

**Biomass Research and Development
Technical Advisory Committee**

May 22–23, 2012

Meeting Summary

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List of Acronyms

ARPA-E – Advanced Research Project Agency – Energy
Board – Biomass Research and Development Board
BRDI – Biomass Research and Development Initiative
Committee – Technical Advisory Committee
DOE – U.S. Department of Energy
EERE – Energy Efficiency and Renewable Energy
FOA – Funding Opportunity Announcement
MOU – Memorandum of Understanding
PNNL – Pacific Northwest National Laboratory
REAP – Rural Energy for America Program
R&D – Research and Development
RFS – Renewable Fuel Standard
RIN – Renewable Identification Number
USDA – U.S. Department of Agriculture

I. Purpose

On May 22–23, 2012, the Biomass Research and Development Technical Advisory Committee (Committee) held its second quarterly meeting of 2012. The purpose of the meeting was to discuss and receive updates about the recent activities of the U.S. Department of Energy (DOE) and U.S. Department of Agriculture (USDA). DOE representatives delivered presentations about the Biomass Program. USDA representatives delivered presentations about current Agency activities and the Biomass Research and Development Initiative (BRDI). In addition, researchers from the Northwest presented on the advanced biofuels research they are performing in the region. The Committee then broke out into subcommittees to discuss their 2012 recommendations.

See Attachment A for a list of meeting attendees. See Attachment B to review the meeting agenda. Meeting presentations can be viewed on the Biomass Research and Development Initiative website at <http://biomassboard.gov/committee/meetings.html>.

Background: The Committee was established by the Biomass R&D Act of 2000 (Biomass Act), which was repealed and replaced by Section 9008 of the Food, Conservation, and Energy Act of 2008. The Biomass Research and Development Board (Board) was established under the same legislation to coordinate activities across federal agencies. The Committee is tasked with advising the Secretary of Energy and the Secretary of Agriculture on the direction of biomass research and development (R&D).

II. Introduction and Welcome to New Committee Members

Steve Briggs and Ronnie Musgrove, Committee Co-Chairs

Steve Briggs and Ronnie Musgrove welcomed new Committee members who were able to attend the meeting. New members in attendance include the following:

- Dean Benjamin, NewPage Corporation
- Joseph James, Agri-Tech Producers, LLC
- Coleman Jones, General Motors
- Bruce McCarl, Texas A&M
- Abolghasem Shahbazi, North Carolina A&T State University
- Alan Weber, MARC-IV Consulting /Weber Farms

New Members who were not in attendance include the following:

- Jimmie Powell, The Nature Conservancy
- Neil Murphy, State University of New York

III. DOE Updates on Biomass R&D Activities

Elliott Levine, Designated Federal Officer, U.S. Department of Energy Biomass Program

Elliott Levine provided an overview on Committee business and DOE's Biomass Program, including information on upcoming events. Mr. Levine provided an overview and introduction of the Committee for its new members. The overview gave background on the establishment, as well as the functions and responsibilities, of the Committee. Mr. Levine confirmed that Dr. David Danielson is now the Assistant Secretary for Energy Efficiency and Renewable Energy (EERE), and he announced other leadership changes within EERE, including the following:

- Dr. Arun Majumdar, Director of ARPA-E and Acting Under Secretary of Energy, has announced he will step down from those positions and leave DOE on June 9, 2012
- Dr. Eric Toone, Deputy Director of ARPA-E, will take over as Acting Director of ARPA-E
- David Sandalow, Assistant Secretary for Policy and International Affairs, will serve as the Acting Under Secretary of Energy.

Mr. Levine acknowledged that the Biomass Program's John Ferrell was awarded the Raphael Katzen Award at the 34th Symposium on Biotechnology in New Orleans. Mr. Levine presented the latest Biomass Program budget scenario and named recent funding opportunity announcements (FOAs), including the following:

- 2012 BRDI
- Bio-Oil Stabilization and Commoditization
- Algal Biofuels
- Clean Cookstoves.

Mr. Levine also provided an overview of recent Biomass Program events, including the following:

- Social Aspects of Bioenergy Sustainability Workshop , April 24, 2012
- Biomass Technical Advisory Committee State of Technology Webinar, April 24, 2012
- Technical Information Exchange on Pyrolysis Oil: Potential for a renewable heating oil substitution fuel in New England, May 9–10, 2012
- Defense Production Act (DPA) Industry Roundtable Advanced Drop-In Biofuels Initiative, May 18, 2012.

Mr. Levine announced the Biomass Program's upcoming annual conference, Biomass 2012, to be held July 10–11, 2012, at the Washington D.C. Convention Center. The conference will include keynote speakers and a poster session. More information can be found on the Biomass 2012 website at www.eere.energy.gov/biomass/biomass_2012.html.

The next 2012 Committee meetings will take place on the following dates:

- August 22–23, 2012
- Week of November 5–9, 2012.

IV. U.S. Department of Agriculture Update

Todd Campbell, Rural Development, U.S. Department of Agriculture

Todd Campbell updated the Committee on various topics, including USDA's 150th Anniversary; Rural Energy for America Progress Report; updated BioPreferred regulation; and closed applications on Rural Energy for America Program (REAP) grants, Biomass Crop Assistance Program, and BRDI. Mr. Campbell also introduced USDA's Under Secretary for Rural Development, Dallas Tonsager, who attended the meeting.

Mr. Campbell provided a brief history of the legislation that established USDA, the Morrill Act which established the land-grant university system, and the Homestead Act on their 150th year anniversary, and he noted the proclamation by President Obama commemorating this historic milestone, "...we pay tribute to the men and women of USDA, past and present, who have faithfully served our Nation for 150

years. For their commitment, our fields grow richer, our abundance grows greater, and our country stands stronger.” The full proclamation can be found at <http://www.whitehouse.gov/the-press-office/2012/05/14/presidential-proclamation-150th-anniversary-united-states-department-agr>.

Mr. Campbell announced the release of the Rural Energy for America Progress Report for FY09-11, which shows the impact of the Program on providing loans and grants to construct energy efficiency improvements and renewable energy systems which helped generate or save enough power to meet the annual needs of 600,000 average U.S. households. The full report is posted on USDA’s website: <http://www.rurdev.usda.gov/Reports/rdREAPReportMarch2012.pdf>. For fiscal year (FY) 2012, funding was limited to about \$25 million, which is a nearly 65% reduction in mandatory funding. Grant applications are due March 30, 2012, and loan guarantee applications are due June 30, 2012.

Mr. Campbell shared new proposed guidelines for the USDA BioPreferred Program to expand the ability of USDA to designate biobased products—including intermediate ingredients such as fibers, resins, and chemicals—so that products made from them could more easily be designated for preferred federal procurement. Mr. Campbell discussed the new proposed guidelines for the USDA BioPreferred Program to expand the ability of USDA to designate biobased products. USDA will accept public comments on these proposed rule amendments until July 2, 2012.

V. BRDI Update

Carmela Bailey, National Institute of Food and Agriculture, U.S. Department of Agriculture

Carmela Bailey provided a status and overview of the FY 2012 BRDI. The FY 2012 competition is underway. Five FY 2011 proposals are in process for award, and a formal announcement is expected in June 2012. Site visits to evaluate current projects are completed, and reports being finalized. The next round of site visits is in the planning process. Committee members are welcome to participate in site visits. The Initiative has been asked to provide an analysis of program performance by Congress. The draft report has been developed that includes summaries of review panelist expertise, trends in technical area investment, geographic diversity of awards, and quantifiable project output measures. When completed, the site visit reports will be added as an appendix to the report.

Joe James stated that the jobs created numbers in the quantifiable output measures seemed low. Ms. Bailey stated that BRDI is an R&D-focused initiative and is focused on research—not a federal jobs program.

Ronnie Musgrove asked what the current status of the Farm Bill in Congress. Under Secretary Dallas Tonsager stated that the U.S. Senate will be discussing the Farm Bill in early June, and the House of Representatives will discuss the Bill in mid-to-late June.

Mr. Musgrove asked about the current list of quantifiable measures for the Initiative. Under Secretary Tonsager stated that he was pleased with the current projects in the Initiative and that they were leading to multiple products for manufacturing.

Pam Contag asked if there is a close-out audit for projects that are completed. Ms. Bailey stated that

they are required to submit a final report. Ms. Contag stressed the need to develop pro-forma for the BRDI projects. Ms. Bailey welcomed inputs from the Committee.

VI. Research, Development, and Commercialization of Advanced Biofuels in the Northwest

End-User Perspective, Mike Hurd, Director of Environmental Strategy, Boeing Conversion and Oil Seed Perspective; John Plaza, CEO, Imperium Feedstock Supplier Perspective; Maro Imirzian, Vice President, Catchlight Energy LLC

Mike Hurd from Boeing provided an end-user perspective on the aviation and sustainable biofuels R&D that is being conducted in the Northwest. Mr. Hurd explained that fuel is the largest operating cost for airlines, and prices continue to rise. Mr. Hurd explained Boeing's strategy for fuel and emission reduction with sustainable aviation biofuel is an essential growth enabler. Boeing supports drop-in fuels because they meet fuel performance requirements, require no change to airplanes or engines, require no change to infrastructure, and can be mixed or alternated with today's Jet-A fuel. Mr. Hurd also provided a perspective on the biofuel supply, demand, and cost concerns. He stated that Boeing's role is to act as an industry catalyst to accelerate commercialization

Pam Contag asked if Boeing has mapped out the top 21 fuel consuming airports to feedstock availability and potential refineries. Mr. Hurd explained that based on the feedstock and conversion pathways, there may not be a need to co-located feedstocks with airports. Todd Campbell stated that Animal and Plant Health Inspection Service reports identify land around airports as a potential land sources for biomass feedstocks.

Joe James asked if the Center for Applied Fundamentals and Innovation was involved. Mr. Hurd stated they are a clear partner.

Steve Briggs asked if Boeing expects biomass to impact and stabilize fuel prices. Mr. Hurd said they hoped biofuels would move closer to parity with fuel prices and could possibly help to stabilize prices in the long term, but emphasized that customers cannot pay premiums for biofuels. John Plaza from Imperium stated that price is not a key driver, but supply security is.

Dean Benjamin asked if the commercial aviation sector has more incentive than other sectors for biofuels. Mr. Hurd explained that emission caps were a key driver and electric is viable for the aviation sector.

Under Secretary Tonsager asked what feedstock or conversion technology Boeing is focused on. Mr. Hurd explained that may be a regional response. Currently oil seeds are viable. Cellulosic could be the future, but soy beans have been ruled out.

John Plaza of Imperium presented from the conversion and oil seed perspective. Imperium produces 100 million gallons (378 million Liters) of annual biodiesel capacity and has been operational since 2007. Their Biodiesel production is sourced from 100% canola oil. Mr. Plaza stated that current forms of advanced Biofuel Production is expensive and challenging, but it is ready for commercialization now. He

feels a long-term stable policy is needed in North America to support biofuels and dedicated biomass for viable advancement of the industry. Governments need to leverage their buying power to provide long-term purchase commitments for advanced biofuels. He stated that multiple solutions are needed for advanced biofuels to succeed, including various feedstocks on a regional basis that take into account land use, water use, and yields. Also, various technologies are needed for conversion of biomass to drop-in fuels to allow for diversification and long-term economic and environmental sustainability. His conclusion is that biofuels can be cost competitive with petroleum once overall supply is built to scale and progress to parity can be accelerated to less than 10 years with more funding and support.

Coleman Jones asked where Imperium gets its hydrogen. Mr. Plaza stated that it does not currently use hydrogen in its production facilities. Should the need for hydrogen arise in the future, Imperium has access to natural gas at its current Grays Harbor facility.

Maro Imirzian, from Catchlight Energy, provided the feedstock supplier perspective for the panel. Catchlight Energy is a joint venture between Chevron and Weyerhaeuser, formed to commercialize the large scale production of liquid transportation fuels from sustainable forest-based resources. Ms. Imirzian stated that Weyerhaeuser Company, one of the world's largest forest products companies, began operations in 1900. Weyerhaeuser grows and harvests trees, builds homes, and makes a range of forest products essential to everyday lives. Ms. Imirzian outlined challenges to get to biofuel commercialization, feedstock strategy, and examples of feedstock research being conducted. Ms. Imirzian noted that multi-stakeholder collaboration is important in developing biofuel solutions, and an example of this in the northwest is the Northwest Advanced Renewables Alliance led by Washington State University. Ms. Imirzian concluded by stating that cellulosic biofuel can fill an important role in diversifying the nation's energy sources by providing a source of low carbon transportation fuel.

Jim Seiber asked what research needs to be addressed to help Catchlight. Ms. Imirzian stated that feedstock scale and logistics, as well as commercial-scale, economic conversion technology development, are important areas to address in the development of cellulosic biofuel. Abolghasem Shahbazi asked what the characteristics of forest residues are. Ms. Imirzian explained that forest residuals generally include residual byproducts of a forest operation such as limbs, tops, small, defective, or broken trees, and other woody parts that remain after higher value merchantable material is used.

David Bransby asked if Catchlight was working with KiOR. Ms. Imirzian stated that they have two agreements with KiOR, a next-generation renewable fuels company, for KiOR's first commercial production facility, which is expected to start up in the second half of 2012 in Columbus, Mississippi—a feedstock supply agreement to supply forest-based feedstocks and a conditional offtake agreement to purchase gasoline and diesel fuel blendstocks. Catchlight Energy's purchase of products is contingent on, among other things, satisfaction of product specification criteria and Renewable Identification Number (RIN) certification of the products as cellulosic biofuels under the U.S. Renewable Fuel Standard.

Joe James asked what the challenges are with conversion technologies. Ms. Imirzian stated conversion technology challenges include achieving high yield, minimizing complexity, and integration into downstream infrastructure.

VII. Technical Advisory Committee Library Demonstration

Andrew Graves, BCS, Incorporated

Andrew Graves from BCS, Incorporated presented the Biomass Technical Advisory Committee Library. The library can be found on the BRDI website at: http://biomassboard.gov/committee/tac_library.html. The Library provides BRDI, materials, including BRDI solicitations and awards; BRDI Annual Reports; and Previous Committee Recommendations. It includes related solicitations and awards, as well as DOE FOAs and awards and Advanced Research Project Agency–Energy (ARPA–E) FOAs. It also includes useful related Information, including related reports classified as “must read” or “recommended reads.” Links to additional resources, such as related advisory committees and biomass national laboratory sites, are listed.

VIII. Subcommittee Breakout Summaries

Feedstock Subcommittee: Information Requests and Recommendations 2012

Funding

- Report of funds going back to FY 2009, with a breakout of dollars authorized for BRDI, dollars appropriated, and dollars committed to solicitations.
- Chart and report past years’ awards since 2009—dollar amount, Principal Investigator, feedstock types, geography, and activity.
- What does the ‘funnel’ look like from the solicitation being released to the panel review to the award? Is there a joint award pot or are there separate amounts and awardees for DOE and USDA?
- Crosswalk the awards with the BRDI categories and Committee recommendations:
 - Identify projects that specifically address prior Committee recommendations
 - Provide more specific feedstock type data from awards
 - *Recommendation:* Develop a checklist for proposers to complete that will provide data that can be tracked (see National Science Foundation example)
 - Need to be a few key metrics
 - Outputs chart needs further breakout by each year
 - Review intellectual property (disclosures) data in summary table
 - Use iEdison from Department of Commerce.

Process

- Access to solicitations and timelines. Total number of pre-proposals by year; full proposals by year invited to submit, awards, and dollar amount.
- Proposal evaluation criteria are needed from the solicitation, highlighting previous years’ changes.

- Step by step for the process and snapshots of the makeup of proposal reviewers. What were the demographics (e.g., geography and education levels) of the panelists and site visit groups? Categories should include university, state, commodity, federal, industry, and non-profit.

Big Picture

- Who sets award size? How is the decision arrived at? Who writes the solicitation? Where does the direction come from for the solicitation?
- What information is needed besides 9008 to make recommendations?
- Report on FY 2011 solicitation/awardees from Carmela Bailey at the second quarter. How can the Committee provide inputs before annual solicitation is released?
- Has the combined solicitation's approach to promote consortium projects been successful over prior years' solicitations?
- Identification of Funding Gaps:
 - See what other research programs are doing in the biomass feedstocks area, such as Office of Science. See funding numbers and number of awards.
 - What are the funding amounts and feedstock topics across and the biomass research, development, and demonstration timeline?

Timeline of Recommendations

- Full Committee should have final recommendations ready for vote at the end of the third quarter meeting in August.

Recommendations Areas

- Demonstration-scale projects are low for BRDI:
 - Cost-share requirements
 - Could be based on pre or full proposals.
- Is the composition of reviewers adequate to evaluate feedstock proposals?
- Analysis/Modeling scenarios on the impacts of select feedstocks.

Logistics, Storage, and Infrastructure Subcommittee

The Subcommittee proposed to rename themselves Logistics, Storage, and Infrastructure Subcommittee. The Subcommittee will focus on feedstock storage, harvesting, preprocessing, logistics and downstream infrastructure for liquid fuels, biobased products, and power generation.

Assessment of Allocations

- The Subcommittee would like to request additional information on BRDI awards related to feedstock logistics: 2010 Awards for Metabolix, University of Kentucky, and U.S. Forrest Service awards; the 2009 University of Tennessee award; and the 2007 Kansas State University award.
- Additional information on 2009 DOE funding opportunity announcement on large-scale feedstock logistics handling systems.
- Additional information, if it exists, on other funding awards germane to the subject of the Subcommittee, including USDA Awards, DOE Labs, Idaho National Laboratory, and small business innovation research.

- Additional information is also requested on DOE's programs relative to the 2011 Infrastructure Recommendation #7.

Research Needs

- Densification and preprocessing to improve logistics and facilitate storage:
 - Research densification, drying, substance removal, and other strategies for efficiently transporting biomass from the field to the conversion facility.
 - Research preprocessing techniques to reduce the logistical load for transportation and storage.
- Research strategies designed to mitigate seasonality concerns and the problems associated with seasonal harvesting, storage, and processing.
- Biopower/Biothermal:
 - Support research for the substitution of biobased solid fuels in electric generation and combined heat and power, as well as in biorefineries.
 - Research on how biomass substitution for fossil fuels in biorefineries could reduce greenhouse gas emissions profiles and costs for transportation fuels and enable them to qualify as Advanced Biofuels under the Renewable Fuel Standard (RFS).
- Bioproducts:
 - Conduct research to explore how manufacturers can utilize biomass in place of fossil materials and fuels.

The Subcommittee is still considering priority levels for the [2011 Recommendations](#) (#7 and #8).

Additional Notes

- Research on testing for differentiating renewable diesel from petroleum diesel for purposes of RIN credit identification.
- Difficulty in using biomass for power, when the RFS mandates liquid fuels, and no comparable federal statute exists to incentivize biopower. Should federal research support state mandates?

Conversion Subcommittee

- Conversion—pretreatment through fuel—is the major barrier to bringing down costs. There is not enough emphasis on research for conversion technologies currently funded by BRDI.
- Awards should be considered based on available feedstocks.
- What constitutes a commercial should be based on profitability.
- The focus of R&D funds should be dedicated to biofuels and bioproducts in preference to biopower.
- BRDI grants failing to meet the stated goals with the requirement to be a full, integrated system. Focus next solicitation on R&D-specific efforts. Percentage of funds should be reserved for smaller, non-consortia grants. Geographic diversity should be improved in the award system.
- The BRDI solicitation would be stronger if the timeline included a draft solicitation phase to allow for public comment and revisions. The solicitation timeline should be longer and more consistent. Consider meeting proposed deadlines as recommended by the Committee.

- All reviewers for the BRDI solicitation should be required to read the full solicitation before beginning the review process. A more neutral review system is still needed for the BRDI process. Consider use of clickers or other method to keep voting independent.
- The quality of the reviewers should be improved. Develop an industry network for reviewers. 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.
- Criteria for awards should be on performance metrics and compared across the Board. Measureable outputs of awards should be established, and results should be recorded and shared.
- Success of the funded technologies should be shared and reviewed by the Committee.

IX. Public Comment

None

X. Closing Comments

Steve Briggs and Ronnie Musgrove, Co-Chairs

Steve Briggs and Ronnie Musgrove closed the meeting.

Attachment A: Committee Member Attendance – May 22–23, 2012 Meeting

Co- Chairs	Affiliation	Attended?
Steve Briggs	University of California	Yes
Ronnie Musgrove	Former Governor, MS	Yes

Members	Affiliation	Attended?
Bob Ames	Solazyme	No
Dean Benjamin	NewPage Corporation	Yes
William Berg	Dairyland Power	No
David Bransby	Auburn University	Yes
Pamela Reilly Contag	Cygnit Biofuels	Yes
Bruce Dale	Michigan State University	No
Harrison Dillon	Solazyme	No
Joseph Ecker	Salk Institute for Biological Studies	Yes
Neal Gutterson	Mendel Biotechnology	No
Jennifer Holmgren	LanzaTech Limited	No
Huey-Min Hwang	Jackson State University	Yes
Joseph James	Agri-Tech Producers, LLC	Yes
Coleman Jones	General Motors	Yes
Kevin Kephart	South Dakota State University	Yes
Craig Kvien	University of Georgia	No
Jay Levenstein	FL Dept. of Ag. and Consumer Services	Yes
Stephen Long	University of Illinois	No
David Nothmann	Battelle	No
Mary McBride	CoBank	Yes
Maureen McCann	Purdue University	Yes
Bruce McCarl	Texas A&M	Yes
Neil Murphy	State University of New York,	No
Jimmie Powell	The Nature Conservancy	No
William Provine	Dupont	No
James Seiber	University of California	Yes
Abolghasem Shahbazi	North Carolina A&T State University	Yes
John Tao	O-Innovation Advisors LLC	Yes
Alan Weber	MARC-IV Consulting / Weber Farms	No
Todd Werpy	Archer Daniels Midland Company	Yes

Total: 18 of 31 members attended

Attachment B: Agenda – May 22–23, 2012 Meeting

Day 1: Technical Advisory Committee Meeting:

May 22, 2012

- 8:30 a.m. – 8:40 a.m. Introduction and Welcome to New Committee Members
Steve Briggs and Ronnie Musgrove, Committee Co-Chairs
- 8:40 a.m. – 9:00 a.m. Presentation: DOE Updates on Biomass R&D Activities
Elliott Levine, DFO, U.S. Department of Energy
- 9:00 a.m. – 9:20 a.m. Presentation: USDA Update on Biomass R&D Activities
Todd Campbell, U.S. Department of Agriculture
- 9:20 a.m. – 9:45 a.m. Presentation: BRDI Update
Carmela Bailey, NIFA, U.S. Department of Agriculture
- 9:45 a.m. – 10:00 a.m. *Break*
- 10:00 a.m. – 12:00 p.m. Panel: Research, Development, and Commercialization of Advanced Biofuels in the Northwest

End User Perspective, Mike Hurd, Director of Environmental Strategy, Boeing

Conversion and Oil Seed Perspective, John Plaza, CEO, Imperium

Feedstock Supplier Perspective, Maro Imirzian, Vice President, Catchlight Energy LLC
- 12:00 p.m.– 1:00 p.m. *Lunch*
- 1:00 p.m. – 1:10 p.m. Committee Library Demonstration
Andrew Graves, BCS, Incorporated
- 1:10 p.m. – 1:30 p.m. 2012 Committee Work Plan and Subcommittee Objectives
Steve Briggs and Ronnie Musgrove, Co-Chairs
- 1:30 p.m. – 4:00 p.m. Subcommittee Breakouts
Conversion, Feedstocks, Infrastructure/Feedstock Logistics

Day 2: Technical Advisory Committee Meeting:

May 23, 2012

8:30 a.m – 8:45 a.m.

Instructions to Subcommittees

Steve Briggs and Ronnie Musgrove, Co-Chairs

8:45 a.m. – 9:45 a.m.

Subcommittee Breakouts

Conversion

Feedstocks

Infrastructure/Feedstock Logistics

9:45 a.m – 10:00 a.m.

Break

10:00 a.m. – 11:15 a.m.

Subcommittee Report-Outs

Conversion, Feedstocks, Infrastructure/Feedstock Logistics

11:15 a.m. – 11:30 a.m.

Public Comment

11:30 a.m. – 11:45 p.m.

Closing Comments and Next Meeting/Webinar Speaker Requests

Steve Briggs and Ronnie Musgrove, Co-Chairs