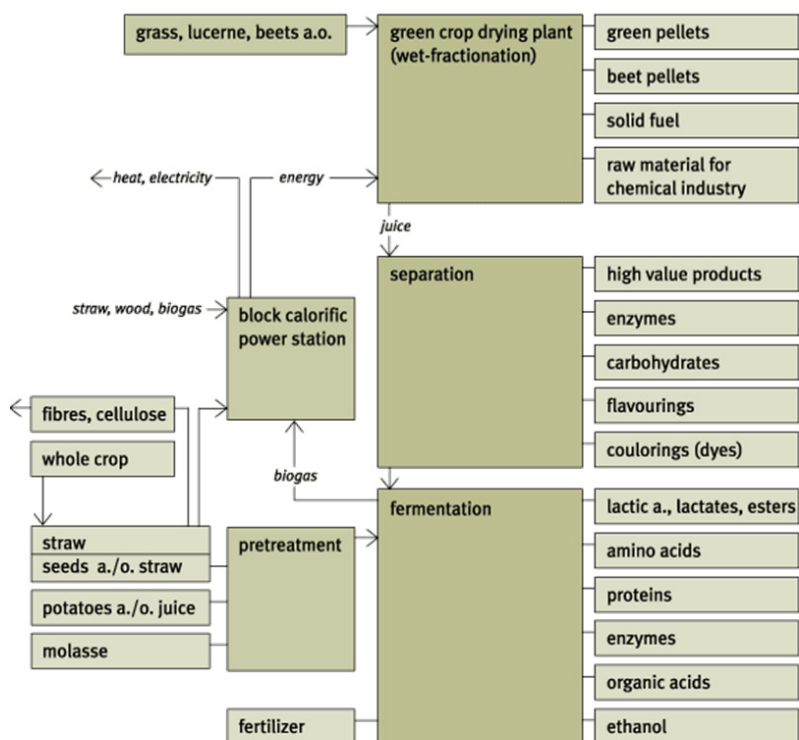


Figure 1. System Green Biorefinery for the manufacture of Food and Non-Food products.

The primary fractionation of Green Biomasses and the production of proteins, fermentation media, animal feed and biogas is demonstrated in a facility connected directly to the green crop drying plant in Havelland (Germany - Brandenburg) in a pilot scheme with an annual capacity of 20.000 tons of lucerne (alfalfa) and grass biomass (primary refinery-basic grade). This primary refinery can be diversified in modules for the production of platform chemicals and synthetic gas. With reference to the basic engineering of the primary refinery, processes, products, investment costs, economic efficiency contemplation and climate effects are shown. The production site and the planned demonstration plant will be presented (B. Kamm *et al*, 2010).

### References

- Kamm B, Schönicke P & Kamm M. 2009. Biorefining of green biomass – technical and energetic considerations, *CLEAN* 37 (1), (2009) 27-30.
- Kamm B, Hille Ch., Schönicke P & Dautzenberg G. 2010. Green Biorefinery Demonstration in Havelland/Germany, *Biofuels Bioprod. Bioref., Special Issue Biorefinery* 4 (2010) 253-262.
- Kamm B, Gruber PR & Kamm M. 2007, 2011. Biorefineries - Industrial Processes and Products, *Ullmann's Encyclopedia of Industrial Chemistry, Electronic Release, 7<sup>th</sup> Ed.* Wiley-Vch, 2007, 2011.