



Biomass Program

Top Value Added Chemicals from Biomass: Sugar, Syngas, and Lignin Pathways

There is an abundance of products—fuels, chemicals, and materials—that could potentially be made from biomass. In order to help the DOE Office of the Biomass Program focus its R&D efforts, analyses were performed to identify the top opportunities for the production of value-added biobased products that would economically and technically support the production of fuels, chemicals, and power in an integrated biorefinery. The analysis was used to identify key technology barriers that could have a broad impact on improving the overall economics for chemicals production. The results, presented in *Top Value Added Chemicals from Biomass, Volume 1 (Sugars and Synthesis Gas)* and *Volume 2 (Lignin)*, are helping to prioritize research opportunities for biobased products.

The *Top Value Added Chemicals from Biomass* (“Top 10”) reports identify the top building block chemicals/chemical classes that can be produced from biomass sugars and lignin via biological or chemical conversion pathways as well as broad technology needs for biobased products. The top tier of the *Sugars and Synthesis Gas* study contains 12 chemical building blocks. The top tier of the *Lignin* study contains 16

chemicals/chemical classes broken down into near-term (4), mid-term (4), and long-term (8) opportunities.

R&D Pathway

Similar approaches were used in conducting the Top 10 analyses for sugar- and lignin-based products. Researchers assembled a large starting group of potential products that are currently produced from petrochemicals or have been given consideration in the literature. The lists were downselected based on the following criteria:

- Technical risk
- Product value
- Market size and risk
- Ability of product to serve as a building block
- Whether the product could be obtained as a single material (lignin only)
- Prior industry experience (sugars only)
- Technical complexity of the synthesis pathway (sugars only)

Since much less effort has been devoted to lignin conversion than other biorefinery process streams, lignin R&D needs that are not linked to products, but will greatly enhance the success of a lignin program were also identified.

The final reports were validated by industry and academic experts.

Bioproducts R&D

Benefits

- Identification of key potential biobased product pathways
- Enable prioritization of OBP R&D efforts

Applications

The Top 10 analyses will help focus R&D efforts on the most technically and economically feasible biobased product pathways, enabling faster commercialization of products in integrated biorefineries.

Project Participants

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Project Period

FY 2003 – FY 2006

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July 2006