

**Biomass Research and Development
Technical Advisory Committee**

May 20–22, 2015

Meeting Summary

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List of Acronyms

APEC – Asia-Pacific Economic Cooperation
BETO – Bioenergy Technologies Office
Board – Biomass Research and Development
Board
BRDI – Biomass Research and Development
Initiative
Committee – Biomass Research & Development
Technical Advisory Committee
DOD – U.S. Department of Defense
DOE – U.S. Department of Energy
DOI – U.S. Department of Interior
EPA – Environmental Protection Agency
EU – European Union
FEMP – Federal Energy Management Program
FOA – Funding Opportunity Announcement
GHG – greenhouse gas
IMI – Institutes for Manufacturing Innovation
NIST – National Institute for Science and
Technology
R&D – research and development
RBIC – Rural Business Investment Company
RFP – Request for Proposal
UNICA – Brazilian Sugarcane Industry
Association
USDA – U.S. Department of Agriculture

I. Purpose

On May 20–22, 2015, the Biomass Research and Development Technical Advisory Committee (“the Committee”) held its second quarterly meeting of 2015. The Committee received updates from the U.S. Department of Energy’s (DOE’s) Bioenergy Technologies Office (BETO), and U.S. Department of Agriculture (USDA) representatives delivered presentations about current USDA activities. The Committee also received an overview of the Biomass Research and Development Initiative (BRDI), Biomass Research and Development Board (“the Board”), Operation Committee, and working groups. Aviva Glaser, National Wildlife Federation; Andrew Miller, Policy Fellow, Biomass Thermal Energy Council (BTEC); and Michele Jalbert, Corinne Young LLC, provided public comment. Other presentations included and panels on manufacturing innovations and on international biomass activities.

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 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Background: The Committee was established by the Biomass Research and Development Act of 2000, which was later repealed and replaced by Section 9008 of the Food, Conservation, and Energy Act of 2008.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 was established under the same legislation to coordinate activities across federal agencies. This 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*
- *Cathie Woteki, Under Secretary, Research, Education, and Economics, USDA*

Dr. Kephart welcomed the Committee to the second meeting of the year and called the meeting to order. Dr. Kephart updated the Committee on the response he receive when presenting the 2014 Committee recommendations to the Board. As a response to the recommendations, the second quarter meeting will included overviews and inputs from the Board Working groups to increase the working relationship between the Board and the Committee.

Dr. Kephart also welcomed the following new members to the Committee:

- **Anna Rath** – President and CEO of NexSteppe
- **Manuel Garcia Perez** – Associate Professor with the Department of Biological Systems Engineering at Washington State University
- **Kelly Tiller** – President, CEO, Chairman, and Founder of Genera Energy Inc.
- **Shelie Miller** – Professor at the University of Michigan School of Natural Resources and Environment
- **Patricia Scanlan** – The Director of Residuals Treatment Technologies, Black & Veatch

- **Marina Moses** – The Director of the American Academy of Microbiology
- **Kimberly Ogden** – Professor of Chemical and Environmental Engineering at the University of Arizona.

Dr. Woteki then welcomed the Committee and expressed her strong belief in external advisory committees. She expressed her excitement of the stepped-up level of engagement reflected in agenda.

III. Committee Business for 2014 and DOE Updates

- *Elliott Levine, DOE, BETO, Committee Designated Federal Official*

Mr. Elliott Levine from BETO provided an overview of Committee activities for 2015 and DOE R&D activities related to bioenergy. Mr. Levine began by presenting an overview and duties of the Committee for the new members. He then provided an overview of BETO announcements, upcoming events, and publications, which included the following:

- The release of the BRDI Funding Opportunity Announcement on February 26, 2015
- Awards from the Targeted Algal Biofuels and Bioproducts Funding Opportunity Announcement are anticipated in June 2015
- Awards from the Landscape Design Funding Opportunity Announcement are anticipated in June 2015.
- BETO held the 2015 Project Peer Review on March 23–27 2015
- BETO held the sustainability webinar “Biofuels for the Environment and Communities” on April 22, 2015
- DOE’s Office of Fossil Energy and BETO sponsored the Bioenergy with Carbon Capture and Sequestration Workshop on May 18, 2015
- BETO is scheduled to hold the webinar “A Changing Market for Biofuel and Bioproducts” on May 27, 2015
- BETO is planning a waste-to-energy workshop series:
 - March 2015 (joint with Fuel Cell Technologies Office): Anaerobic Membrane Bioreactors, Microbial Electrochemical Cells, and combinations thereof to produce hydrogen and higher hydrocarbons from wastewaters
 - April 2015 (together with the U.S. Environmental Protection Agency [EPA], National Science Foundation , and DOE Water-Energy Tech Team): Energy-Positive Water Resource Recovery
 - Mid-June 2015: Water Environment Federation Water-Energy Conference
 - June 22–24, 2015: *Bioenergy 2015*, with sessions “Renewable Gaseous Fuels” and “Beyond Biogas: Challenges for Wet Waste-to-Energy”

Mr. Levine also provided updates on activities of other DOE Offices, including the Loan Programs Office, Vehicle Technologies Office, Office of Science, and Advanced Research Projects Agency-Energy.

Ray Miller stated that much of what we talk about revolves around liquid fuels and biochemical conversion, and asked, at what point should we add the recent developments in the power generation

industry? Dr. Kephart suggested that the Committee discuss power generation in subcommittee breakouts during the meeting.

IV. USDA Updates

- *Todd Campbell, USDA*
- *Harry Schomberg, USDA*

Mr. Todd Campbell provided updates on the following Farm Bill programs:

- Rural Energy for America Program – This program encourages agricultural producers and rural small businesses to improve their renewable energy systems and energy efficiency by covering up to 25% of total project costs (maximum of \$500,000 for RES and \$250,000 for energy efficiency). It also provides loan guarantees for up to 75% (maximum of \$25 million) of total improvement costs. More than \$280 million is available to eligible applicants.
- Biomass Crop Assistance Program – This program provides up to \$25 million each year in financial assistance to owners and operators of agricultural and non-industrial private forestland. To qualify, owners and operators must establish, produce, and deliver biomass to a qualifying facility for heat, power, biobased products, research, or advanced biofuels. The rule includes modifications to cost sharing, eligible types of biomass, and other definitions. Comments were due by April 28, 2015. The full program resumed on May 28, 2015. The request for proposal (RFP) for new project areas will be solicited mid-summer.
- Nanotechnology Research funded under the Agriculture and Food Research Initiative – This program provides \$3.8 million in funding to support grants focused on using nanotechnology. Awards focuses on finding solutions to societal challenges such as food security, nutrition, food safety, and environmental protection.
- Forest Service Wood Innovation Grants – Awards of more than \$9 million were given to expand and accelerate wood energy and other wood product markets. The federal funds will leverage \$22 million in investments from partners, resulting in a total investment of \$31 million in 23 states.
The awarded funds will stimulate the use of hazardous fuels from National Forest System lands and other forested lands to promote forest health while simultaneously generating rural jobs.
- New Private Funds to Make Investments in Rural America – Secretary Vilsack announced two new private funds, known as Rural Business Investment Companies (RBICs), which make equity investments in rural businesses, helping them grow and create jobs. Meritus Kirchner Capital has set a goal of raising \$100 million, while Innova Memphis has set a goal of raising \$25 million for their respective funds. USDA intends to accept RBIC applications through 2016.
- President's 2016 Budget Proposal on USDA-Led Manufacturing Innovation Institutes – This proposal includes \$80 million to support public-private partnerships to establish two innovation institutes engaging industry, leveraging funding, and facilitating technology transfer in BioManufacturing and Nanocellulosics.
- Building Blocks for Climate Smart Agriculture – The program focuses on 10 priority areas. USDA expects voluntary actions to reduce net emissions and enhance carbon sequestration by more

than 120 million metric tons of CO₂ equivalent per year—about 2% of economy-wide net greenhouse emissions—by 2025.

V. Biomass Research and Development Initiative Solicitation and Update

- *Daniel Cassidy, National Institute of Food and Agriculture, USDA*

Mr. Daniel Cassidy thanked the Committee members for their 2014 recommendations. Mr. Cassidy leads USDA programs including BRDI, the Agriculture and Food Research Initiative, the Sustainable Bio challenge, Bio Diesel Education Program, and the Sun Grant Initiative.. BRDI has been the instrument used to help projects to cross the valley of death. The fiscal year (FY) 2014–2015 solicitation was due on February 26, 2015. The first phase is for concept papers. DOE then conducts the initial reviews. A total of 379 papers were submitted, including 69 concept papers in feedstocks development, 279 in fuels and product development, and 31 in the life-cycle analysis area. USDA will review the full proposal submitted. The estimated project award size is between \$500,000 and \$2 million. At most, BRDI will fund 6–10 projects out of 379. In the existing portfolio of active projects, two projects are ending this year.

Elliott Levine asked what the difference is between the current solicitation and previous solicitations and how they had to respond. Mr. Cassidy explained that in the previous solicitation, \$40 million was available to make awards, so they required all three technical areas to be included. Currently, BRDI has \$3 million/year available, so the technical areas are decoupled, allowing for each concept paper to address just one of the three areas. Dr. Kephart noted that the Committee’s recommendation in the past was to decouple the program areas.

Maureen McCann asked for what proportion of concept papers do they expect to send invitations to submit a full application. Dr. Cassidy stated the proportion has been significantly reduced due to the time and effort that is required to make a high-quality proposal funded by BRDI.

VI. Manufacturing Innovation

- *Mike Molnar, Advanced Manufacturing Program Office, National Institute for Science and Technology (NIST)*
- *Mark Shuart, DOE Advanced Manufacturing Office*
- *Robbie Barbero, Biological Innovation Office Science and Technology Policy*

Mr. Mike Molnar from the Advanced Manufacturing Program Office at National Institute for Science and Technology (NIST) gave a presentation on industry-led consortia. He first started with NIST’s mission to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. The National Program Office for the Advanced Manufacturing Partnership is an effort initiated by the White House that brings together industry, academia, and the federal government to drive investments in emerging technologies that will create high-quality manufacturing jobs and enhance global competitiveness.

President Obama launched the Advanced Manufacturing Partnership in June 2011 on the recommendation of the President's Council of Advisors on Science and Technology.

The Advanced Manufacturing Partnership was charged with identifying collaborative opportunities between industry, academia, and government that will catalyze development and investment in emerging technologies, policies, and partnerships with the potential to transform and reinvigorate advanced manufacturing in the United States. Federal investment in the National Network for Manufacturing Innovation serves to create an effective manufacturing research infrastructure for U.S. industry and academia to solve industry-relevant problems. The National Network for Manufacturing Innovation will consist of linked Institutes for Manufacturing Innovation (IMIs) with common goals, but unique concentrations. In an IMI, industry, academia, and government partners leverage existing resources, collaborate, and co-invest to nurture manufacturing innovation and accelerate commercialization. As sustainable manufacturing innovation hubs, IMIs will create, showcase, and deploy new capabilities, new products, and new processes that can impact commercial production. They will build workforce skills at all levels and enhance manufacturing capabilities in companies large and small. Institutes will draw together the best talents and capabilities from all the partners to build the proving grounds where innovations flourish and to help advance American domestic manufacturing. Mr. Molnar then walk the Committee through the development of an example institute for Digital Manufacturing.

Mark J. Shuart, R&D Facilities Program Manager for the DOE's Advanced Manufacturing Office, then presented on Clean Energy Manufacturing Innovation Institutes. Mr. Shuart provided an overview of the rigorous process to select Institute topics that includes inputs from industry and universities. He shared the Administration's vision of up to 45 institutes in 10 years. The DOE Clean Energy Manufacturing Innovation Institutes include the following:

- PowerAmerica: Next Generation Power Electronics Manufacturing Innovation Institute, led by North Carolina State University
- Institute for Advanced Composites Manufacturing Innovation, in negotiation with team led by the University of Tennessee
- Smart Manufacturing: Sensors, Controls, Platforms, and Models for Manufacturing.

VII. International Biomass Activities

- *Harry S. Baumes, USDA*
- *Paul Niznik, Strata Advisors, Hart Energy Company*
- *Laura Scandurra, Office of Global Analysis, USDA*
- *Leticia Phillips, Brazilian Sugarcane Industry Association (UNICA)*

Mr. Harry Baumes from USDA chaired a session on International Biomass Activities.

First, Mr. Paul Niznik from Strata Advisors provided a global biofuels outlook to 2025. Mr. Niznik provided an overview on historical international biofuels production and consumption data and then presented some findings from their study. Despite the lack of growth in the United States and EU 28,

these regions remain leaders in consumption of biofuels. However, with the current policy framework in those regions, biofuel policies are not making progress, the ambitious targets will not be met, and follow-up policies have not yet been decided. Latin America and Asia Pacific are generally increasing their biofuel blend mandates. Energy security is once again one of the main drivers behind alternative fuels development, which leads to biofuels promotion in some regions. The current market shows ethanol continues to be dominated by the United States and Brazil, even if strongest growth is expected in Asia Pacific. The United States and EU 28 are expected to have decreasing ethanol markets between 2015 and 2025. The biodiesel market is expected to remain dominated by EU 28, although supply from Asia Pacific could surpass that of EU 28 by 2025. The strongest growth in biodiesel demand is expected to happen in Asia Pacific, depending on palm oil price vs diesel. With only a few successes, advanced biofuels does not lead to industry takeoff. In spite of several on-road biofuels units operating successfully, such as HVO/renewable diesel plants in Europe or Asia, and new cellulosic ethanol plants in Europe and North America, these projects are not followed by investments in new plants. Sustainable feedstock sourcing, financing, and economics/product prices are still major hurdles that advanced biofuels producers struggle to overcome. For aviation fuels, few production pathways have been certified, and sustainable feedstock sourcing, in addition to final product price, remain major barriers. Significant numbers of test and demonstration flights have taken place on all the continents, but few countries actively promote aviation biofuels. In order to lower greenhouse gas (GHG) emissions from aviation, few options seem more cost-effective than biofuels.

Next, Ms. Laura Scandurra from USDA's Office of Global Analysis provided an overview of USDA support for Global Ethanol Market Development. Ms. Scandurra started by providing a global market overview for ethanol. Industry partnerships form the basis of USDA export market development initiatives. To date, the U.S. Grains Council has conducted four market assessment missions to seven markets. Buyer missions are planned for Peru, Columbia, and the Philippines. A market study is also planned for Japan. The Foreign Agriculture Service has received \$120,000 in Asia-Pacific Economic Cooperation (APEC) to conduct workshops. APEC has an aspiration goal of doubling the percentage of renewables in the APEC energy mix by the year 2030. To do this they must build policy support of ethanol as a renewable energy source in transportation fuel. The workshops will be geared toward information sharing, adoption of best practices, and enabling policy environments.

Finally, Ms. Leticia Phillips from the UNICA provided some background. UNICA is the leading sugarcane industry association in Brazil. Member companies represent approximately 60% of the sugarcane, sugar, and ethanol produced in Brazil. Ms. Phillips provided an overview of public policy changes in Brazil. The changes for industry are recouping the capacity of making money out of sugar and ethanol in the short term. Recent measures need to remain credible (which means stable and predictable) and need to be completed to be effective. Tax differentials must be enough to compensate for the positive externalities offered by the ethanol and energy from biomass. Finally, the blend has to be stable over time. In the long-term, the fundamentals are there. Global energy security will depend on renewable sources. Environmental sustainability will renew the global debate and policies regarding GHG emissions. Brazil continues to be competitive in the sugar market despite protectionist and distorting economic policies by other producing countries and global campaigns to villainize sugar consumption. Brazil has the

natural resources, technology, labor force, and experience to attend the internal and external demand for ethanol.

Dean Benjamin asked why Ms. Phillips' presentation was mostly focused on sugar-based ethanol and asked if there are any investments or policies in Brazil for conversion of sugars to bioproducts or renewable chemicals. Ms. Phillips stated that Brazil does have a bioproducts industry and so far, bioplastics are the most successful. With help from the United States, Brazil is seeing higher-value cosmetics and oils coming from the sugarcane.

Coleman Jones asked about the Brazilian experience with flex-fuel vehicles. Ms. Phillips said there is no country with more experience in flex-fuel vehicles than Brazil. Brazil didn't see E100 until the 2000s when car makers began producing those fuels. 90% of new sales are vehicles including flex-fuel engines. In Brazil, every fueling station is required to have at least one dedicated pump of E100. These stations don't have blender pumps. When price is different, they make different choices.

VIII. Biomass Research and Development Working Groups 2015 Activities and Priorities

- *Alison Goss Eng, DOE BETO*
- *Mark Elless, DOE BETO*
- *Harry Baumes, USDA*
- *Mark Segal, EPA*
- *Prasad Gupte, DOE BETO*
- *Cathy Ronning, DOE*

Ms. Alison Goss Eng provided overview and background on the Biomass Research and Development Working Groups. Their mission is to promote collaboration and coordination of research, development, demonstration, and deployment activities to help reduce the costs and increase the sustainability of harvest, handling, collection, storage, and preprocessing of feedstocks. Their focus for 2015 is to identify and solve logistic barriers to growing the bioeconomy.

Mr. Mark Elless provided an overview of the Feedstock Production and Management Interagency Working Group. Its mission is to develop and help deploy sustainable biomass feedstock management and production systems and practices and to integrate these systems and practices into conventional agriculture, forest, and rangeland management systems for energy crops. The focus of current research areas is to improve management systems efficiency and economics, improve sustainable feedstock production systems and practices, integrate biofuel feedstock production into landscape management options, and develop effective decision support tools. The Committee could also focus on the following aims:

- Increase public understanding that sustainably producing hundreds of millions of tons of high-quality feedstocks will require the development and widespread adoption of innovative new

production and management strategies and systems that are adapted to local environmental conditions.

- Increase public acceptance of biomass as a feedstock that can be managed sustainably while continuing to deliver needed levels of goods (including food supplies), services, and values from the landscape
- Increase public support for sustainable biomass production and management as a foundation for the bioeconomy.

Mr. Harry Baumes provided an overview of the Analysis Working Group. Its mission is to coordinate federal analytical activities in the areas of biofuels, biopower, and bioproducts. The goals of the working group are to inform the Board of the analytical activities that are undertaken by various federal agencies, identify areas of potential duplication, leverage resources, and ensure that analysis products are focused and provide value to federal agencies, the Administration, and the general public. Current activities include coordination among Board agencies for increased communication of data/analysis and analysis of the impacts of implementing a bioeconomy grand challenge. The Committee could focus on the following areas:

- Intricacies of the bioeconomy; data and analytical needs
- Data gaps in the bioeconomy and related sectors.

Next, Mr. Mark Segal provided an overview of the Algae Interagency Working Group. Its mission is to leverage federal resources across the biomass supply chain by bringing together algae experts across the federal agencies who have varying perspectives of energy, agriculture, human and animal health, and the environment. The Committee could focus on the following:

- Consider the observation that productivity levels must greatly improve if algae are to be a significant component of the bioeconomy. Progress has been made recently, as evidenced by the National Alliance for Advanced Biofuels and Bioproducts report of 2014, but much more is needed, such as in the following areas:
 - Strain improvements
 - Process improvements
- Understand the biology and ecology of target species for commercialization, not just the physiology. To be used sustainably, species need to be chosen that are efficient users of nutrients, do not put unnecessary stress on resources (e.g., fresh water), and do not threaten native ecosystems if they escape from containment.
- Look more at the potential for macroalgae. The issues, dimensions of sustainability, and limiting constraints are different than for microalgae.

Mr. Prasad Gupte provided an overview of the Conversion Working Group. Its mission is to assist the Board in coordinating federal research and development programs focused on the conversion of biomass into biofuels, biopower, co-products, and non-food biobased products, and provide the Board

with information about conversion technologies. Currently the Conversion Group is working on a comprehensive listing on the status of agency projects working to accelerate the advancement of conversion technologies for advanced biofuels, revising the list of technology performance metrics to assess the commercial viability of conversion technology routes to reflect accomplishments in conversion technology, and reviewing and implementing strategy and recommendations resulting from the Federal Bioeconomy Strategy Workshop. Areas that the Committee could focus include the following:

- Encourage greater interagency interaction (formal, informal, scheduled), conversations, and discussion at all levels
- Encourage/emphasize CRADAs (cooperative research development agreements)/WFOs (work-for-others agreements) to improve national laboratory/industrial impact (are there better metrics to measure this?)
- Encourage greater interaction and support from state and local governments (this is sometimes fragmented)
- Utilize existing infrastructure and extensions to communicate aims of bioeconomy
- Help identify the “industrial commons” for biomass conversion to enable the technical community to interact more efficiently and productively
- Provide guidance/direction on the best use of the interagency working groups.

Ms. Cathy Ronning provided an overview of the Feedstocks Genetic Improvement Working Group. Its mission is to advise, communicate, and coordinate federal research activities relative to the genetic improvement of terrestrial (primarily cellulosic) biomass feedstocks. The goal is to further development of superior, sustainable, and dedicated biomass feedstocks using the tools of genetics and genomics for the implementation of innovative feedstock breeding programs. In this area, the Committee could focus on the following:

- Genotype-to-phenotype determination through development of technologies such as high-throughput phenotyping
- Whole systems understanding of biomass crops and surrounding environment, including crop and soil microbiome, to enhance sustainable production of feedstocks
- Analytical tools and infrastructure needs to enable full exploitation of the wealth and diversity of feedstock data
- Mechanisms of biological carbon sequestration and potential markets.

IX. Subcommittee Summaries

After the subcommittee breakout and full committee discussion, the Committee agreed to move forward with the following themes:

- ***Reducing Capital Expenditure/Operating Expenditure***

- *How can the government help to mitigate risk and hasten development of technologies that reduce costs and enhance efficiencies?*
- **R&D Pipeline**
 - *How do we encourage technologies that can make leapfrog advances?*
 - *How can the government better support public-private partnerships for on-going essential R&D?*
- **Creating/Capturing Social Value**
 - *How can we demonstrate the benefits of the bioeconomy beyond the price of fuel at the pump?*
 - *How can we better determine and capture value from enhanced ecosystem services and enhanced national security provided by the bioeconomy?*
 - *Are better decision support tools or mechanisms needed to assign value to benefits?*
- **Bioeconomy Drivers**
 - *How can policies better support the bioeconomy?*
 - *What does the future fuels market look like and how do biofuels fit?*
- **Cultivating Market Demand and Innovation**
 - *How do we create market demand for bioproducts?*
 - *What technical areas should we focus on to catalyze the bioeconomy?*
- **Educational Tools and Information for Public Outreach and Messaging**
 - *Can we identify ways to communicate the benefits of the bioeconomy differently so they are better received by our audiences?*

X. Public Comment

- *Michele Jalbert, Corinne Young LLC*
- *Aviva Glaser, National Wildlife Federation*
- *Joseph Seymour, Executive Director, Biomass Thermal Energy Council (BTEC)*
- *William W.M. Steiner, General Manager, HOSPRO (submitted via email)*

Michele Jalbert, Corinne Young LLC

Good morning. My name is Michele Jalbert and I serve as Chief Operating Officer for the Renewable Chemical and Advanced Materials Alliance, also known as re:chem. Thank you for this opportunity to speak, and I sincerely appreciate the scheduling accommodation, which allowed me to attend the annual OECD Rural Development Policy Conference earlier this week in Memphis before joining you today. For those who may not be familiar with us, re:chem was founded in 2013 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 US. The global landscape for siting renewable chemical manufacturing operations was and continues to be extremely competitive. Other countries offer a veritable smorgasbord of incentives to lure companies abroad. These incentives range 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. An overview of incentives by country is shown in the table below.

Country	Supply Incentive	Demand Incentive
Australia		X
Brazil	X	
Canada	X	
European Union		X
Japan		X
Korea		X
Malaysia	X	
Philippines		X
Singapore	X	
Taiwan	X	X

Re:chem was created to help level the global playing field, just as innovative renewable chemical technologies were beginning to reach the commercialization stage. Our goal was, in 2013, and is today, to foster policies that will allow this advanced manufacturing renaissance to take root and flourish here in the U.S. We do not want to cede the potential of this important driver in the new economy—with its high-value jobs, investment, infrastructure, and full value chain development—to other countries. We want to keep those jobs and that manufacturing potential right here at home.

As mentioned, the 10th Annual Rural Development Conference was held earlier this week. At this conference, there were hours of robust policy discussion covering a bioeconomy that now spans biofuels, biochemicals, and biopower. That would not have been the case two short years ago. There has been a fundamental shift in U.S. policy, and while work still needs to be done, there is increasing harmonization across federal funding opportunities that support biofuels, biochemicals, and biopower in a more balanced way.

I am here today to thank the members of the Biomass Research and Development Technical Advisory Committee, the Biomass Research and Development Board, and the hard-working professionals at both USDA and DOE for your leadership in helping accomplish this shift in policy. Your work is making a fundamental difference in the chances that the exciting renewable chemical sector will become an integral part of the emerging new economy in the U.S.

By way of example, let me offer the most recent Biomass Research & Development Initiative funding opportunity. Two new elements in this year’s application process dramatically changed the relevance of BRDI for the renewable chemical sector.

- 1) Biochemical projects were allowed to apply in parity with biofuels and biopower projects
- 2) Project scopes were narrowed to a more realistic single focus area, versus the previous requirement for broad solutions for the full value chain.

Opening up programs like BRDI will facilitate the commercialization of renewable chemical products and the development of full value chains to support that commercialization—right here in the U.S. These two changes made a big difference, and they are part of an encouraging larger picture.

In addition to your good work, we are thrilled with the evolution of programs under the most recently enacted Farm Bill, where clear congressional intent is evidenced in the inclusion of renewable chemicals in programs like the 9003 loan guarantee program. In fact, this program is now renamed *The Biorefinery, Renewable Chemical and Biobased Products Manufacturing Program*.

This is all part of an accelerating realization that renewable chemicals have moved far beyond the green niche they once occupied to become a significant driver in the emerging new economy. There is still work to be done—we will always be knocking on your door encouraging inclusion of renewable chemicals in all programmatic offerings. At re:chem, we are working hard to enact a renewable chemical production tax credit. We are also working to achieve regulatory parity for the exciting new products emerging in this sector, such as materials used in light-weighting of cars, high-performance nylons, and polymers used in amazing 3D printing applications. But we are making progress, thanks to the leadership demonstrated by this committee and others who grasp the potential of the global renewable chemical market, projected to reach \$73.8 billion by 2020.

Thank you.

Aviva Glaser, National Wildlife Federation

Good morning. My name is Aviva Glaser. I am a senior policy specialist with the National Wildlife Federation (NWF). Thanks for opportunity to comment today.

NWF has over 5 million members and supporters across the country. NWF believes that it is important that we transition to homegrown sources of renewable energy, and we appreciate all that the administration is doing to identify and promote new sources of renewable energy, including through research investments. However, it is critical that we move forward with these renewable energy sources in a way that does not threaten or harm our natural resources and native wildlife and does not have unintended consequences.

As some of you may know, with energy crops, we have a fundamental problem in that the characteristics that make a crop a great bioenergy crop—quick growing, hardy, tolerant, doesn't need a lot of inputs, etc.—are the same characteristics that describe an invasive species. So by their fundamental nature, bioenergy crops are more likely to become invasive than other plants. **It is crucial that sensible precautions be taken to prevent invasions before they occur, and to ensure that there are no unintended consequences of investments in next-generation bioenergy.**

Fortunately, there are effective screening tools to help assess the invasive potential of plants. Weed risk assessments are a well-established and accurate tool for evaluating the invasive species risk of plants and predicting which plants pose a high risk of harm. A variety of peer-reviewed WRA tools, including

USDA's own, exist and are now available to quantify invasion risk presented by a species, hybrid, or cultivar.

It is critical, however, that weed risk assessment screening tools be incorporated into federal policies and programs, including federal bioenergy research and development programs, and that feedstocks that are invasive or potentially invasive be excluded from funding or incentives.

I want to specifically applaud the Department of Energy on its RFP on landscape design for cellulosic bioenergy feedstocks, which was released last fall. In that RFP, DOE specifically forbids feedstocks that have high potential for invasiveness, as determined by weed risk assessments. As DOE explains in its technical appendix: **"Projects may not cultivate any feedstock that is invasive or noxious or species or varieties of plants that credible risk assessment tools or other credible sources determine are potentially invasive."**¹

Given the potential economic and ecological repercussions should bioenergy crops escape and invade natural or agricultural areas, **I strongly urge all federal funding for bioenergy research to similarly require weed risk assessment screening and to prohibit invasive or potentially invasive feedstocks, as determined by credible weed risk assessment tools. Moreover, I strongly urge this technical advisory committee to issue recommendations to federal agencies that they include this language in all bioenergy feedstock research and development programs.**

Finally, I wanted to encourage this committee to include stakeholders who are experts on fish, wildlife, and invasive species, including stakeholders from the conservation and environmental community.

Thank you for this opportunity to comment. I look forward to continuing to work with you on this important issue.

Joseph Seymour, Executive Director, BTEC

Thank you for the opportunity to speak before the Technical Advisory Committee (TAC) today. I'm Joe Seymour, Executive Director of the Biomass Thermal Energy Council, an association of biomass fuel producers, appliance manufacturers and distributors, supply chain companies, and non-profit organizations that view biomass thermal energy as a renewable, responsible, clean, and energy efficient pathway to meeting America's energy needs.

Today, I'm happy to report on agency successes and new momentum towards the increased federal recognition and deployment of bioheat technologies and fuels.

As you may have heard from earlier this year, President Obama's Executive Order (EO) 13693,

¹ <https://eere-exchange.energy.gov/Default.aspx?Search=landscape&SearchType=#Foaldf2ab85d-f92e-4f03-a386-efe605acafe3>

“Planning for Federal Sustainability in the Next Decade,” the successor to EO 13514, stipulates biomass thermal energy as a path for government agencies to meet their agency greenhouse gas reduction goals. This new EO presents an ample opportunity for the federal government to demonstrate leadership on deployment of bioheat technologies and fuels and reduce greenhouse gas emissions in the process.

The Department of Energy's Federal Energy Management Program (FEMP) has reported that in fiscal year 2013, federal buildings used approximately 143 million gallons of fuel oil and 19 million gallons of propane, for a total cost of nearly \$534 million.

When biomass fuel is available, the General Services Administration has reported that these fossil fuels may be displaced by commercially available bioheat system in a cost-effective manner.

Numerous agencies have already demonstrated progress through their 2014 Strategic Sustainability Performance Plans with regard to biomass energy and bioheat. These advancements include

- **Department of Energy (DOE)**
 - DOE's goal from its 2014 Strategic Sustainability Performance Plan is to “Develop capacity for biomass generation,” with a narrative that notes “DOE views biomass as a key renewable energy resource.”
 - Case in point, DOE has six operating biomass plants. The most well-known of these, the Savannah River Site Biomass Steam Combined Heat and Power Plant, generated 69 GWh of electricity and 567 billion BTU in FY 2013.
- **Department of Agriculture (USDA)**
 - Under its plan, USDA notes that it will “Develop biomass capacity for energy generation.”
 - Also, the recent USDA announcement and funding of four additional State Wood Energy Teams to 20 overall, plus other grants for biomass-related R&D (including the development of a U.S. wood chip fuel standard) bolsters the department's support of advanced bioheat fuels and technologies.
- **Department of Defense (DOD)**
 - DOD's Ft. Carson is buying electricity from a wood biomass project at Colorado State University.
- **Department of the Interior (DOI)**
 - DOI states in its 2014 plan that 7.5% of facility electricity is from renewable energy sources and half (50%) of the energy obtained from new renewable energy sources was from biomass (includes both on-site systems and RECs)
 - Additionally, DOI plans to increase access to public lands for renewable energy development leases (goal of 16,500 MW increase in renewable energy on public lands since 2009).

Where an agency may not have the ability to install bioheat systems onsite, there will be direction from FEMP on using tradable Thermal Renewable Energy Credits to demonstrate compliance, akin to existing Renewable Energy Credit markets.

While not applicable to the new EO, the Environmental Protection Agency has recently launched a Renewable Heating and Cooling website portal to assist residential and commercial building owners in deploying geothermal, solar, and biomass heating technologies.

On the Hill, there are also several legislative proposals that would allow DOE and USDA to directly and formally support the deployment of bioheat and biopower projects, as well as provide R&D for their necessary logistical and processing needs. These measures include

- The Bioenergy Act of 2015 from Sen. Wyden (D-OR) that would appropriate \$94 million and would encourage DOE and USDA coordination
- A Senator Wyden-led appropriations request of \$11 million that would expand BETO's focus to include bioheat and biopower

I also wanted to provide a brief update on a private sector-led effort to establish a method of test and eventual efficiency standard for commercial bioheat systems. We (BTEC) are a month away from developing the first draft of the protocol, and we are likely one year away from publishing the final document. There remains an opportunity for a member of DOE and/or the TAC to participate as an observing project partner.

Thank you again for the opportunity to address the TAC. My comments will be posted to the post event notes, and I welcome any comments you may have at this time.

Respectfully submitted,
Joseph Seymour

William W.M. Steiner, General Manager, HOSPRO (submitted via email)

Sirs:

I am submitting the following statement because of a potential oversight in your biomass funding considerations. By cutting off funding to oil palm projects, or at the least ignoring them, you have overlooked the possibility of growing oil palm in Hawaii, a state which has no natural petroleum reserves and is forced to spend \$6.1 billion/year to import energy fuel of transportation. This is also a concern of DOD.

As former Dean of the College of Agriculture at the University of Hawaii-Hilo on the island of Hawaii, I initiated a project as a proof of concept that oil palm would grow and produce in Hawaii. The objective was not only to produce our own oil, but also to put over 100,000 acres of abandoned sugar cane land

to work and create jobs in an area where unemployment was highest in the islands. The study aimed to import phytosanitized hybrid seeds containing genes for dwarfism (short height), high production of nut masses, and resistance to cooler climates (since Hawaii is at 23 degrees latitude and oil palm normally grows between 11 degrees north and south of the equator). Over 8,000 seeds were eventually planted by cooperating farmers. These seeds were studied to determine which insect and fungal pests attacked them, how to treat for those possibilities, which elevation and soil type was best to grow the trees, and which rainfall regime would work best. We found the answers to all these questions, and the trees are now producing fruit after five years. We have formed a cooperative—the Hawaii Oil Seed Producers LLC (HOSPRO)—and are purchasing our first extraction mill to arrive this summer to begin extracting oil. We estimate a production of 500 gallons/acre of oil. In addition, we have determined we can grow cacao, coffee, and tea—plants that don't mind shade, between the palms—and use a leguminous grass as nitrogen depositing ground cover to reduce fertilizer inputs. Finally, we find the waste products can be made into a 12% cattle and pig feed for finishing meat animals on the island without importing grain or shipping the animals to the mainland. This is a very robust system, as you can see. If algae or biomass production were able to replace the amount of fuel we can produce at a cheaper rate, all is not lost, as palm oil also makes a very good cooking oil, which is also imported into the islands.

We have done this work with donations, though the mill is being purchased with a USDA Rural Development grant. Our concern is that we need funding in the area of \$15 million to expand this process, which will buy us the ten million trees we need to cover the available land. We would like to prevail upon you to consider helping fund this operation, as we have not found previous R&D calls to support development of oil palm production within the boundaries of the United States. I may be reached at wwmsteiner@gmail.com if you have any questions or would like to discuss this further.

Thank you for your consideration!

Mahalo (thank you in Hawaiian)

William W.M. Steinerm, General Manager, HOSPRO

XI. Closing Comments

The meeting was adjourned.

Attachment A: Committee Member Attendance—May 20–22, 2015

Co- Chairs	Affiliation	Attended?
Kevin Kephart	South Dakota State University	Yes
Paul Bryan	University of California-Berkeley	No

Members	Affiliation	Attended?
Dean Benjamin	Verso Corporation	Yes
Steve Csonka	Commercial Aviation Alt. Fuels Initiative	Yes
Claus Crone Fuglsang	Novozymes North America, Inc.	No
Joseph James	Agri-Tech Producers, LLC	No
Randy Jennings	Tennessee Department of Agriculture	Yes
Coleman Jones	General Motors	Yes
Man Kit Lau	BioAmber Inc.	Yes
Johannes Lehmann	Cornell University	Yes
Stephen Long	University of Illinois	No
Maureen McCann	Purdue University	Yes
Bruce McCarl	Texas A&M	No
Christine McKiernan	BIOFerm Energy Systems	No
Ray Miller	Michigan State University	Yes
Shelie Miller	University of Michigan	Yes
Marina Moses	American Academy of Microbiology	Yes
Neil Murphy	State University of New York,	Yes
David Nothmann	Battelle	Yes
Kimberly Ogden	University of Arizona	Yes
Manuel García Pèrez	Washington State University	Yes
William Provine	Dupont	No
Anna Rath	NexSteppe	No
Patricia Scanlan	Black & Veatch	Yes
James Seiber	University of California	Yes
Abolghasem Shahbazi	North Carolina A&T State University	No
Don Stevens	Cascade Science and Tech. Research	Yes
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
Todd Werpy	Archer Daniels Midland Company	Yes

Total: 23 of 32 members attended

Attachment B: Agenda—May 20–22, 2015

Day 1: Technical Advisory Committee Meeting

May 20, 2015

- 8:30 a.m. – 9:00 a.m. Welcome and Introduction of New Members
Committee Co-Chairs
- 9:00 a.m. – 9:15 a.m. Opening Remarks: Cathie Woteki, Under Secretary, Research, Education, and Economics, USDA
- 9:15 a.m. – 9:30 a.m. Presentation: Committee Business for 2015
Elliott Levine, DFO, DOE
- 9:30 a.m. – 10:00 a.m. Presentation: DOE Updates
Elliott Levine, Bioenergy Technologies Office, DOE
- 10:00 a.m. – 10:15 a.m. *Break*
- 10:15 a.m. – 10:45 a.m. Presentation: USDA Update on Biomass R&D Activities
Todd Campbell, USDA
Marlen Eve, USDA
- 10:45 a.m. – 11:00 a.m. Presentation: Biomass Research and Development Initiative (BRDI) Solicitation and Update
Daniel Cassidy, National Institute of Food and Agriculture, USDA
- 11:00 a.m. – 12:00 p.m. Panel: Manufacturing Innovation
 - *Todd Campbell, U.S. Department of Agriculture*
 - *Mike Molnar, Advanced Manufacturing Program Office, NIST*
 - *Mark Shuart, Advanced Manufacturing Office, DOE*
 - *Robbie Barbero, Biological Innovation Office Science and Technology Policy*
- 12:00 p.m. – 1:00 p.m. *Lunch*
- 1:00 p.m. – 2:30 p.m. Panel: International Biomass Activities
 - *Harry S. Baumes, USDA*
 - *Paul Niznik, Strata Advisors, A Hart Energy Company*
 - *Laura Scandurra, Office of Global Analysis, USDA*
 - *Leticia Phillips, UNICA (Brazilian Sugarcane Industry Association)*
- 2:30 p.m. – 3:00 p.m. *Break*

3:00 p.m. – 5:00 p.m. Panel: Biomass Research and Development Working Groups 2015 Activities and Priorities
Alison Goss Eng, Bioenergy Technologies Office, U.S. Department of Energy

5:00 p.m. – 5:15 p.m. Public Comment:
○ *Aviva Glaser, National Wildlife Federation*
○ *Joseph Seymour, Executive Director, Biomass Thermal Energy Council*

Day 2: Technical Advisory Committee Meeting **May 21, 2015**

8:30 a.m. – 10:00 a.m. Discussion: 2015 Key Committee Topic Areas and Breakout Instructions
Committee Co-Chairs

10:00 a.m. – 12:00 p.m. Subcommittee Breakouts

12:00 p.m. – 1:00 p.m. *Lunch*

1:00 p.m. – 5:00 p.m. Subcommittee Breakouts

Day 3: Technical Advisory Committee Meeting **May 22, 2015**

8:30 a.m. – 10:15 a.m. Subcommittee Report Outs

10:15 a.m. – 11:00 a.m. Discussion: Next Steps of Key Topic Areas for 2015
Committee Co-Chairs

11:00 a.m. – 11:30 a.m. Discussion: 2015 Site Visit Options

11:30 a.m. – 11:45 a.m. Public Comment:
Michele Jalbert, Corinne Young LLC

11:45 a.m. – 12:00 p.m. Discussion: Meeting Close
Committee Co-Chairs

12:00 p.m. – 1:00 p.m. *Lunch*

1:00 p.m. Meeting Adjourn