

**Biomass Research and Development  
Technical Advisory Committee**

**June 13–14, 2016**

*Meeting Summary*

## Table of Contents

<b>TABLE OF CONTENTS .....</b>	<b>II</b>
<b>LIST OF ACRONYMS .....</b>	<b>III</b>
<b>I. PURPOSE .....</b>	<b>1</b>
<b>II. WELCOME .....</b>	<b>1</b>
<b>III. COMMITTEE BUSINESS FOR 2016 AND DOE UPDATES.....</b>	<b>1</b>
<b>IV. USDA UPDATE ON BIOMASS R&amp;D ACTIVITIES.....</b>	<b>2</b>
<b>V. BRDI SOLICITATION, STATUS, AND UPDATE .....</b>	<b>3</b>
<b>VI. OVERVIEW OF THE USDA AGRICULTURE AND FOOD RESEARCH INITIATIVE.....</b>	<b>4</b>
<b>VII. UPDATE ON THE BIOMASS BOARD BIOECONOMY INITIATIVE AND PRELIMINARY REVIEW OF THE LISTENING SESSIONS.....</b>	<b>4</b>
<b>VIII. OVERVIEW OF THE BIOENERGY TECHNOLOGIES OFFICE MULTI-YEAR PROGRAM PLAN .....</b>	<b>5</b>
<b>IX. NATIONAL LABORATORIES BIG IDEA ACTIVITIES.....</b>	<b>6</b>
<b>XI. PUBLIC COMMENT .....</b>	<b>10</b>
<b>XII. CLOSING COMMENTS.....</b>	<b>14</b>
<b>APPENDIX A: COMMITTEE MEMBER ATTENDANCE—JUNE 13–14, 2016 .....</b>	<b>A-1</b>
<b>APPENDIX B: AGENDA—JUNE 13–14, 2016 .....</b>	<b>B-1</b>

## List of Acronyms

AFRI	Agriculture and Food Research Initiative
ATIP	Agricultural Technology Innovation Partnership
BETO	Bioenergy Technologies Office
Board	Biomass Research and Development Board
BRDI	Biomass Research and Development Initiative
CAPs	Coordinated Agricultural Projects
Committee	Biomass Research and Development Technical Advisory Committee
DOE	U.S. Department of Energy
EERE	Office of Energy Efficiency and Renewable Energy
FARB	Federal Activities Report on the Bioeconomy
MSW	Municipal Solid Waste
MYPP	Multi-Year Program Plan
NARA	Northwest Advanced Renewables Alliance
NIFA	National Institute of Food and Agriculture
R&D	research and development
RFS	Renewable Fuels Standard
SBV	Small Business Vouchers
STP	Standard Temperature and Pressure
USDA	U.S. Department of Agriculture

## I. Purpose

On June 13–14, 2016, the Biomass Research and Development Technical Advisory Committee (Committee) held its second meeting of 2016. The Committee received updates from the U.S. Department of Energy's (DOE's) Bioenergy Technologies Office (BETO), as well as U.S. Department of Agriculture (USDA) representatives delivering presentations about current USDA activities.

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

**Background:** The Committee was established by the *Biomass Research and Development Act of 2000*, which was later 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 *Food, Conservation, and Energy Act* has recently been amended by the *Agricultural Act of 2014*. 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. Welcome

*Kevin Kephart, Committee Co-Chair*

*Paul Bryan, Committee Co-Chair*

Dr. Kephart and Dr. Bryan welcomed the Committee to the second meeting of the year and called the meeting to order. They also welcomed the following new members to the Committee:

- Dr. Esteban Chornet – CTO and Cofounder, Enerkem
- Vonnie Estes – Consultant
- Dr. Emily Heaton – Assistant Professor at Iowa State University.

## III. Committee Business for 2016 and DOE Updates

*Elliott Levine, Designated Federal Officer, DOE*

Mr. Levine provided an update and overview of the Committee activities. He then went on to provide updates from DOE Program Offices with biomass related activities. Updates on funding opportunities include

- **Bioproducts to Enable Biofuels** with \$11.3 million in funding to develop flexible biomass-to-hydrocarbon biofuels conversion pathways that can be modified to produce advanced fuels and/or products based on external factors, such as market demand. Closed in April 2016.

- **Small Business Vouchers (SBV) Pilot Program** to help small businesses bring clean energy technologies to market faster by enabling access to national lab expertise and tools, easily and affordably. The results of the first round of funding are:
  - Lygos (\$300K in BETO funding)
  - Visolis (\$300K in BETO funding)
  - Second round currently in the selection process—announcements expected July 2016.
- **Advancements in Algal Biomass Yield Phase II** with up to \$15 million in funding to develop technologies that are likely to succeed in producing 3,700 gallons of algal biofuel intermediate (or equivalent dry weight basis) per acre per year (gal/acre/yr) on an annualized average basis (not peak or projected) through multiple batch campaigns or on a semi-continuous or continuous basis, in an outdoor test environment. Closed March 2016.
- **Project Development for Pilot- and Demonstration-Scale Manufacturing of Biofuels, Bioproducts, and Biopower** with up to \$90 million in funding for projects focused on designing, constructing, and operating integrated biorefinery facilities that manufacture biofuels, bioproducts, or biopower. The funding opportunity announcement (FOA) seeks applications for projects to first design (Phase 1), and then construct and operate the integrated biorefinery (IBR) facilities (Phase 2). Concept paper submission deadline was June 6, 2016 and the full application submission deadline is July 22, 2016.

Upcoming BETO events include:

- **Bioenergy 2016:** July 12–14, 2016 at the Walter E. Washington Convention Center
- **Sustainable Transportation Summit:** July 11-12, 2016 at the Walter E. Washington Convention Center
- **Waste-to-Energy Workshop:** June 22–23 in Golden, CO
- **The 6th International Conference on Algal Biomass, Biofuels and Bioproducts:** June 26-29 in San Diego, CA
- **2016 ASABE Annual International Meeting:** July 17–20 in Orlando, FL
- **Biorefinery Optimization Workshop:** October 25–26 in Chicago, IL.

## IV. USDA Update on Biomass R&D Activities

*Todd Campbell, USDA*

Mr. Campbell started his talk highlighting the progress report on USDA’s Building Blocks for Climate Smart Agriculture and Forestry. He then went on to highlight the Special Edition of Bioenergy Research, which reviews the research accomplishments of the Agricultural Research Service and Forest Service on biomass and bioenergy. The first 12 articles of issue encapsulate much of the research that was reported by the USDA Regional Biomass Research Centers since their inception in 2010. Also, from June 15 to August 4, 2016, the Biomass Crop Assistance Program will accept applications from foresters and farmers seeking incentives to deliver biomass from fields or national forests to energy generation facilities. The Advanced Biofuel Payment Program made \$8.8 million in awards, through USDA Rural Development, to biofuels producers based on the amount of advanced biofuels produced from renewable biomass, other than corn

kernel starch. The Rural Energy for America Program (REAP) awarded 26 grants totaling nearly \$1.9 million through the REAP Energy Audit and Renewable Energy Development Assistance program to help rural small businesses and agricultural producers across America conserve energy and develop renewable energy systems, reducing their carbon footprint and lowering operational costs. The Wood Innovations Grants program awarded \$8.5 million, through Forest Service, to expand and accelerate technologies and strategies that promote the use of wood in heat and power generation, commercial construction, and other wood product innovations that also benefit forest health. The Value-Added Producer Grant program makes available \$44 million to farmers, ranchers, and businesses for economic planning activities or for working capital expenses related to the processing and/or marketing of valued-added products. Electronic applications for this round of funding are due June 24, 2016; paper applications must be submitted by July 1, 2016.

## V. BRDI Solicitation, Status, and Update

*Daniel Cassidy, National Institute of Food and Agriculture (NIFA), USDA*

Mr. Cassidy provided an update on the BRDI solicitation. There were 414 concept papers submitted to the request for proposals. Of those, 47 full applications were accepted and 8 were identified as outstanding or very good. USDA and DOE are looking to make a joint announcement on awards soon. Seven awards were given, five from USDA and two from DOE.

USDA Awards:

- “Integrated Biorefinery To Produce Ethanol, High-Value Polymers, and Chemicals from Lignocellulosic Biomass,” University of California-Riverside University of Tennessee. \$1.3 Million.
- “Cotreatment for Low-Cost Fermentation of Cellulosic Biomass,” Dartmouth College Penn State, Bioenergy Science Center, Enchi Corp. \$1.8 Million.
- “Development of Stochastic Techno-Economic and Life Cycle Models for Quantifying the Economic and Environmental Costs of Cellulosic Bioenergy,” State University of New York. \$907,000.
- “Forest Bioenergy and Biofuels Integration: Sustainability, Energy Balance, and Emissions from Forest Restoration in the Southern Rocky Mountains,” University of Montana, University of N. Arizona, USFS RMRS. \$1.3 Million.
- “Mid-Atlantic Biomass Sorghum Collaborative To Optimize Agronomic Production and Grower Profitability,” North Carolina Biotechnology Center NCSU, Virginia Tech, Chemtex International. \$1.9 Million.

DOE Awards:

- “Improving Tolerance of Yeast to Lignocellulosic Feedstocks and Products,” Massachusetts Institute of Technology.
- “Biomass Gasification for Chemical Production Using Chemical Looping Techniques,” Ohio State University, eight Industrial partners.

## **VI. Overview of the USDA Agriculture and Food Research Initiative**

*Bill Goldner, Acting Director for the Division of Sustainable Bioenergy of the Institute of Bioenergy, Climate and Environment, NIFA, USDA*

Mr. Goldner provided a presentation that informed the Committee on the Agriculture and Food Research Initiative (AFRI) Regional Bioenergy Feedstock Systems Coordinated Agricultural Projects (CAPs) as an integrated approach to understanding regional feedstock supply, quality, and cost. The Sustainable Bioenergy and Biobased Product Portfolio vision is to facilitate the development of sustainable regional production systems for biofuels, biopower, industrial chemicals, and biobased products, through partnerships and collaboration, to create and preserve jobs, increase rural economic vitality, enhance food production systems, create ecosystems services, and reduce use of fossil carbon. AFRI uses a regional approach to bioenergy systems through the CAPs, establishing regional partnerships with academic, government, non-government, and industry. Mr. Goldner then focused his overview on the Northwest Advanced Renewables Alliance (NARA) partnership.

## **VII. Update on the Biomass Board Bioeconomy Initiative and Preliminary Review of the Listening Sessions**

*Alison Goss Eng, BETO, DOE*

*Todd Campbell, USDA*

*Wes Jurey, Agricultural Technology Innovation Partnership (ATIP), USDA*

Ms. Goss Eng and Mr. Campbell provided an update on the Bioeconomy Initiative activities. On February 18, the Biomass Board released the Federal Activities Report on the Bioeconomy (FARB). This report aims to educate the public on the wide-ranging, federally-funded activities that are helping to bolster the bioeconomy. The vision for the Billion Ton Bioeconomy is to sustainably reach the full potential of biomass-derived products as a way of expanding our nation's economy. In doing so, the bioeconomy will provide multiple economic, environmental, and social benefits to the Nation. The Bioeconomy Initiative reports plan includes three reports: (1) The FARB – released in February 2016; (2) Stakeholder engagement included more than 400 participants who were involved in 5 sessions with an upcoming report will be the second part of a staggered release of the Initiative based on recommendations and guidance from the Office of Science and Technology Policy (OSTP); and (3) an "Action Plan" will follow in fiscal year 2017. Next steps include regional forums, organized by the ATIP Foundation, to focus on regional issues and their specific bioeconomy related industries by partnering with the states, rather than conferences geared to a specific industry. These workshops will take place in late July through October.

Mr. Jurey provided an overview of the regional forums. The purpose is to engage stakeholders on how to build and grow the "Billion Ton Bioeconomy." The goal, in partnership with USDA and DOE, is to bring together a mix of stakeholders to seek their input, relative to the initiative's vision, strategies, and implementation, and co-host 3 to 5 regional forums, each with 40-60 attendees representing 6 industry sectors:

- industry
- state and local government
- economic and workforce development
- investment and finance
- academia
- agricultural and environmental organizations.

Proposed Forum Locations (Pending):

- Western Region: Washington (co-host), Oregon, California, Idaho, Montana
- Midwest: Iowa (co-host), Nebraska, South Dakota, North Dakota, Minnesota, Wisconsin, Illinois
- Southcentral: Texas (co-host), Oklahoma, Arkansas, Kansas
- Southeast: Florida/Georgia (co-host), South Carolina, North Carolina, Alabama, Mississippi, Louisiana
- Northeast: Maine (co-host), New Hampshire, Vermont, New York, Pennsylvania.

## **VIII. Overview of the Bioenergy Technologies Office Multi-Year Program Plan**

*Amy Schwab, National Renewable Energy Laboratory-Systems Integration*

Ms. Schwab provided an overview of the updated BETO Multi-Year Program Plan (MYPP). She started by explaining the linkages of the MYPP goals to the Office of Energy Efficiency and Renewable Energy (EERE), DOE, and Federal goals. The purpose of the MYPP is to articulate BETO's mission and goals to internal and external stakeholders, provide budget request justification, help the Office manage and coordinate its activities, and frame a 5-10 year planning horizon. The objectives of the 2015-2016 MYPP update is to incorporate a new BETO Vision and Mission, expand technology focus for attainment of cellulosic hydrocarbon biofuels goals, expand investigation into wet waste-to-energy pathways, better quantify algae production targets, update targets and milestones for demonstration at scale to reflect updated strategy, and incorporate R&D results for current state of technology progress toward R&D goals. She then went through each technical program area, including

- Terrestrial Feedstocks Supply and Logistics R&D
- Algal Feedstocks R&D
- Conversion R&D
- Demonstration and Market Transformation
- Sustainability
- Strategic Analysis
- Strategic Communications.



## IX. National Laboratories Big Idea Activities

*Nathan J. Hillson, Advanced Biomanufacturing, Biological Systems & Engineering Division, Lawrence Berkeley National Laboratory*

*John Holladay, Energy Everywhere: Modular Chemical Conversions Delivering Clean Energy, Energy & Environment Directorate, Pacific Northwest National Laboratory*

*Trent Northen, Enhancing the Global Carbon Sink, Lawrence Berkeley National Laboratory*

Mr. Hillson first introduced the Advancing Biomanufacturing SynBio Foundry. The opportunities space in the U.S. bioeconomy is estimated to be \$250B/yr, and is expected to grow significantly over the next decade; the U.S. has about a billion tons of renewable biomass available annually that is a strategic national resource for the bioeconomy; the biomanufacturing remains nascent in terms of robustness, scale, and standardization; and mobilizing and valorizing this resource through biomanufacturing could rapidly expand the U.S. bioeconomy. There is possible savings of billions of dollars by reducing development time of products from 10 years to 2 years, and reducing energy intensity and carbon efficiency. The impact of the SynBio Foundry are:

- Distributed, integrated capability operated as a collaboration facility
- Decreased energy intensity of current manufacturing processes by 40% over status quo by 2025
- Decreased carbon intensity of current manufacturing processes by 60% over status quo by 2025
- Increased biomanufacturing cycle efficiency (cost, time) >40% by 2025
- Increased U.S. industry competitiveness and create new opportunities for private sector growth and jobs.

Next, Mr. Holladay provided an overview of Energy Everywhere, where modular chemical conversions are delivering clean energy. The concept is to convert the nation's stranded, underutilized, and distributed waste into fuels and chemicals. Waste sources include agriculture and forest waste, animal waste, food processing, waste water sludge, flared gas, CO<sub>2</sub>, and municipal and industrial solid waste. The impact could be 1.5-2.5 billion barrels of oil. The next steps are to demonstrate market feasibility with a functioning prototype in 5 years, and in 10-15 years, create regional networks of modular processing systems. To coordinate partners, a roadmap will identify early targets, cross-office activities, research plan, early adopters, policy implications, industry collaborations, and regional demonstrations.

Lastly, Trent Northen presented the Enhancing the Global Carbon Sink. The sink is for Global Anthropogenic CO<sub>2</sub> Emissions. The land carbon sink has doubled in the last 40 years. The question is, how much carbon can vegetation and soils hold? Enhancing the carbon sink has significant co-benefits, including restoring soil carbon to native levels as it relates to fertility, soil water, arable land (food), and erosion; expanding carbon-neutral biomass with the decarbonized energy supply; and maintaining ecosystem resilience as it relates to biodiversity, resources, and fire risk.

## X. Subcommittee Breakout Reports

### Feedstocks and Logistics Recommendations

#### Outcomes/New Themes

- Based upon insight gained from the Scenario Analysis, consider emphasizing low carbon intensity crops as part of future BRDI RFAs. There is some concern within the subcommittee based upon limitations of current life cycle analyses (e.g. iLUC forecasts have not necessarily been robust).
- Public perception/education remains vital
- Reinforce work that is ongoing and critical
  - Logistics work
  - BETO MYPP
  - Continue and expand Interagency work
- Consider additional language in future BRDI RFAs that require respondents to demonstrate effort to mitigate risk in proposed projects.
- The subcommittee supported the “Systems Analysis” component of the RFA and recommended the full committee consider additional language in future BRDI RFAs that require respondents to demonstrate how the proposed projects will address human and ecosystem health and wellbeing.

### Conversion

Ideas for Committee 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:**

Continued support of novel/transformational 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.

Additionally, R&D should be pursued in coordination with other unrelated sectors that may provide conversion technologies which address the existing challenges.

Increase interconnectivity and knowledge sharing across the supply chain.

**Problem Statement:** The Committee recognizes that the bioeconomy industry is driven by the dependence of fossil fuels.

**Recommendation:**

Analysis is needed to account for regional human health, economic, environmental, and security benefits. Additionally, there should be an effort to understand the monetary value of the non-economic benefits (especially health).

Due to current Board agency limitations, consider working with the National Institutes of Health and the U.S. Food and Drug Administration to expand the ability of the Board to look into the health benefits and other impacts of the Bioeconomy.

We propose there be a heavier emphasis on the benefits that the bioeconomy offers that the fossil fuel industry cannot:

- Energy Security
- Environmental Benefits and Climate Change Mitigation
- Job Creation
- Increased Revenues and Export Potential
- Rural and Disadvantaged Development
- Human Health Gains
- Domestic Competitive Advantage
- Advanced Manufacturing.

**Problem Statement:** It is currently cost prohibitive to partner with National Labs and difficult to overcome intellectual property issues.

**Recommendation:**

The Board should work to better enable the private sector to utilize resources at National Labs and other federally funded research facilities. Increase voucher programs and better communicate technology transfer opportunities, assist with match making, and streamline partnership process.

**Problem Statement:** Feedstock value is insufficient and potential market risks are too excessive to convince producers to dedicate acres to biomass production. Address the risk premium for producers associated with switching or rotating to new dedicated bioeconomy feedstocks.

**Recommendations:**

Develop a suite of risk management tools and insurance programs to include bioenergy crops, and conduct necessary research that provides data for USDA-Risk Management Agency (RMA) to implement new, actuarially sound policies that aid feedstock producers. This includes better decision support tools that incorporate the ability to customize for regional approaches, farming systems, crop rotations, conversion technologies, and production alternatives.

Develop model trading rules and mechanisms for new biomass feedstocks, including both annual and perennial crops.

Leverage state and federal conservation programs to promote biomass production for ecosystem services.

Conduct research on socioeconomic drivers that influence producer decisions regarding production of feedstocks.

## Products Markets and Systems

- If there is progress on the feedstock logistics for creating bioelectricity—which would enable biofuel production—then it should be a priority.
- The Committee should focus on low-hanging fruit to make real tangible progress. Biogas derived from municipal solid waste (MSW) is low-hanging fruit and there are currently ways to make biogas production/use tangible.
- The solutions that the Committee has outlined in the past are too broad and overwhelm resources. Some ideas are being implemented but not nearly enough. The Committee should start off with something that is tangible and use it as the foundation to grow something that is next level. Historically, there has been no pushback on Committee reports, meaning that the Committee recommendations do not push the envelope. The Board members are not only involved in the BRDI, they also echo what the Committee recommends throughout their own agencies and to others they meet, so the Committee should make its recommendations more solid and less nebulous.
- The Committee should pick a new topic to focus on each year. Some pathways are more progressed than others—address the ones that can be easily improved to increase production.
- Past Committee recommendations have been good but are too vague. Federal agencies will take this vagueness and not know how to address it. For example, NARA was successful because it included an education campaign.
- The Committee can recommend policy.
- De-risk growing energy crops more to achieve a price parity with corn. Refineries have to demand the feedstocks, though, to achieve a price parity with corn. But the refineries will not demand the feedstocks until the technology is scaled up. The Committee recommends that DOE and USDA continue to increase their support for R&D in advanced technology for bioenergy production and use.

Ideas for Committee Recommendations:

1. Provide examples of situations with successful outcomes. There are a few topics where the biobased industry will not run into the problems of a feedstock becoming too valuable. Manure-like feedstocks (e.g. food waste) can be processed on a local scale enabling localities to learn how to work with that feedstock better. For example, the federal government is not helping companies that use food-based feedstock to make up for nonfood gaps (sub-food quality crops could be used since they cannot be sold on the market).
2. Issue a Request for Information (RFI). PMS suggests the Committee make more progress like this—more clear actions. “Enforce the Renewable Fuels Standard (RFS)” is too vague of a

recommendation. The Committee should provide examples on how to enforce the RFS. For example, facilities can currently double biodiesel production but it is not happening.

3. The EPA should enforce the RFS by increasing biodiesel demand. The facilities exist to produce double the current demand, the RFS should encourage demand by raising the RFS requirement, which raises the RIN. DuPont does not have a reason to invest in their cellulosic plant because there is no requirement in the RFS for cellulosic, so their facility has fallen idle. The EPA should raise the RFS requirements for cellulosic ethanol production but not nearly as much as biodiesel. The EPA should set up volume requirements for cellulosic ethanol that incentivizes increased production. POET (running at 50% capacity), DuPont (idle), Abengoa Hugoton (shuttered) are the three commercial-scale cellulosic biorefineries. The technology is where it needs to be to produce cellulosic efficiently. However, there are issues with this technology that will only get fixed when the facilities are running, but they will not run until they are encouraged to run and they are invested in.
4. Stakeholders supporting the bioeconomy need to continue working to educate the public on the benefits of bioenergy production and use.
5. States need to develop their individual plans to address the Clean Power Plan demands. Some states will choose biomass and others will not, but that is natural.
6. Gasification technologies for MSW exist and tipping fees for MSW in densely populated areas, like east/west coasts, are very high. The Committee should encourage the biobased industry to start improving technologies for converting MSW to biogas and biogas to finished fuels because MSW is easier to handle today than other nonfood feedstocks. As gasification technologies improve over time, the technology will be better able, and more financially feasible for facilities, to adapt to the next lowest-cost feedstock in the value chain. MSW can prime the pump.

## **XI. Public Comment**

### **James Meade, Chief Technical Officer, Agricultural Fuels Corp.**

BRDI Technical Advisory Committee –Public Comments

Washington, DC –June 13–14, 2016

Nineteen years ago, our facility, located in Orlando, FL, began accepting and recycling biogenic materials, specifically wood and wood residuals harvested from the waste stream. We are located near the entrance to the Orange County Landfill, the second largest in the Southeast. We began our business by making landscape materials, such as red mulch. Six years ago, with the passage of the Farm to Fuel Act in Florida, we shifted to only inventorying agricultural fuels. In the future, we intend to provide a market for farmers growing agricultural fuels that we will be able to cost-effectively blend into our existing feedstock.

The following are the main issues for this type of business:

1. Competing with your regulator—which is the local government (owner of the landfill)—for market share of carbon neutral biogenic materials that are otherwise being wasted (e.g. discourages harvesting from the waste stream)

2. Lack of an unambiguous, specific Federal definition of what is a carbon neutral agricultural or biogenic fuel, versus solid waste. Current law in Florida makes fuels such as camelina, switch grass, or bagasse indistinguishable from the definition of yard waste.
3. The high cost and carbon impact of processing equipment
4. The high cost and carbon impact of transporting of materials using fossil fuels
5. The cost and carbon impact of growing and harvesting fuel crops using fossil fuel powered equipment, and the difficulty in finding a buyer who will pay enough for these crops.

We offer the following solutions:

1. Federal agencies, including the EPA and the DOE, should collaborate with [the] USDA to promote the idea of harvesting from the waste stream, with the ultimate goal of zero waste. All consumer packaging should be incentivized, and ultimately mandated, to be produced from non-fossil-fuel, agriculturally produced materials. This action will have many immediate strong and long-term benefits, including dramatically reducing carbon impacts in a significant and sustainable way.
2. Create an unambiguous, specific Federal definition of what constitutes a carbon neutral agricultural or biogenic fuel, versus solid waste. This definition should further allow the inventory and maintenance of supplies of these carbon neutral materials, as long as proof can be provided that there is no impact to public health or safety.
3. Any biogenic material harvested from the waste stream, and used as a traditional fuel, should be defined as a carbon neutral agricultural product, thereby affording it all of the legal protections of any other farm product, and providing an avenue for rapid reduction of CO<sub>2</sub> emissions. Furthermore, these materials should be entitled to special incentives, as should other farm fuels.
4. The EPA, the USDA, and the DOE should coordinate to provide or encourage grants, incentives, and loan guarantees for innovative and cost-effective equipment or transportation that processes and/or utilizes carbon neutral biogenic fuel, or carbon neutral biogenic raw materials, directly or indirectly.
5. The EPA, the USDA, and the DOE should coordinate to encourage programs, such as the Biomass Crop Assistance Program, to expand eligible carbon neutral biomass materials to include those “harvested from the waste stream,” and eligible locations to include state forests and state water management districts. This should be accomplished while still being mindful that these materials are likely transported using fossil fuel transportation.
6. The EPA, the USDA, and the DOE should coordinate to create policy and incentives to promote the planting of high-value crops with high-energy-value chaff from which can serve as carbon neutral biogenic or agricultural feedstock that can be profitably sold or blended for fuels.
7. Encourage and promote reduction and/or elimination of the use of fossil fuels in transportation and processing, including, but not limited to, creating a program for RINs for electric transportation vehicles.

Any or all of these changes could have a tremendous impact on the biomass and agricultural fuel industries, and help these renewable energy businesses to grow and thrive while reducing carbon impacts in a significant and meaningful way.

Sincerely,

James Meade, Chief Technical Officer  
Agricultural Fuels Corp.

**Corinne Young, Corinne Young LLC.**

Testimony Submitted to the Committee

June 12, 2016

The Renewable Chemicals and Advanced Materials Alliance (re:chem) was founded by a group of leading renewable chemical companies, all of which have earned prestigious EPA Presidential Green Chemistry Challenge Awards for their innovative work. Re:chem was formed to focus on federal and state policies that could facilitate the development of the rapidly commercializing renewable chemical sector in the U.S. We have had the privilege of offering comments at previous Biomass Research and Development Technical Advisory Committee meetings, and appreciate the opportunity to submit these comments today.

As reported in “An Economic Impact Analysis of the U.S. Biobased Products Industry,” the total contribution of the biobased products industry to the U.S. economy in 2013 was \$369 billion and employment of four million workers. Some 1.5 million direct jobs resulted in 1.1 million indirect [jobs] in related industries, and another 1.4 [million] jobs induced from the purchase of biobased goods and services. As we have argued for years, the renewable chemical and biobased products industry is a critical driver in the “new economy,” creating high-value jobs, investment, infrastructure, and full value chain development.

Given the highly competitive global environment, U.S. federal and state government policy plays a vital role in ensuring that renewable chemical and biobased products companies stay here, build here, and expand here. Other countries offer incentives ranging from direct equity, low or zero interest loans, ten-year tax holidays and abatement, pre-permitted and built-out infrastructure, as well as active recruitment for up and downstream value chain. Proactive, pragmatic U.S. government policy and its effective implementation will enhance U.S. competitiveness in this global arena—and ensure continued growth in the bioproducts economy with its 2.64 jobs multiplier.

From our vantage point, as pioneering voices since the renewable chemical sector’s earliest nascent stages, we recognize and applaud the progress of the federal government in working to enable the development of the U.S. bioeconomy. Nowhere is the progress more clearly articulated than in the recently released Federal Activities Report on the Bioeconomy. The report documents significant interagency collaboration, enabling the burgeoning bioeconomy by working to effect change throughout

the value chain: from feedstock supply, through conversion and distribution, to end-use. This cross-agency approach can also ensure taxpayer dollars are most effectively deployed, and we applaud the trend toward collaboration across agencies, and collaboration between government and industry. It offers the best path forward to achieve rapid acceleration of the recent gains in the bioeconomy, and the wisest use of public resources.

Clearly, as passionate advocates for the renewable chemical industry, we heartily endorse the report's Billion Ton Bioeconomy Vision. Central to that vision is an integrated systems approach to overcome barriers and reduce financial, environmental, and market risks. Without apology, as we have for several years, we submit that high-value renewable chemicals are a critical driver in the bioeconomy, cross-subsidizing and supporting the broader bioenergy agenda.

New funding opportunities, such as the MEGA-BIO: Bioproducts to Enable Biofuels, exemplify the approach that can transform the bioeconomy. Strategically targeting the development of higher-value derivative bioproducts can substantially help reduce the risks of investment in biomass production systems, conversion facilities, and end-use infrastructure. All of these investments are crucial to achieving the bioenergy agenda, reducing U.S. reliance on foreign, creating jobs, and reducing greenhouse gas emissions.

However, it is critical [that] the full range of government funding opportunities be aligned if we are to truly realize the ambitious vision for a Billion Ton Bioeconomy. The U.S. Department of Energy's recently issued "Project Development for Pilot and Demonstration Scale Manufacturing of Biofuels, Bioproducts, and Biopower" funding opportunity is a case in point. There is more than \$90 million on the table to put steel in the ground, bringing technology out of the lab and that much closer to the market. It held great promise as a catalyst for true sector development, just at a time when a struggling industry truly needed it.

Unfortunately, the nuances of this funding opportunity operate in contradiction to the Billion Ton Vision. Rather than equitably supporting the manufacture of biofuels, bioproducts, and biopower, allowing the bioeconomy to truly develop and flourish, it severely restricts project eligibility. The primary product output for allowable cellulosic, algal, and biogas feedstocks has to be a statutorily-defined advanced biofuel. Further, that biofuel has to be a liquid at STP (Standard Temperature and Pressure, 25°C and 1 atmosphere pressure) conditions, suitable for use as an infrastructure compatible blendstock that can be co-processed or co-distributed with petroleum derived fuels. And, applications only proposing to produce alcohols or other intermediates without conversion to finished biofuels are disqualified.

While co-products were allowed, this pilot and demonstration funding opportunity's singular focus on a specific biofuel output precluded many emerging bioeconomy players. The list of companies opting not to pursue this opportunity includes not only renewable chemical manufacturers, companies with a hybrid portfolio of biofuels and biochemical products also found the highly restrictive output requirements were simply too burdensome. These are companies poised to deliver on the Billion Ton vision. And, unfortunately, in this instance, government policy missed a huge opportunity to help.



This particular funding opportunity also ignores lessons learned about the inherent need for collaboration all along [the] value chain, both up and downstream. We've learned no start up can solve all value chain bottlenecks and that forward-looking policy must embrace this reality.

Our hope is that future funding opportunities truly reflect the diversity of the nation's growing bioeconomy, or it will be very difficult to reach our collective aspirational goal. Government policy should drive the best innovation the sector has to offer, regardless of feedstock, technology, or products, as in the end that is the true path toward a Billion Ton Bioeconomy.

## **XII. Closing Comments**

The meeting was adjourned.

## Appendix A: Committee Member Attendance—June 13–14, 2016

<b>Co-Chairs</b>	<b>Affiliation</b>	<b>Attended?</b>
Kevin Kephart	South Dakota State University	Yes
Paul Bryan	Consultant	Yes
<b>Members</b>	<b>Affiliation</b>	<b>Attended?</b>
Dean Benjamin	Verso Corporation	Yes
Esteban Chornet	Enerkem	Yes
Steve Csonka	Commercial Aviation Alt. Fuels Initiative	Yes
Vonnie Estes	Consultant	Yes
Emily Heaton	Iowa State University	Yes
Joseph James	Agri-Tech Producers, LLC	Yes
Randy Jennings	Tennessee Department of Agriculture	Yes
Coleman Jones	General Motors Corp.	No
Man Kit Lau	BioAmber Inc.	Yes
Maureen McCann	Purdue University	No
Bruce McCarl	Texas A&M University	Yes
Christine McKiernan	BIOFerm Energy Systems	Yes
Ray Miller	Michigan State University	Yes
Shelie Miller	University of Michigan	No
Marina Moses	American Academy of Microbiology	Yes
Neil Murphy	State University of New York	Yes
David Nothmann	Valent USA	No
Kimberly Ogden	University of Arizona	Yes
Manuel Garcia Pèrez	Washington State University	No
William Provine	Dupont	Yes
Anna Rath	NexSteppe	No
Patricia Scanlan	Black & Veatch	Yes
James Seiber	University of California	Yes
Abolghasem Shahbazi	North Carolina A&T State University	Yes
Don Stevens	Cascade Science and Tech. Research	No
John Tao	O-Innovation Advisors LLC	Yes
Kelly Tiller	Genera Energy, Inc.	Yes
Valerie Thomas	Georgia Tech.	Yes
Alan Weber	MARC-IV Consulting/Weber Farms	Yes

**Total: 24 of 31 members attended**

## Appendix B: Agenda—June 13–14, 2016

### Day 1: Technical Advisory Committee Meeting

June 13, 2016

8:30 a.m. – 8:45 a.m.	<u>Welcome</u> <i>Committee Co-Chair(s)</i>
8:45 a.m. – 9:10 a.m.	<u>Presentation</u> : Committee Overview and DOE Updates <i>Elliott Levine, DFO, DOE</i>
9:10 a.m. – 9:30 a.m.	<u>Presentation</u> : USDA Update on Biomass R&D Activities <i>Todd Campbell, USDA</i>
9:30 a.m. – 10:00 a.m.	<u>Presentation</u> : BRDI Update <i>Daniel Cassidy, NIFA, USDA</i>
10:00 a.m. – 10:15 a.m.	Break
10:15 a.m. – 11:00 a.m.	<u>Presentation</u> : Overview of USDA Agriculture and Food Research Initiative <i>Bill Goldner, Acting Director for the Division of Sustainable Bioenergy of the Institute of Bioenergy, Climate and Environment, NIFA, USDA</i>
11:00 a.m. – 11:45 a.m.	<u>Panel</u> : Update on the Biomass Board Bioeconomy Initiative and Preliminary Review of Listening Sessions <ul style="list-style-type: none"><li>• <i>Alison Goss Eng, BETO, DOE</i></li><li>• <i>Todd Campbell, USDA</i></li><li>• <i>Wes Jurey, ATIP, USDA</i></li></ul>
11:45 a.m. – 12:00 p.m.	<u>Public Comment</u> <i>Corinne Young, Corinne Young LLC</i>
12:00 p.m. – 1:00 p.m.	<u>Lunch</u> (for committee only)
1:00 p.m. – 1:30 p.m.	<u>Presentation</u> : Overview of the Bioenergy Technologies Office Multi-Year Program Plan <i>Amy Schwab, National Renewable Energy Laboratory—Systems Integration</i>
1:30 p.m. – 2:30 p.m.	<u>Panel</u> : National Laboratories Big Idea Activities <ul style="list-style-type: none"><li>• <i>Nathan J. Hillson, Advanced Biomanufacturing, Biological Systems &amp; Engineering Division, Lawrence Berkeley National Lab</i></li></ul>

- *John Holladay, Energy Everywhere, Modular Chemical Conversions Delivering Clean Energy, Energy & Environment Directorate, Pacific Northwest National Laboratory*
- *Trent Northen, Enhancing the Global Carbon Sink, Lawrence Berkeley National Laboratory*

2:30 p.m. – 3:00 p.m.      Discussion: Subcommittee Instructions  
*Committee Co-Chair(s)*

3:00 p.m. – 6:00 p.m.      Breakout Session: Subcommittee Breakouts (closed session)

**Day 2: Technical Advisory Committee Meeting** **June 14, 2016**

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8:30 a.m. – 8:45 a.m.      Welcome  
*Committee Co-Chair(s)*

8:45 a.m. – 10:00 a.m.      Breakout Session: Subcommittee Breakouts (closed session)

10:00 a.m. – 11:30 a.m.      Presentation: Subcommittee Breakout Reports

11:30 a.m. – 12:00 p.m.      Discussion: Next Steps for Q3 Meeting  
*Committee Co-Chair(s)*

12:00 p.m. – 12:15 p.m.      Public Comment

12:15 p.m. – 1:15 p.m.      Lunch (for committee only)

1:00 p.m.      Meeting Adjourn