

**National Agricultural Research, Extension,
Education and Economics (NAREEE) Advisory Board**

“Bio-Energy and Bio-Based Products Research Initiatives”

**Report and Recommendations from a Focus Session on this Topic Conducted at the
NABREE Advisory Meeting held in Washington D.C.
October 20 - 24, 2006**

Contextual Observations

From an agricultural value chain perspective, bioenergy and bioproducts represent new uses for familiar crops and landscapes. Ethanol and biomaterials have been around for over a century, but they have languished in favor of petroleum-based energy and materials because of a lack of clear economic advantage and sustained support for their development. That situation is beginning to change, and both the Agricultural Research Service (ARS) and the Land-Grant Universities have enormous technical assets that can help strengthen the emerging “bioeconomy.”

In the short term, the greatest success will come from picking the “low-hanging fruit,” i.e. directly replacing familiar oil-based products with equivalent bioproducts from existing crops. However, longer term technological success will depend on developing entirely new crops, new products and new processes. Several speakers cautioned that the technological process is never simple or linear, and success will depend on both (1) translational research and technology transfer and (2) a total systems approach that integrates traditional agricultural research and economics with their larger social and environmental impacts.

For agricultural policymakers, the challenge will be to focus attention on what the public wants (e.g., both cheaper energy and sustainability) while also focusing on the longer term and the larger picture. Previous false starts have left some researchers reluctant to pursue these technologies—a reluctance that can be overcome only by significantly increased and *sustained* funding for bioenergy and bioproduct research.

The debate over expanding the bioeconomy, particularly if approached from a total systems perspective, will also provide an opportunity to address a number of important, collateral issues. These include not only conservation and global warming, but also environmental impacts, including the increasingly critical dialogue about water. The development of the bioeconomy must not come at the expense of the nation’s water supply.

Board members at this meeting asked whether USDA and its university partners have, or can quickly develop, the research and extension workforce that will be required to pursue this new mandate. Some members suggested that long-term success would require larger and more sustained funding (including translational research support) than that now available from USDA. Given the need for multidisciplinary approaches and teamwork, other members suggested that success would also require changes in

professional reward systems—changes that would encourage collaboration rather than individual effort.

As a result of the NAREEE Advisory Board focus session, *Bio-Products at Work, Research, Education, Extension & Economics: Effectiveness of Planning and Execution*, the Board endorses the following recommendations.

Recommendations to the USDA

- USDA should take the lead on strategies for development of a bioenergy and bioproducts based economy. The Board recommends that its report on Biofuels and Bioenergy from the March, 2006 meeting and the recommendations presented here from the October, 2006 Bioproducts Focus Session be considered together. The Board understands that there is a commitment by the Department to make bioenergy a priority issue. A strong USDA role in this area would support the Energy Policy Act of 2005, and will meet the directive to the Agriculture and Energy Departments to conduct an “analysis that provides strategic guidance for the application of biomass technologies in accordance with realization of improved sustainability and environmental quality, cost effectiveness, security and rural economic development featuring system wide approaches.”
- USDA needs to announce a holistic and coherent vision of its role and strategy in bioenergy and to convey this message to the public. The vision should include both long-term research that will contribute to transitional research and technology transfer, and short-term strategies that will sensitize Americans to bioproducts from existing crops replacing oil-based products. The USDA strategy should be a *systems approach to problem solving*, emphasizing collaboration and coordination among federal agencies and Land Grant universities and cooperation with private sector biobased products, processing, and service industries.
- USDA should undertake a focused effort to request the increased funding required to develop a nationally visible program. There are numerous research and education efforts within the REE mission area that relate to bioproduct understanding and new uses, but there is a need for more focused coordination. It is difficult to obtain reasonable REE agency estimates for programs that fund bioenergy and bioproduct research, education, and extension because of REE’s broader budget breakouts under selected programs, such as Agricultural Materials Program (formula and special earmark funding), the Sustainable Agriculture Research and Education Program (Higher Education), and the National Research Initiative Competitive Grants Program and Small Business Innovation Research Program (both competitively funded).
- USDA should take a "portfolio" approach while identifying which new intermediates for current and new applications may hold the most promise for potential commercialization. The Board believes that direct replacements and new intermediates for existing applications have the greatest near term potential to advance demand for bio-products. An industrial advisory panel may be able to

help guide efforts in bio-products. In addition, R&D proposals should not be discounted for being practical.

- USDA needs a systems approach including economics, engineering and social systems management to evaluate research directions and alternatives. Creating a working group similar to the National Academy of Sciences National Research Council Study Committee could help to develop a systems modeling of bioenergy alternatives to:
 - a) Assess environmental outcomes, including market and non-market costs and benefits
 - b) Identify system leverage points where new technology could enhance technical feasibility and economic viability
 - c) Evaluate policy alternatives that might be used to promote bio-energy substitution

- USDA should seek additional funding for new and enhanced research and education bioenergy and bioproducts initiatives. USDA has a track record of successful research, education, and extension activities in feedstock production, new uses and technology transfer already in place. Strategic leveraging of this track record should be used in seeking increased funding for bioenergy and bioproduct programming. Specifically, USDA should direct research to develop the following:

 - Feedstock production through the development of crops and cropping systems relevant to production of raw materials for conversion to biobased fuels and biobased products;
 - Overcoming recalcitrance of cellulosic biomass through developing technologies for converting cellulosic biomass into intermediates that can subsequently be converted in biobased fuels and biobased products;
 - Product diversification through technologies relevant to production of a range of biobased products (including chemicals, animal feeds, and co-generated power) that eventually can increase the feasibility of fuel production in a biorefinery;
 - Multi-dimensional, systems-based analysis that provides strategic guidance for the application of biomass technologies in such key areas as improved sustainability and environmental quality, cost effectiveness, security and rural economic development.

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