Biomass Research & Development Technical Advisory Committee 2014 Report

Presentation to the Biomass Board
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Presentation Outline

- Scope of Committee's Charter
- BRDI Recommendations
- R&D Recommendations
- Key TAC Matters

Committee Scope

The Biomass Research and Development Act requires the Committee to evaluate and make recommendations to the Board on the following:	
(i) Funds authorized for the Initiative are distributed and used in a manner that is consistent with the objectives, purposes, and considerations of the Biomass Research and Development Initiative (BRDI)	Funds were not distributed in calendar year 2014
(ii) Solicitations are open and competitive with awards made annually	N/A
(iii) Objectives and evaluation criteria of the solicitations are clearly stated and minimally prescriptive with no areas of special interest	N/A
(iv) The points of contact are funding proposals under this title that are selected on the basis of merit, as determined by an independent panel of scientific and technical peers predominantly from outside the Departments of Agriculture and Energy	N/A

BRDI Recommendations

- The Committee commends the two lead agencies for their respective preparatory work for the next solicitation and for leveraging additional funds.
- Developing a secure biobased economy will require BRDI appropriations to be similar to what was previously provided prior to funding cuts implemented in the most recent Farm Bill. BRDI has a critical role in the science value chain, serving as an important translational link for accelerating potential early-stage technologies toward application and commercialization.
- The Committee wishes to have a strong and ongoing working relationship with the Board.

BRDI Recommendations

- **Problem Statement**: Budget cuts and focused program R&D solicitations have hindered the progression and actualization of potential benefits from BRDI.
- **Recommendations**:
  - BRDI should explore collaborations with other federal agencies (beyond DOE and USDA), foundations, corporations, and other funding sources to better leverage its resources.
  - BRDI should solicit proposals for work and increase public outreach efforts to demonstrate the current and potential societal benefits of the bioeconomy (job creation, reduced oil imports, greenhouse gas reductions, and positive regional impacts).
  - BRDI should ensure that information is shared and that there are efforts made to include underrepresented and disadvantaged communities.
  - BRDI should develop and track new performance metrics that provide insights on outcomes and accomplishments, such as return on investment, job creation, and commercial activity.

BRDI Recommendations

- **Problem Statement**: The Committee wishes to better understand the scope of biomass-related projects funded by other federal research programs being conducted, particularly in agencies that are represented in the multi-agencies BRDI Board.
- **Recommendation**:
  - Obtain focus areas and program summaries for significant federal biomass-to-energy programs and present them in a manner similar to the BRDI program update that was provided by USDA-NIFA.
- **Problem Statement**: The Committee does not have a complete picture of the types of proposals submitted in the pre-application and final proposal submission stages.
- **Recommendation**:
  - Develop a checklist for proposers to complete that will provide data that can be tracked. The Committee recommends that BRDI implements a tracking process similar to the one used by the National Science Foundation.

BRDI Recommendations

- **Problem Statement**: The dialog between the Board and Committee in response to the Committee's annual report is slow and unsatisfactory. Committee members understand that reviewing recommendations and approving the annual report takes time; however, the lack of timely feedback and turnover in Committee members each year prevents the Committee from receiving formal responses on annual recommendations. The amount of feedback the Committee receives could be enhanced through greater interaction between the Committee and the BRDI Operations Committee.

- **Recommendation**:
  - Members of the BRDI Operations Committee should be encouraged to attend Committee meetings to become more aware of Committee concerns on an ongoing basis.

Conversion Recommendations

- **Problem Statement**: Biomass conversion plants require substantially higher capital expenditure per gallon capacity than first-generation ethanol or biodiesel plants because biomass processing is more complex and entails a greater number of unit operations.
- **Recommendations**:
  - To establish a successful biofuels industry, there needs to be major policies driving it forward (e.g., maintaining cellulosic RFS2 as originally enacted) and a major increase in R&D funding dedicated to crossing major technical barriers.
  - Emphasize development of technologies that have viable economics for early-stage plants that attract capital investment for subsequent expansion of similarly designed facilities. Priority should go to the following:
    - Disruptive technology investments that can significantly reduce the capital and operating costs of advanced biofuels and biochemicals.
    - Basic, targeted research on specific elements of processes and programs that address operational issues of current pilot and/or commercial demonstration facilities.
    - Support technologies that can displace fossil fuels on a cost-competitive basis, including a reasonable return on capital.

Conversion Recommendations – Cont'd

- Continue to support novel research in the following conversion areas will help to address barriers for commercialization:
  - Densification, Storage, and Transport
  - Pretreatment
  - Fermentation
  - Thermochemical Conversion and Catalysis
  - Separations
  - Modeling and Simulation.
- "Nth" plant economics are not realistic for driving early investment because they don't accurately reflect risks, capital requirements, or contingencies required for the first several plants. There is a need for a dynamic model that accurately reflects commercially relevant risks, capital requirements, and return on investment/hurdle rate adjustments over time.

Products, Markets, and Systems Recommendations

- **Problem Statement**: The creation of fuels that are not true drop-in biofuels can drive significant distribution, retail, and end-user infrastructure costs. The use of true drop-in biofuels minimizes issues with products, markets, and systems, as is the case with the development of aviation turbine fuels.

- **Recommendation**:
  - Analysis is needed to address how to accelerate installation of E85 dispensers. The research should identify policy differences, success factors, and effects potential policies have on increasing adoption/penetration of alternative fuel use and infrastructure.

Products, Markets, and Systems Recommendations – Cont'd

- **Problem Statement***:* Bioproducts are underexploited and could enhance overall biofuel production if bioproducts were further developed and marketed.

- **Recommendations**:
  - Support research on specialty and high-value products derived from biomass to build bio-derived product platforms that will facilitate low-cost production of fuels.
  - Examine how to calculate the total carbon impact of products for the purposes of federal procurement and consumer outreach.
  - Create, maintain, and widely share databases of federally and privately developed bioproducts to inform federal and private initiatives.
  - Encourage more educational outreach on bioproducts with "show and tell" events in Washington, D.C., and elsewhere.

Feedstocks and Logistics Recommendations

- **Problem Statement**: Sufficient volumes of advanced biomass feedstocks are not delivered continuously to the processor at low enough unit costs. Land owners/ operators must achieve sufficient economic return to adopt bioenergy feedstocks and new production systems. Regional differences require unique approaches to addressing the general logistic issues (harvest, transportation, storage).
- **Recommendations**:
  - Increase yield and decrease unit cost.
    - Better utilize and maximize use of existing but underutilized feedstock resources.
    - Prioritize feedstocks that require minimal inputs of water, nutrients, and energy.
    - Develop and utilize farming systems that maximize productivity throughout the year.
    - Do not exclude any feedstock, as long as it can show that it meets volumetric needs and economic viability.
  - Ensure feedstocks are continuously available to processors.
    - Develop and demonstrate improved logistics for feedstock procurement and distribution by aggregating, processing, blending, and storing feedstocks.
    - Establish processes to efficiently deconstruct, increase energy density, remove oxygen, improve handling, and stabilize during storage.

Feedstocks and Logistics Recommendations – Cont'd

- **Problem Statement**: Diversity of feedstocks gives rise to different bioproduct yields and compositions.
- **Recommendations**:
  - Better characterize and standardize analysis of the chemical and physical properties of feedstocks.
    - Conduct coordinated R&D to understand how variations in plant nutrition, climatic, soils, and stress affect chemical composition, and how impacts of variation might be minimized.
    - Analyze the stability and composition in different environments for different feedstocks and define how we can control/tailor it.
    - Prioritize productive feedstocks that can be grown economically with minimal water, energy, and fertilizer inputs.

2015 Committee Planning

RECOMMENDATIONS for 2015 (under consideration)

- More emphasis on bioproducts, waste-to-energy, and sustainability are likely.
- Co-chair considering refocusing Subcommittees and recommendations around selected topics.

Committee/Board Interaction

- TAC welcomes a close working relationship between TAC and the Board.
- TAC is open to receiving Board-derived topics requiring TAC assistance, but appreciates it if informed at the Q1 meeting to maximize effectiveness.

Thank You!

Are there any questions?