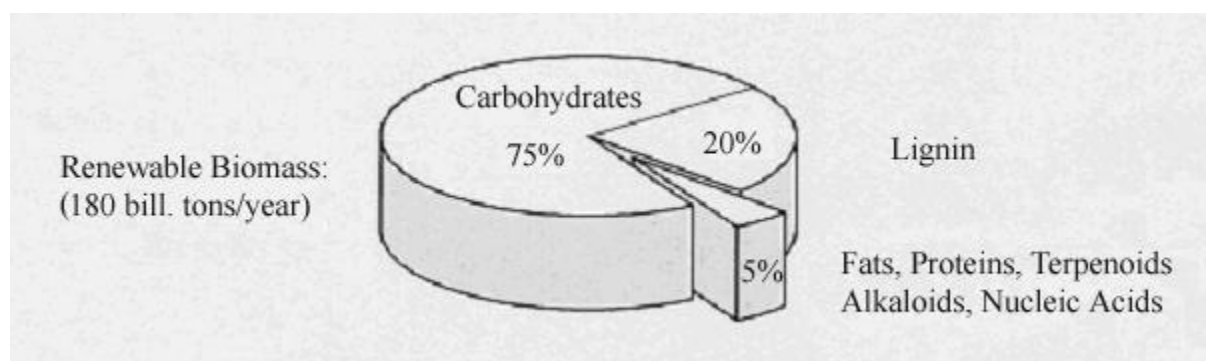


CARBOHYDRATES AS ORGANIC RAW MATERIALS : THE MAJOR CHALLENGES AHEAD

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As our fossil raw materials are irrevocably decreasing – the end of cheap oil is predicted for 2040¹ – and as the pressure on our environment is building up, the progressive changeover of chemical industry to renewable feedstocks emerges as a foremost necessity. Carbohydrates representing 75% of the renewable biomass, they are by far the major biofeedstocks from which to develop industrially and economically viable products that are to replace those derived from petrochemical sources.²⁻⁶



To highlight the major challenges lying ahead, the overview to be presented attempts to trace those carbohydrate-based development lines along which the further exploitation of the key sugars of biomass is likely to proceed, towards bulk or fine chemicals, pharmaceuticals, agrochemicals, high-value-added speciality chemicals, or simply enantiopure building blocks for organic synthesis.

¹ Campbell, C. J., Laherrère, J. H. "The End of Cheap Oil", *Sci. Am.*, March 1998, pp. 60-65.

² Lichtenthaler, F. W. (Ed.), *Carbohydrates as Organic Raw Materials*, Wiley-VCH, Weinheim, **1991**, 365 pp.

³ Lichtenthaler, F. W. „Unsaturated O- and N-Heterocycles from Carbohydrate Feedstocks“, *Acc. Chem.. Res.* **2002**, *35*, 728-737.

⁴ Lichtenthaler, F. W., Peters, S. "Carbohydrates as Green Raw Materials for the Chemical Industry", *Compt. Rend. Chim.* **2004**, *7*, 65-90.

⁵ Lichtenthaler, F. W. "The Basic Sugars of Biomass: Availability, Present Non-food Uses and Potential Future Development Lines", in *Biorefineries – Industrial Processes and Products* (B. Kamm, P. Gruber, Eds.), Wiley-VCH, Weinheim, **2006**, Vol. 2, pp. 3-59.

⁶ Lichtenthaler, F. W. "Carbohydrates as Renewable Raw Materials: A Major Challenge of Green Chemistry" *Methods and Reagents for Green Chemistry* (P. Tundo, A. Perosa, Eds.) J. Wiley, Hoboken, NJ, **2007**, pp. 23-63.