

**NATIONAL AGRICULTURAL RESEARCH, EXTENSION,
EDUCATION AND ECONOMICS ADVISORY BOARD**

FOCUS SESSIONS: BIOENERGY AND GERMPLASM

HIGHLIGHTS AND RECOMMENDATIONS

March 7-9, 2006

The NAREEE Advisory Board heard presentations on the roles and responsibilities of REE agencies in the areas of bioenergy and germplasm, along with questions on which REE agencies sought input from the Board.. Board members did not receive white papers or background materials on these subjects in advance of the meeting, nor did they hear presentations from agencies outside REE and USDA, or from university or industry stakeholders. The Board discussed the topics further in two subcommittees, which then reported back to the full Board. These committees will develop more complete reports on the two topics in coming weeks. The following is a summary of the Board's findings and recommendations on these topics.

Bioenergy

The Energy Policy Act of 2005 authorizes \$200 million per year for bioenergy research and specifies that 15 percent should be spent on applied research, 35 percent on innovation and 50 percent on demonstration projects. It also establishes production goals of 7.5 billion gallons of ethanol per year by 2012, with at least 250 million gal/yr coming from cellulose by 2013. The drivers for this new policy are energy security, balance of trade, environmental protection, and rural development.

Board members expressed the opinion that the transition from petroleum to bioenergy will require a coordinated effort on the scale of the Manhattan Project, along with higher levels of investment and a "national will to change." In their opinion, however, no central roadmap is yet in place, nor is there enough information about the price structures and scale-up problems of alternative technologies. Commercialization of new bioenergy technologies will require a systems approach, combining economics, engineering and social research, particularly to identify bottlenecks and anticipate nonmarket impacts, especially in rural communities and in the grain and forestry sectors. These impacts will not be addressed by the Department of Energy (DOE), which is focusing (rightly) on displacing petroleum, and the Board was not encouraged to hear that such an analysis is "outside the purview of the Economic Research Service" (ERS).

Board members felt that ARS and CSREES are funding the right kinds of basic research in bioenergy, but current efforts are scattered and REE is not adequately funded to address the broader questions that also need answers. An important subset of questions concerns the sustainability of different bioenergy technologies, their inputs and outputs, their impacts on other sectors, and their impacts on the environment. These questions can be modeled, and ERS could do that modeling if given the budget; the Environmental Protection Agency should also be involved. USDA needs to be more assertive in asking for additional funds and in trying to

influence the national research agenda, which at present is driven by DOE; it should also do everything it can to ensure that the resulting science base remains in the public domain.

The USDA Energy Council, a newly-formed department-level coordinating body, is currently headed by the Undersecretary for Rural Development. However, the Board suggested that USDA should not put a rural development face on its bioenergy initiatives, not least because Rural Development does not have a research arm. On the contrary, the Biomass R&D Initiative, which funds demonstration projects, should return from Rural Development to REE, where it was originally assigned.

The Board suggested that REE should take a proactive role in pushing for systems research, including scenarios planning that would allow the bioenergy initiative to shift and reshape itself in the future. ARS should fund additional research not only on bioenergy technologies, but also on energy conservation, in the farm sector and in society at large. ERS should examine nonmarket costs and the option of funding bioenergy research from an increase in the federal gas tax. CSREES should play a lead role in coordinating with states, universities and the private sector; it should also conduct needs assessments for intellectual capital in bioenergy research and work with land-grant universities to train the scientists, managers and technicians that will be needed by this emerging sector. Current planning on this topics ignores the broader topic of bioproducts, which would make a good topic for a follow-on focus session at the Board's meeting in October 2006.

Germplasm

In 1990, Congress authorized the creation of a National Genetic Resources Program (NGRP) to acquire, characterize, preserve, document, and distribute the germplasm of all lifeforms important for food and agricultural production. REE agencies support numerous programs to carry out this mandate. ARS National Program 301 collects and preserves germplasm from plants, microbes and insects in 18 gene banks, while NP101 handles animal germplasm at 12 regional centers, with a central repository at Fort Collins, CO. CSREES collaborates with ARS and state Agricultural Extension Stations to maintain four regional centers that focus on crops of local significance, and ERS conducts studies of the economic significance of these crops. The U.S. Forest Service conducts similar research, funded by the Department of the Interior, aimed at collecting and breeding forest and orchard trees with superior productivity and disease resistance.

Questions and comments from the Board revealed concerns about access and the opportunity to add value to present collections and activities. ARS and CSREES add hundreds of thousands of samples to their collections each year, but the report that international access is increasingly restricted, including diversity "hot spots" such as Costa Rica and the Amazon. Nevertheless, foreign scientists and breeders continue to account for a quarter to a third of the samples distributed each year, and the United States – which maintains open access as an example to other countries – might do well to propose NGRP as a custodial repository for germplasm from plants and animals that might otherwise face extinction because of loss of habitat. For this custodial role to be convincing to potential donors, the concept of custody must be clearly decoupled from any sense of ownership.

The Board found that NGRP is a unique and valuable resource that enables 21st century

research on plant and animal breeding, but this resource might be lost for lack of a trivial amount of funding. REE should therefore seize every opportunity to demonstrate the value received from these programs, which is the best justification for continued and increased funding. REE should do more to publicize success stories, such as the recent victories over soybean rust and Holstein inbreeding, but it should also make clear what would be lost if these programs were to disappear. One way to do this would be to develop a television documentary that illustrates the value of germplasm banks to urban populations, such as heirloom vegetables, “nutriceuticals,” new ornamentals, and eradication of invasives. Another would be to think 20 years out and envision “what-if” scenarios that demonstrate the value of germplasm banks in recovering from climate change, a global epidemic or a bioterror attack.

REE should also look for ways to add value to the collections, for example by adding more precise geographic information or more completed genomic information. One member suggested that it may be time to make the transition from germplasm collection to gene bank. Another way to add value is to conduct surveys of NGRP customers to find out what needs it meets, what needs remain unmet (or undiscovered), and how the system can better serve its intended users. REE should continue to work on overcoming barriers to new accessions, but it should also seek to increase the sharing of these resources. Continued and increased interagency collaborations represent an effective way to strengthen and exploit these resources; the key to success for REE will be its ability to leverage funds from other agencies and departments. But there is also a need to develop criteria for managing the repositories and for balancing the demands of major, minor and specialty crops and “custodial” species. As always, these efforts will require not only new money but also new manpower; REE should set aside more grants and training programs to meet the need for expanded characterization of specimens, including genomic information.

Board Matters

Board members expressed concern that they did not have enough information on the operations of the Board Office and on the specific topics of these focus sessions. Staff will take the following actions to remedy this problem in future:

- Provide the Chairman with a budget update prior to each meeting of the Board, including basic information on how much has been spent and how much remains.
- Provide advice on the appropriateness and proper procedures for asking Congress to provide more funds for the operation of the Advisory Board, particularly in view of additional mandated activities.
- Provide estimated information on staff salaries, meeting costs, etc.
- Commission white papers on subjects of upcoming focus sessions to be included in briefing books, and deliver briefing books to members well in advance of meetings.
- Ensure that presentations include agencies outside REE and USDA, as well as universities and the private sector, in order to give the Board a broader perspective on issues under discussion.
- Provide table of contents for briefing books, and name tents for Board meetings.
- Obtain hard copies of presenters’ PowerPoint and other materials, and distribute prior to presentation.

- Circulate the report on REE responses prior to the next meeting.
- Prepare a complete list of past focus sessions and a two-year summary of Board recommendations, with actions REE has taken in response (not things they were doing already).
- Conduct a half-day orientation session for new members, with the focus on the Advisory Board rather than REE.

Action Items

- Gil Leveille will draft a paragraph or two on the “systems approach” to bioenergy.
- Ricardo Rel will draft a paragraph on educating the people needed to develop and operate a new bioenergy sector.
- Staff will provide Marty Apple with statistics on the percentage of NGRP budget that goes to characterization, as opposed to acquisition or maintenance; estimated number of projects on gene regulation; and names of seminal papers published by ARS scientists or grantees.