

Subcommittee Breakout Summaries

Feedstock Subcommittee: Information Requests and Recommendations 2012

1. Were funds distributed and used consistent with the Initiative objectives, purposes, and considerations?

Generally, yes; the selected projects appropriately address the objectives and the defined technical areas.

Limited waste feedstocks are utilized. BRDI should expand feedstock types to include others waste residues, such as animal waste, crop residues, Municipal Solid Waste, and food waste.

Through the last 3 years, the BRDI has addressed more than 15 types of feedstocks.

2. Were the solicitations open and competitive with awards made annually?

Yes, the solicitations were made available through grants.gov and were announced through social media and other routine means. The joint agencies shared in the workload with DOE-OBP leading the review process for pre-applications. This process pre-screened applications and was used to identify the most promising projects that would be invited to submit full proposals. Evaluation and selection of full proposals was led by USDA-NIFA.

The BRDI merit review process appears to be in line with other federal R&D programs and appears to be effective and efficient. We commend the pre-proposal process which avoids unnecessary burden on the applicant community.

3. Were the objectives and evaluation criteria for each solicitation clearly stated, minimally prescriptive and aimed toward no special interests?

The Initiative objectives were clearly presented in each solicitation and were consistent with §(e)(2). The solicitations also presented the Initiative technical areas consistent with §(e)(3).

The pre-application criteria in FY2009 and FY2010 included a statement that implied a preference toward industry/academia collaborations. In FY2011, consortia are specifically allowed and encouraged in §(3)(5), however. Such collaborations are no longer limited to industry and academic participants; we commend this expansion.

4. Were proposals evaluated and selected on merit by use of independent panels pre-dominantly comprised of experts outside of USDA and DOE?

Evaluation criteria and procedures were clearly presented in each solicitation and adhered to established merit review guidelines and procedures for both agencies. The Initiative is conducted through a two-phase submission process with pre-applications serving as a screening process prior to full applications being invited for final merit review.

Review panels were gathered for both processes. During 2010 and 2011, a total of 107 panelists were involved with most members having expertise in engineering, cropping systems, agronomy, and business. Section (d)(3)(B)(iv) instructs that the independent panels are to be predominantly comprised of individuals outside of the Departments of Agriculture and Energy. For the pre-application process, the percentage of reviewers coming from industry and academia was 80 and 87% for FY2010 and FY2011, respectively. Only 21 and 13%, respectively were from the federal government and there were no reviewers from state agencies. For the USDA-NIFA led full proposal process, industry and academia reviewers made up 93 and 87% of the panels for FY2010 and FY2011, respectively. Only 7% were from the federal government for both years and 4% were from state agencies in FY2011 only.

RECOMMENDATIONS

The Feedstocks Sub-Committee expresses that without the ability to review the DOE and USDA responses to 2011 recommendations, the Sub-Committee reviewed the 2011 recommendations and would like to acknowledge that the 2011 recommendations are still relevant and supported by this Sub-committee.

BRDI Process

Problem Statement: The TAC needs a better understanding on how the awarded projects are meeting expectations toward commercialization of technologies and creation of new industries.

Recommendation: Implement an analysis on commercialization and technology transfer resulting from federally funded research programs. Identify what lead to successes and its ability to replicate. Need key metrics.

Problem Statement: The TAC wishes to have a better understanding of other significant federal research programs being conducted, particularly in agencies that are represented in the multi-agencies BRDI Board [§(c)].

Recommendation: Obtain program summaries for significant programs that are presented similarly to the BRDI program update that was provided by USDA-NIFA.

Problems Statement: The Committee does not have a complete picture of the types of proposals submitted in the pre-application and proposal submission.

Recommendation: Develop a check list for proposers to complete that will provide data that can be tracked. See NSF example.

- Better match the reviewers to proposals

Feedstock Sustainability

Problem Statement: We need actual measurements on GHG exchange for more accurate Life Cycle Assessment.

- *Recommendation:* Build on the success of the DOE Great Lakes Regional Center making actual measurements. Issue proposal to make these measurements.

Improving Biomass Logistical Systems

Problem Statement: Feedstock production is very distributed and low density. Design and implementation of logistical systems the densify feedstocks and deliver to processing nodes is a limiting factor to creating a lignocellulosic-based biofuels industry.

Need more emphasis to ensure balance of feedstocks production with logistics and energy density. Suggest one master recommendation. **(NOTE: Check with Infrastructure Sub Committee)**

System Optimization

Problem Statement: A systems approach is lacking to maximize efficiency or yield of bioenergy crops.

Recommendation: Growth system approach to maximize land use - modifying growing seasons to maximize land use throughout the entire year. Research on best options.

Problem Statement: Lack of understanding on the market impacts and opportunities of wide spread adoption of bioenergy crops.

Recommendation: Federal agencies should conduct analysis that utilizes pilot scale projects to develop better market forecasting models that show impacts and opportunities to other markets to justify future R&D decisions.

Logistics, Storage, and Infrastructure Subcommittee:

In support of GHG emissions reductions, the unique issues related to bioenergy and bioproducts, creating new jobs, reducing fossil fuel use, and improving rural economies, we recommend:

- 1) Densify and preprocess to improve logistics and facilitate storage.

Problem statement: Biomass, the raw material for production of biofuels, biopower and bioproducts, has many serious logistical disadvantages as an industrial feedstock. Compared to fossil feedstocks, biomass is much less dense per unit energy, is more heterogeneous, more spatially dispersed, less stable, more difficult to handle, store and transport, more variable in year to year yields and chemical properties and presents some additional safety challenges (e.g., dust explosions and spontaneous combustion). Most forms of biomass pose cost, logistical and

processing challenges. It seems very unlikely that very large scale commodity industries can be built up around biomass feedstocks until these disadvantages are overcome.

- Recommendations: To overcome these serious disadvantages with biomass, we recommend research in the following areas:
 - i. Development of relatively low capital/operating cost, distributed processes that can increase the energy and physical density of biomass near where the biomass is produced. Emphasis should focus on overcoming heterogeneity, and the removal of moisture and other problematic substances.
 - ii. Development of integrated land use, harvesting, handling, transport, processing, and blending methods that can improve logistics and storage stability of biomass feedstocks plus manage availability uncertainties.
 - iii. Develop strategies for how more distributed biomass production and processing can promote rural communities and accelerate industry emergence.

2. Mitigate seasonality concerns and associated problems.

Problem Statement: Typically biomass has seasonal growth and harvest patterns, which impact supply, storage, and use. Bioenergy production generally requires year round feedstock supplies, sometimes with peak demands at times very different from peak feedstock supply seasons. Storage often leads to feedstock losses plus moisture and combustion issues. Matching seasonal supplies with year-round or seasonal demands requires development of extensive storage, multiple feedstocks, altered harvesting practices, and various forms of preprocessing and/or densification. This can be both expensive and challenging in terms of implementation.

- Recommendation: Ways need to be developed for field-to-user systems to accommodate seasonality.
 - I. Research projects need to develop low cost preprocessing or multi-feedstock provision, logistics, and storage system designed to accommodate seasonality.
 - II. Develop mobile feedstock processing operations, to accommodate seasonality issues, as well as unexpected changes in weather, beetle kill, etc.

3. Increase biopower/bioproducts R&D.

Problem Statement: Electric generation faces issues of GHG emissions, in addition to a number of unique issues related to biomass densification, handling, storage, and other logistical matters. At the same time, some companies are looking for alternatives to fossil material in their manufacturing processes.

Forests in several regions of the U.S. are in severe need of fuel reduction to reduce the likelihood of catastrophic fires, or may be in areas with little demand for forest products. There

is available land upon which a variety of bio-feedstock can be grown and there now exists an opportunity to convert these available bio-feedstock into low net GHG fuels or products.

At the same time, European utilities have fast-growing demand for renewable alternatives to coal, due to mandates, and are able to pay substantial prices for such fuels, due to government incentives. New technologies are needed to sustainably convert wood and plant biomass into advanced solid fuels and advanced bioproducts.

The Biomass Research and Development Act, which created the Biomass Research and Development Initiative (BRDI) and the Advisory Committee, clearly lists bio-products and bio-power as areas in which research should be conducted. Unfortunately, relatively little research has been funded, in recent years, on these topics.

- Recommendation (Biopower): Conduct more BRDI-funded biopower R&D projects, as described below:
 - i. BRDI projects should support the commercialization of new technologies and processes which improve the energy and physical density (pelletization and briquetting), handling characteristics, logistics and storage features of plant and woody biomass, so that it may better be used for bio-power and electric generation.
 - ii. Projects should support co-firing demonstrations in coal-fired utilities.
 - iii. Help U.S. companies and biomass surplus areas compete in export markets by producing a superior biomass-based solid fuel for biopower.

Recommendation (Bioproducts): In addition, research is needed to develop biomass based feedstock and bioproducts which manufacturers can utilize in place of fossil materials. Projects to demonstrate this substitution should be encouraged.

Information Requests

- 1) The Committee would like to request additional information on the results of completed BRDI projects related to the successes, long lasting impacts, etc.
- 2) Additional information, if it exists, on other funding awards germane to the subject of the Committee, including USDA awards, EPA, DOE Labs – INL, and SBIR.
- 3) The Committee would like to request additional information on the BRDI awards related to feedstock logistics: 2010 Awards for Metabolix, University of Kentucky, and U.S. Forest Service awards; the 2009 University of Tennessee; the 2007 Kansas State University.
- 4) Additional information on 2009 DOE FOA on large scale feedstock logistics handling systems.

BRDI Procedural Recommendations

Problem Statement #1: *Proposal submitters should reasonably expect that rejected BRDI proposals will be improved by responding to the reviewers' comments in a later submission. While responding to comments can never guarantee approval in a later submission, it is only fair for the submitters to expect that their efforts to respond were duly noted and taken into account. Many federal funding programs make explicit provision to consider the response to reviewers' comments in a resubmitted proposal, but the BRDI does not. The credibility and value of the BRDI program, and its institutional memory, will be strengthened if this deficiency is corrected.*

Recommendation #1: *We recommend that when a revised proposal is submitted to the BRDI, that the new reviewers be provided with a copy of the past review(s) and a two page response, to be submitted with the proposal. This action will help the current set of reviewers be better informed and render a more useful and accurate review than if the past review and the submitters' response to that review is excluded from the decision.*

Conversion Subcommittee

General Recommendations

1. *Problem Statement:* While the BRDI Program has met the overall objectives of the Biomass R&D Act (Section 9008 of FCEA of 2008), the portfolio of awards do not show clear technology progression nor is there a link from one year to the next or to the larger goals of the USDA or DOE Biomass Programs. BRDI awards should be in support of wider USDA/DOE Biomass goals and portfolio.

Recommendation: The Committee believes that the value of the BRDI Program can be significantly enhanced by implementing a five year technology roadmap with goals, objectives and metrics. (following existing USDA and DOE roadmaps)

2. *Problem Statement:* BRDI solicitations are very broad, partly due to requiring all projects to include feedstock, conversion and systems analysis components. The integrated systems approach does not address specific gaps in knowledge that we know exist.

Recommendation: For the next solicitation consider including R&D specific efforts. A percentage of funds should be reserved for grants to address these gaps. Consider a two-tiered approach, one a systems level, and one a systems component level.

3. *Problem Statement:* Awards to date do not seem to be related to availability of feedstocks.

Recommendation: Current and future available feedstocks should be an important selection criterion for awards.

4. *Problem Statement:* The time from releasing the BRDI solicitation to the deadline for proposal submission was too short, and BRDI draft solicitations have never been made available for public comment prior to releasing the final draft, as is done by some other federal grant programs.

Recommendation: In order to ensure high quality proposals, adequate time should be allowed between the pre-proposal and full proposal. BRDI Programs should make available a draft Funding Opportunity Announcement (FOA) to allow for public comment and revisions.

5. *Problem Statement:* BRDI review and site visit panels seem to have a limited number of representatives from the private sector.

Recommendation: Develop larger network of reviewers, inform them of the scope/areas for review. Consider drawing reviewers from previous or current applicants or using a finalist peer review system. Qualifications should be previously demonstrated. Reviewers should be drawn from industry, academia, government and other groups to create a diverse pool.

6. *Problem Statement:* BRDI does not seem to have a method of evaluating the success of awards, and results from past awards have not been shared with the Committee.

Recommendation: Measureable outputs of awards should be established; results should be recorded and shared. Success of the funded technologies should be shared and reviewed by the Committee. Funded projects should be presenting at Committee's Quarterly meetings on substantive challenges and milestones.

7. *Problem Statement:* \$15 Million of available \$40 Million BRDI Funding was held over in 2012 for continuation of previous year projects, limiting the amount of funding for new awards.

Recommendation: Inform the Committee of the decision making process for how additional funds are allocated for continuing projects, and how it impacts new award cycle.

Conversion Recommendations

1. *Problem:* Conversion, pre-treatment through fuel production, is the major barrier to bringing down costs.

Recommendation: Some funds should be reserved for funding focused grants for research in this area.

1A. Problem: There is a critical gap in the existing solicitations portfolio on separations technology. Improved separations technology can significantly reduce capital and operating requirements, as well as life-cycle emissions.

Recommendation: Conduct a review of the status of chemical and physical separations R&D, with the goal of identifying gaps and opportunities in product purification (e.g., alcohol and water). R&D should focus on reducing capital expenses, operating expenses, energy intensity, etc. for separations technology.

2. *Problem:* Some bioenergy grants outside the BRDI (for example the Defense Production Act) programs restrict eligibility to 'commercial scale' projects, defined as those that use at least 700 tons per day of biomass or produce 10 million gallons per year of biofuel.

Recommendation: What constitutes 'commercial scale' should be based on profitability and commercial impact rather than size or production capacity. Small-scale systems can be commercially viable and still generate profits. Any minimum size requirements should be explained in the funding opportunity announcement. Biomass scale-up requirements are different than those for petroleum refineries and need to be better understood.