

**Biomass Research and Development
Technical Advisory Committee**

February 27-28, 2013

Meeting Summary

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List of Acronyms

ACE – Air, Climate, and Energy Program
AFRI-SBE – Agriculture and Food Research Initiative Competitive Grant Program for Sustainable Bioenergy
ARPA-E – Advanced Research Projects Agency-Energy
BETO – Bioenergies Technology Office
Biomass Act – Biomass R&D Act of 2000
Board – Biomass Research and Development Board
BRDI – Biomass Research and Development Initiative
CAFE – Corporate Average Fuel Economy
Committee – Biomass Research and Development Technical Advisory Committee
DOE – U.S. Department of Energy
DOT – Department of Transportation
DPA – Defense Production Act
EISA – Energy Independence and Security Act
EPA – Environmental Protection Agency
FCEA – Food, Conservation and Energy Act of 2008
FOA – Funding Opportunity Announcement
GBTL – gas-biomass-to-liquids
GHG – greenhouse gas
IBR – Integrated Biorefinery
LCA – Life Cycle Assessment
mmgy – million gallons per year
MOU – Memorandum of Understanding
MYPP – Multi-Year Program Plan
NIFA – National Institute for Food and Agriculture
ORD – Office of Research and Development
OTAQ – Office of Transportation and Air Quality
PETRO – Plants Engineered to Replace Oil
R&D – Research and Development
RDD&D – Research, Development, Demonstration and Deployment
REAP – Rural Energy For America Program
RFS – Renewable Fuel Standard
SAFETEA - LU – Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for User
SBIR – Small Business Innovative Research
SHC – Sustainable and Healthy Communities
TEA – techno-economic analysis
USDA – U.S. Department of Agriculture

I. Purpose

On February 27–28, 2013, the Biomass Research and Development Technical Advisory Committee (Committee) held its first quarterly meeting of 2013. The Committee received updates about the Department of Energy (DOE) Bioenergy Technologies Program (BETO), and US Department of Agriculture (USDA) representatives delivered presentations about current Agency activities, as well as the Biomass Research and Development Initiative (BRDI). An overview of DOE BETO FY 2014 Budget and Anticipated Funding Opportunity Announcements (FOA) was also provided along with overviews of Advanced Research Projects Agency-Energy (ARPA-E) and Sun Grant activities. Additional agency presentations were given by the Department of Transportation (DOT) and Environmental Protection Agency (EPA).

See Attachment A for a list of meeting attendees. See Attachment B to review the meeting agenda.

Meeting presentations can be viewed on the BRDI website:

<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 (R&D) Board (Board) was established under the same legislation to coordinate activities across federal agencies. The American Taxpayer Relief Act of 2012, Title VII—Extension of Agricultural Programs, Sec. 701. “1-Year Extension of Agricultural Programs”, subsection (f) Energy Programs, Paragraph 7 on “Biomass Research and Development” extended the Section 9008 through 2013. The Committee is tasked with advising the Secretary of Energy and the Secretary of Agriculture on the direction of biomass R&D.

II. Welcome

Ronnie Musgrove, Committee Co-Chair

Mr. Musgrove welcomed the Committee to the first meeting of the year and called the meeting to order.

II. Committee Business for 2013 and US Department of Energy Updates

Elliott Levine, US Department of Energy, Designated Federal Official

Mr. Levine provided the Committee with some overview and background information. The key policy driver behind the Committee’s work is the Renewable Fuel Standard Program (RFS). The Committee was established by the Biomass Research and Development Act of 2000 (Biomass Act). This has since been amended by the Food, Conservation and Energy Act of 2008(FCEA). The revised Biomass R&D Act outlines the Committee’s objectives, membership requirements, and duties. The Biomass R&D Act also established the Interagency Biomass R&D Board and the Biomass R&D Initiative. Mr. Levine stated that the Biomass R&D Act was extended through 2013 under House Resolution 8, the American Taxpayer Relief Act of 2012. Mr. Levine provided an overview of the Committee Functions, including the recommendations they are tasked to develop. While the legislation authorizing the TAC was extended

by Congress, no Mandatory funding was set aside for BRDI, which resulted in no annual solicitation in FY 2013.

III. 2013 Committee Work Plan

Ronnie Musgrove, Committee Co-Chair

Mr. Musgrove stated that the Committee will move forward as usual per the extension of the Biomass R&D Act. He then asked Kevin Kaphart (Committee Member) to provide a summary of the presentation that both Mr. Musgrove and Mr. Kephart gave the Board in Decemer 2012 regarding the 2012 Committee Recommendations. Mr. Kephart stated that the 2012 recommendations were well received by the Board, and they will be taken back to their agencies and reviewed by agency staff.

IV. US Department of Energy Updates

Elliott Levine, US Department of Energy, Designated Federal Official

Mr. Levine provided an update of U.S. DOE activities. First he announced that the office has changed its name to the Bioenergies Technology Office . He also stated that in November 2012, an update to the Office’s Multi-Year Program Plan (MYPP) was released. The Office has selected new "pathway" technologies that will enable the development of hydrocarbon fuels to meet national needs for aviation, heavy vehicle, and light vehicle transportation fuels. The 8 technology pathways chosen were based on the following:

- Feasibility of achieving programmatic cost goal of \$3/gal
- Near/Mid/Long-term techno-economic potential
- Potential national impact
- Feedstock availability/flexibility
- Data availability across the full pathway

The 8 new technology pathways are as follows:

Technology Area	Pathway
Sugars	Fermentation of Sugars to Hydrocarbons
	Catalytic Upgrading of Sugars to Hydrocarbons
Oils	Catalytic Pyrolysis – ex situ
	Catalytic Pyrolysis – in situ

	Fast Pyrolysis and Upgrading
Algae	Whole Algae Hydrothermal Liquefaction (HTL)
	Algal Lipid Extraction Upgrading to Hydrocarbons (ALU)
Gaseous Intermediates	Syngas to Mixed Alcohols to Hydrocarbons

The Bioenergy Technologies Office 2013 Project Peer Review will be held on May 20-23, 2013, in Alexandria, Virginia. The Peer Review is designed to provide an opportunity for an independent panel of experts to review DOE-funded projects and provide recommendations on the status, technical progress, and relevance of each project in the Office’s portfolio.

This event will be followed by the Program Management Review on July 30, 2013. This event is meant to promote public and stakeholder engagement surrounding the activities of the BETO. The Program Management Review provides the results and findings of the biennial Project Peer Review for dissemination to the public and assessment of the Office’s direction by the external Steering Committee. Then the Biomass 2013: *How the Advanced Bioindustry is Reshaping American Energy Conference* will be held at the Washington Convention Center on July 31-August 1, 2013. This event will run in sequence with the Program Management Review. Biomass 2013 will be a 360° review of the bioenergy industry, focusing on a celebration of the industry’s achievements, contemporary trends, and the technology frontiers on the horizon.

Mr. Levine then updated the Committee on recent funding opportunities.

- On January 3, 2013 the DOE announced a \$10 million award for research and development in projects that use innovative, synthetic, biological, and chemical techniques to convert biomass into processable sugars that can be transformed into bioproducts and drop-in biofuels for cars, trucks, and planes. The DOE selected five projects.
- On June 15, 2012, the Bioenergy Technologies Office released a solicitation for up to \$20 million to support the production of hydrocarbon fuels at pilot or demonstration scale facilities that meet military blend fuel specifications.
- On December 14, 2012, BETO released a solicitation for up to \$12 million to focus on three barriers repeatedly identified at Conversion Technologies for Advanced Biofuels workshop and in the RFI: Carbon, Hydrogen, and Separations efficiency.
- On January 25, 2013, this solicitation released up to \$6 million to support developing and demonstrating strategies, equipment, and rapid analytical methods to manage feedstock quality within economic constraints throughout the feedstock supply chain.
- On January 15, 2013, BETO released a solicitation for up to \$10 million for the Advancements in Algal Biomass Yield to demonstrate, at a process development unit scale of one acre cultivation

equivalent, algal biofuel intermediate yield of 2,500 gallons of biofuel feedstock (or equivalent dry weight basis) per acre per year by 2018.

- In FY 2013 BETO released Small Business Innovative Research (SBIR) solicitations in the following technology areas:
 - Catalysis for the Production of Hydrocarbon Fuels or Chemicals from Mixed-Oxygenates
 - Chemical Catalysis of Lignin
 - Measuring and Improving Biomass Quality Throughout the Feedstock Supply Chain
 - Design and Fabrication of Solids Handling for Biomass Conversion Systems
- On February 7th, the DOE and DOT announced the availability of \$150 million in Advanced Energy Manufacturing Tax Credits (commonly referred to as 48C) for clean energy manufacturing in the U.S.

Finally, Mr. Levine stated that on February 1, 2013, Secretary Chu announced his intention to step down as Secretary of Energy. He has agreed to stay until a successor is transitioned.

V. US Department of Agriculture Updates

Todd Campbell, U.S. Department of Agriculture

Mr. Campbell provided updates from the USDA on the *Food, Conservation, and Energy Act* Energy Title, the state of the current discussion on the Farm, Food and Jobs Bill, and other USDA Programs.

The USDA Certified Biobased Label was launched in February, 2011. Some 850 labels have already been issued to businesses with products registered in the USDA BioPreferred program. At the moment the USDA has suspended the processing of applications

The Biorefinery Assistance Program currently has 9 Active Projects in Portfolio with \$771M in projects announced.

The following are updates on the Farm Bill Energy Titles:

- Section 9004-Repowering Assistance Program, Notice is being prepared.
- Section 9005-Advanced Biofuel Payment Program, Notice Expected in Near Future
- Section 9007-Rural Energy For America Program (REAP), Notice Expected in Near Future
- Section 9008-Biomass Research and Development, No additional funds for 2013
- Section 9011-Biomass Crop Assistance Program, Currently unfunded for 2013

The Agriculture and Food Research Initiative Competitive Grant Program for Sustainable Bioenergy (AFRI-SBE) is designed to achieve the long term outcome of reducing the National dependence on foreign oil through the production of regionally appropriate sustainable bioenergy systems. A required letter of intent were to be submitted by Jan. 28, 2013, and full applications were due on April 3, 2013.

The Forest Service Woody Biomass Utilization Grant Program is a nationwide challenge of using low-value, woody biomass material to create renewable energy and protect communities and critical infrastructure from wildfires. The application deadline is April 8, 2013.

VI. Biomass Research and Development Initiative Update

Carmela Bailey, U.S. Department of Agriculture

Ms. Bailey gave an overview on the following activities:

- National Institute of Food and Agriculture (NIFA) Bioenergy Portfolio
- Agriculture Food and Research Initiative
- Biomass Research and Development Initiative
- Measuring sustainability

Ms. Bailey started with an overview of FY 2012 funding for the NIFA Bioenergy Portfolio.

- Joint DOE/USDA Plant Feedstock Genomics Program - \$2 million
- Agriculture and Food Research Initiative (AFRI)
 - Sustainable Bioenergy Challenge - \$46million
- Joint USDA/DOE Biomass Research and Development Initiative - \$40million
- Critical Agricultural Materials - \$1million
- Small Business Innovation Research Program - \$4million
- Sun Grant, other and non-competitive ~ \$15million
- >\$100M NIFA annual investment in FY 2012

AFRI Sustainable Bioenergy Challenge's is to most effectively produce liquid transportation fuels from dedicated energy crops. FY 2013 the Agriculture and Food Research Initiative made 3 awards.

Ms. Bailey then gave an overview of the Biomass Research and development Initiative from 2009-2012. In that time the Initiative funded \$118 million to support 25 projects that focus on advanced biofuels/biobased industrial products/chemicals. Projects are required to integrate feedstock development/production, feedstock logistics, feedstock conversion, product development, and system analysis. In FY 2012, the Initiative had a USDA contribution of \$40 million authorized with \$25million available and had a DOE contribution of \$10million. The DOE Office of Biomass and Golden Field Office administered the pre-application process. NIFA administered the invited full application process. The FY 2012 solicitation was announced March 2012 with 178 pre-applications reviewed and 42 Invited full applications reviewed. Four awards were made in September. Currently there are 23 projects active under the current Farm Bill. The USDA is completing an analysis of program performance with 28 site visits completed (projects are pre-2009).

Ms. Bailey also stated that the USDA is funding 2 projects that are developing cutting edge evaluation methods and metrics on sustainability. These projects are developing innovative economic accounting metrics that incorporate resources and environmental factors.

VII. Review of Q2 Meeting Site Visit Options

Ronnie Musgrove, Committee Co-Chair

The Committee was presented with 4 options for site visits at the Q2 Meeting.

- University of Florida in Gainesville, FL
- INEOS Facility in Vero Beach, FL
- LOGOS Technologies facility in Visalia, CA
- Dynamic Fuels facility in New Orleans, LA

Another option was proposed to visit the Knoxville, TN area to see ORNL and DuPont facilities.

The committee was asked to discuss these options in subcommittee breakouts.

VIII. Overview of DOE Bioenergy Technologies Office FY14 Budget and Anticipated Funding Opportunity Announcements (FOAs)

Valerie Reed, Acting Program Director, Bioenergy Technologies Office, U.S. Department of Energy

Dr. Reed provided an overview of the BETO office mission: “Through targeted Research, Development, Demonstration and Deployment (RDD&D), this enables sustainable, nationwide production of advanced biofuels that will displace a share of petroleum-derived fuels, mitigate climate change, create American jobs, and increase U.S. energy security.” She then announced that DOE’s national laboratories are successfully validated, through a pilot-scale demonstration, feedstock and conversion processes that reduced the cost of production of cellulosic ethanol. The biochemical conversion pathway achieved a modeled total cost of \$2.15 per gallon of ethanol, and the thermochemical conversion pathway achieved a modeled total cost of \$2.05 per gallon.

Dr. Reed then updated the Committee on the Integrated Biorefinery (IBR) program. BETO has awarded 29 cooperative agreements covering a diverse set of technologies and feedstocks, including 4 commercial-scale, 11 demonstration-scale, 12 pilot-scale, and 2 R&D design projects. Currently 21 IBR projects are active; those include 12 projects utilizing biochemical conversion technologies, 6 utilizing thermochemical conversion technologies, and 3 with algal feedstocks. Thirteen projects are focused on cellulosic ethanol, and 8 projects are focused on renewable hydrocarbons. Three have been completed, and five were terminated for lack of technical progress or lack of cost share. In March 2013, a pre-commercial-scale biorefinery will be coming online to start producing 8 million gallons per year (mmgy) of cellulosic ethanol. This will be the first DOE-supported operating cellulosic ethanol production facility in the United States. Currently two commercial-scale biorefineries are under construction and due for completion in 2014, and two more projects are scheduled for completion in 2015. This will bring the DOE-sponsored production capacity to 80 mmgy by 2015.

Dr. Reed also provided an overview of BETO’s direction for FY 2014. New Funding Opportunity Announcements include the following: Biomass to Lignocellulosic Sugars to Hydrocarbons, Syngas to

Hydrocarbon Fuels and Fuel Components, and a potential Defense Production Act (DPA) FOA: DPA MOU Drop-in Fuels. New priority areas for BETO include the following:

- Waste-to-Energy: The Office plans to expand its focus to include the organic fraction of municipal solid waste and bio-solids, with initial efforts targeting improvements in anaerobic digestion.
- Incubator Program: An opportunity for small business/industry to develop innovative concepts and link to the capital already invested by DOE.

DOE issued the Innovative Pilot FOA for up to \$20 million—with 50/50 cost share requirement—for innovative pilot and demonstration scale biorefinery facilities using FY 2012 appropriated funds. Proposals were due on September 13, 2012. The merit review process has been completed, and announcements are anticipated in March 2013.

The DPA FOA was released on June 27, 2012, for the production of hydrocarbon fuels at pilot-or demonstration-scale facilities that meet military blend fuel specifications. Proposals were due on August 13, 2012. The proposal merit review process has been completed and involved technical experts from DOE, the Navy, and the USDA. In coordination with the Navy, USDA, and the White House, a public announcement is anticipated for mid-March 2013. BETO is advancing research being done for renewable aviation fuels, including techno-economic modeling, feedstock logistics solutions, fuel processing pathways, and greenhouse gas lifecycle assessments. With 25 pilot- and demonstration-scale facilities across the country, BETO is now focusing on eight additional pathways that can produce jet fuel:

- Three thermochemical (pyrolysis) technical approaches
- Biochemical conversion processes, including both biological conversion and catalytic upgrading of sugars to hydrocarbons
- Two algae-based pathways
- Gasification followed by upgrading of synthesis gas to hydrocarbon fuels.

The initial analyses of these pathways will be conducted over the next two to three years.

The intent of the Incubator Program will assist small and start-up companies in prototype and pilot-stage process development for next generation technologies. It is expected that projects awarded under this program will address the barriers/challenges attributed to the feedstock, thermochemical, and biochemical technology areas, as identified in the BETO Multi-Year Program Plan.

BETO has received several requests from industry to investigate whether a combination of natural gas and biomass could be utilized to produce liquid transportation fuels and products. In September 2013, BETO, in coordination with the Office of Fossil Energy and NETL, will host a one-day workshop addressing natural gas-biomass-to-liquids (GBTL) research needs and technology options. The objective of this event is to obtain input from industry, academia, research establishments, and other experts on whether or not there is a role for DOE to conduct R&D and develop new process technologies in GBTL area.

VIII. Overview of Other Agency Programs

Department of Transportation, Shawn Johnson, Grants Manager

Environmental Protection Agency, Chris Clark, Research Scientist

ARPA-E, Chad Haynes, Booze Allen Hamilton

Sun Grant, Vance Owens, Interim Director, North Central Regional Sun Grant Center

Shawn Johnson, Grants Manager, from the Department of Transportation, provided the first overview on DOT's organization, strategic goal, legislation, view on biofuel/alternative fuels, and role in the biofuel industry. DOT's mission is to serve the United States by ensuring a safe, fast, efficient, accessible and convenient transportation system that meets vital national interests and enhances the quality of life of the American people, today and in the future. The three main legislative drivers are *Moving Ahead for Progress in the 21st Century Act (MAP-21)*; *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*; and *Corporate Average Fuel Economy (CAFE)*. Other drivers include *Energy Independence and Security Act (EISA) of 2007* and *Renewable Fuel Standard (Part of EISA)*.

DOT sees a transportation component to each step of the biomass supply chain. Currently DOT has the *Biobased Transportation Research Grant Program*, which is a regional study of feedstock development and deployment and is a collaborative effort with USDA and DOE. They also have the *University Transportation Center's Grant Program*, which provides approximately \$80 million annually to address a wide variety of transportation issues. This is a competitive program. They also have the *Alternative Fuel Life Cycle Analysis Grant Program*, which completed a study on mid-level blends of biodiesel (B20) and ethanol (E85) with RIT transportation fleet and the *Renewable Energy Deployment in Transportation Right-of-Way (ROW)*.

The DOT's *Alternative Fuels Program* is a congressional appropriation to support fuel pathway research and training. This program allows RITA to fund various cross modal research throughout the Department as well as provide collaboration with other agencies, academic institutions, and industry. The DOT also participates on the Biomass Research and Development Board and is a member of the Transport and Distribution Infrastructure Working Group. New activities for DOT include the Clean Transportation Initiative. This is an Interagency Agreement with DOE/ NREL to look at the use of biofuels from the perspective that effective use of alternative fuels can play a critical role in the long-term transition of the surface transportation system to an electric vehicle or other zero-emission based system and its sustainment thereafter. Another new effort is looking at the impacts of feedstock transportation beyond the gate.

Chris Clark from the EPA's Office of Research and Development provided our second agency overview. First he reviewed the recent and ongoing activities of the Office of Transportation and Air Quality (OTAQ). OTAQ protects public health and the environment by regulating air pollution from motor vehicles, engines, and the fuels used to operate them, and by encouraging travel choices that minimize emissions. These "mobile sources" include cars and light trucks, heavy trucks and buses, non-road engines, equipment, and vehicles. There are 38 pathways currently under review that still need to

determine lifecycle GHG emissions. Dr. Clark provided and updated on the review of candidate pathways, setting volume standards, and guidance activities.

Dr. Clark then provided an overview of relevant activities in the Office of Research and Development (ORD). The EPA Air, Climate, and Energy (ACE) National Program has about 16 projects related to the Initiative, divided into the two Sustainable Energy Evaluation groups (SEE-1 and SEE-2). Five projects (SEE-1) are primarily focused on the broader energy landscape, including socioeconomics, Life Cycle Assessment (LCA) development, and other factors. Eleven projects (SEE-2) are primarily focused on bioenergy (fuels, heat, and power). The Sustainable and Healthy Communities (SHC) National Program has 4 relevant projects, including the former “Future Midwestern Landscapes” project which examined different future portfolios of biomass production for biofuels and the estimated environmental effects.

Next, Chad Haynes from Booz Allen Hamilton provided an overview and bioenergy update from the DOE Advanced Research Projects Agency-Energy (ARPA-E) to the Committee. ARPA-E advances high-potential, high-impact energy technologies that are too early for private-sector investment. Dr. Haynes also provided a brief history of the agency and how it operates. Specifically, he shared information regarding ARPA-E bioenergy-related technology development in the areas of feedstock improvements, increase energy density of bioenergy crops, process improvements, and new processes. Dr. Haynes provided an overview of the Plants Engineered to Replace Oil (PETRO) Program’s strategies to develop dedicated biofuel crops and the Electrofuels program to address current biofuel production inefficiencies. At the core of the Electrofuels program is the use of chemoautotrophic microorganisms capable of assimilating energy from inorganic sources, such as hydrogen, for converting carbon dioxide to liquid fuels. Dr. Haynes described that the numerous platform organisms and energy pathways are being developed by Electrofuels performers. ARPA-E conducted techno-economic analysis (TEA) to compare Electrofuels to other biofuel/fuel approaches to help evaluate the next best investment opportunities for the program. ARPA-E and NREL specifically addressed hydrogen, formate, and direct electrosynthesis in first iteration of the models. The agency held an Electrofuels program review and workshop in Houston on Dec. 10, 2012. ARPA-E also recently released a funding opportunity entitled REMOTE, Reducing Emissions using Methanotrophic Organisms for Transportation Energy.

Our last agency overview was of the Sun Grant initiative provided by Vance Owens, Interim Director, North Central Regional Sun Grant Center. Sun Grant is a consortium of the nation’s land-grant universities addressing national bioenergy and bioproduct challenges at the local level and on a regional scale, supporting research and educational activities in the development of biobased transportation fuels and biobased products. It is comprised of five regional university centers and engages agricultural and natural resource colleges in every state and territory. Participating federal agencies include USDA, DOE, and DOT. Current research includes more than 200 projects with collaborators in over 90% of states. The feedstocks that are included are as follows: Switchgrass, Miscanthus, Energycane, Corn and cereal residues, CRP, Willow, Poplar, Prairie cordgrass, and others. Mr. Owens then provided project highlights for each region. Mr. Owens highlighted that the Sun Grant Initiative has a broad scope of projects that cover the entire bioenergy value chain. They are primarily early stage projects that may not have been funded in other programs. Each project has often been a catalyst for further research activity, and they have strong linkage to industry.

X. Subcommittee Breakout Summaries

FEEDSTOCKS

Criteria for site visits

- See technology before commercial to see how they make commercial
 - What are the issues they dealt with and are still dealing with?
- See industrial settings over research scale
- Hear about award process
 - Role of DOE /USDA and other funds
- What is the role of the site visit for the Committee?
 - How do we use these to help us make recommendations?
- Like to see a variety of activities
- What would the feedstock subcommittee be interested in
 - Must see feedstock as component of site visit
 - Think about seasons for feedstock

Possible Locations:

- Tennessee
- California

Strategic Plans/Vision/MYPP

- What should be our guidance framework?
- ACTION: Group to review 2007 TAC Roadmap (from each subcommittee)
 - Idea of what the Committee did and their role
 - Is it necessary now?
 - Need to review other workshop outputs
 - Does this need to be more BRDI focused?
 - Evaluate what happened since 2007 and to what impact BRDI grants made

Agency Reports

- Metrics
 - Input and outcomes
- Need to make the tie-in to what Committee are looking at
- Good presentations from:
 - DOE

- BRDI
- DOT
- ARPA – E
- EPA
- Sun Grant
- Dialog with feedback
- BRDI as providing pathway to commercialization
- Focus on long term field trials (e.g. Sun Grant)

Impact of Natural Gas

- Could TAC provide questions to guide BETO September workshop development?
- What are the potential feedstock issues related to natural gas?
 - Production of biogas or syngas
 - Opportunities
 - Supply hydrogen
 - Are there new feedstocks now cost competitive or no longer cost competitive?
- Argument of Energy Security
 - Cost competitiveness
- Lower cost nitrogen fertilizer impacts?
- More information to the Committee on the September workshop

New Charge DOE/USDA

- Examples
 - Sun Shot
 - EV Everywhere (Vehicle)
- Level differences between feedstocks
 - Processes to uniform feedstock for multiple conversion processes
- Robust conversion processes to deal with variations in feedstocks
- Build and demonstrate a complete supply chain to biomass-derived C5 and C6 sugars and/or aromatics by specific timeframe (5 years)
 - Uniform intermediate commodity
 - Need a cost target
- Jet Fuel
 - Can fly with 100% biofuel
 - Cost target needed.
 - All specs met.
- Carbon capture for useful end products
 - Improve carbon efficiency
- Bring the artificial leaf concept to commercialization

- Set aside Funds
 - ARPA-E is high-risk high-rewards
 - Set aside funds in BETO would have flexibility for the program to address their goals but not as high risk
 - Question: Is it implemented through a competitive process?
 - Could be more effective at the Technology team areas to collectively come together on ideas
 - Office of Science
 - BETO
 - Energy Frontier
 - ARPA-E

Conversion Subcommittee

New Charge DOE/USDA

- Meet the RFS2 requirements as part of a green target for the grand challenge.
- Enable biofuels to be produced at a total cost of less than \$3 dollars per gallon (BOE): “Three Buck Bio”
- 100% of the fleet should be flex fuel capable by 2020: “Flex-All”
- Challenge to replace 50% of petroleum based chemicals and products with bio-based feedstocks by 2035.
- Double productivity on every acre of land to sustainably achieve 20-25 BOE per acre per year.

Others:

- Review of BETO MYPP and 8 Conversion Pathways. Review for technical hurdles and possible gaps for recommendations.
 - Are there other technologies that are not being focused on that should be considered?
- Programs should open ‘innovation’ solicitations for a small percentage of the budget to target specific problems, such as separations and syngas cleanup. All government programs in this area should be considered to avoid duplication.

2013 Infrastructure Recommendations

The Infrastructure Subcommittee continues to recognize the importance of the 2012 Infrastructure Recommendations focused on FS Logistics. However, we believe additional downstream infrastructure issues that should be addressed include the following:

1. The market is constraining the utilization of renewable fuels; thus, the market is not increasing. This leaves the US with a surplus of renewable fuels, specifically ethanol. We recommend the factors concerning this constraint, both short term and long term, be studied and solutions proposed. This includes the following:

- a. Fungibility: the ability to interchange “drop-in” fuels
 - b. Low proportion of FFV in the fleet
 - c. Delivery at service stations
 - d. Consumer acceptance and adoption
 - e. Technical features that allow biofuels to meet Tier 3, Lev III emissions standards, with the proposed certification fuels
2. Fuel is a significant portion of the operational expense of harvesting, handling, transport, and processing Feedstock.
 - a. Recommendation: R&D on FS Logistics equipment that allows the use of renewable fuels
 3. DOE RM describes biofuels as a transition fuel on the path to Electric Vehicles.
 - a. What is the best path for biomass to transport miles: optimum use of biomass - generating electricity or producing liquid fuels
 - i. Conduct economic and LCA analysis

New Charge DOE/USDA

We recommend technology be developed to replace all imported fuel by 2030, with domestically produced low greenhouse gas (GHG) renewables by 2030 (replace EIA projected use of 7 mmbd in 2030, or 53% of total, currently at approximately 10% of this target).

Information Request:

Information on achievement of 2012 cellulosic ethanol cost target, including modeled cost of capital expenditures, and infrastructure costs

XI Public Comment

None

XII Closing Comments

Meeting was adjourned.

Attachment A: Committee Member Attendance – February 27-28, 2013, Meeting

Co- Chairs	Affiliation	Attended?
Ronnie Musgrove	Former Governor, MS	Yes

Members	Affiliation	Attended?
Dean Benjamin	NewPage Corporation	Yes
David Bransby	Auburn University	No
Pamela Reilly Contag	Cygnnet Biofuels	Yes
Harrison Dillon	Solazyme	No
Neal Gutterson	Mendel Biotechnology	Yes
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	Yes
Jay Levenstein	FL Dept. of Ag. and Consumer Services	Yes
Stephen Long	University of Illinois	Yes
Maureen McCann	Purdue University	Yes
Bruce McCarl	Texas A&M	No
Neil Murphy	State University of New York,	Yes
David Nothmann	Battelle	Yes
Jimmie Powell	The Nature Conservancy	Yes
William Provine	Dupont	Yes
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	Yes
Todd Werpy	Archer Daniels Midland Company	Yes

Total: 21 of 24 members attended

Attachment B: Agenda – February 27-28, 2013

Day 1: Technical Advisory Committee Meeting

February 27, 2013

- 1:00 p.m. – 1:15 p.m. Welcome *Room A*
Co-Chair – Ronnie Musgrove
- 1:15 p.m. – 1:30 p.m. Presentation: Committee Business for 2013
Elliott Levine, DFO
- 1:30 p.m. – 1:45 p.m. Presentation: 2013 Workplan for the Committee
Ronnie Musgrove, Committee Co-Chair
- 1:45 p.m. – 2:00 p.m. Presentation: U.S. DOE Updates
Elliott Levine, U.S. Department of Energy
- 2:00 p.m. – 2:15 p.m. Presentation: USDA Update on Biomass R&D Activities
Todd Campbell, U.S. Department of Agriculture
- 2:15 p.m. – 2:45 p.m. Presentation: Biomass Research and Development
Initiative (BRDI) Update
Carmela Bailey, NIFA, U.S. Department of Agriculture
- 2:45 p.m. – 3:00 p.m. *Break*
- 3:00 p.m. – 3:15 p.m. Public Comment:
- 3:15 p.m. – 3:30 p.m. Discussion: Review of Q2 Meeting Site Visit Options
Committee
- 3:30 p.m. – 4:15 p.m. Presentation: Overview of DOE Bioenergy Technologies
Office FY14 Budget and Anticipated Funding Opportunity
Announcements (FOAs)
*Valerie Reed, Acting Program Director, Bioenergy
Technologies Office, U.S. Department of Energy*
- 4:15 p.m. – 5:30 p.m. Panel: Overview of Other Agency Programs
Department of Transportation, *Shawn Johnson, Grants
Manager*
Environmental Protection Agency, *Chris Clark, Research
Scientist*
- 5:30 p.m. – 6:30 p.m. Breakout: Subcommittees *(Not Open to the
Public)*

Day 2: Technical Advisory Committee Meeting

February 28, 2013

8:15 a.m. – 8:45 a.m.	<i>Breakfast (to be provided for Committee)</i>	<i>Room A</i>
8:45 a.m. – 10:15 a.m.	<u>Panel</u> : Overview of DOE and USDA R&D Programs <i>ARPA-E, Chad Haynes, Booze Allen Hamilton Sun Grant, Vance Owens, Interim Director, North Central Regional Sun Grant Center</i>	
10:15 a.m. – 10:30 a.m.	<i>Break</i>	
10:30 a.m. – 12:00 p.m.	<u>Breakout</u> : Subcommittees	<i>(Not Open to the Public)</i>
12:00 p.m. – 1:00 p.m.	<i>Lunch (to be provided for Committee)</i>	
1:00 p.m. – 2:30 p.m.	<u>Breakout</u> : Subcommittees	<i>(Not Open to the Public)</i>
2:30 p.m. – 2:45 p.m.	<i>Break</i>	
2:45 p.m. – 4:15 p.m.	<u>Discussion</u> : Subcommittee Report Outs	<i>Room A</i>
4:15 p.m. – 4:30 p.m.	<u>Discussion</u> : Data and Topic Requests for Q2 Meeting	
4:30 p.m. – 4:45 p.m.	<u>Public Comment</u> :	
4:45 p.m. – 5:00 p.m.	<u>Closing Comments</u> <i>Co-Chair – Ronnie Musgrove</i>	
5:00 p.m.	<u>Adjourn</u>	