ATIP Foundation Regional Bioeconomy Forums:
"Addressing the Challenges & Opportunities of Advancing the Billion Ton Bioeconomy"

Synopsis of Report to Participants in the Midwest (MW) Regional Bioeconomy Forum
Schisler Conference Center, Ohio State University, Wooster, OH
November 15, 2016
Wes Jurey, Foundation CEO, and R.J. Brenner, Director, ATIP Foundation
Note: full report with 4 attachments can be found at www.atipfoundation.com

Forum Structure and Role of the Foundation and Co-hosts

The Midwest U.S. Bioeconomy Forum was moderated by Wes Jurey, CEO of the ATIP Foundation. Members of the BR&DB Operations Committee made presentations that reviewed the *Federal Activities Report on the Bioeconomy* (FARB) and posed questions related to advancing the bioeconomy.

Table 1: Demographics by sector describe the demographics of invitees by sector, and the actual number that participated on October 18, 2016. As has been the case in the regional bioeconomy forum series, both industry and investment & finance have low positive response rates (or few participants) to invitation to participate.

Table 1. Demographics (by sector) of invitees and participants convened by ATIP Foundation and co-host The Ohio State University, Midwest Regional Bioeconomy Forum, Wooster, OH, November 15, 2016.

Sector Designation	Invited	% of invited	No. Participated	%RSVP to Attend	% of Attendees
Industry	60	36	22	37	39
State and local government	42	25	11	26	20
Economic and workforce development	18	11	6	33	11
Investment & finance	9	5	1	11	2
Academia	25	15	10	40	18
Agricultural and environmental organizations	13	8	6	46	11
Totals	167	100	56	33.5	100

The agenda (see attachment) included welcoming comments Dennis Hall, Director, Ohio Bioproducts Innovation Center (OBIC) at Ohio State University, Tony Logan, State Director, USDA Rural Development, and Wes Jurey, Chairman, ATIP Foundation. A presentation was made by Todd Campbell (USDA). In addition, a "discussion document" was provided to the participants (see attachment). The remainder of the day consisted exclusively of stakeholder attendees from the six sectors participating in discussions on these "discussion document" questions.

Notes were taken (attributed to the commenter) by Jennifer Brown (USDA, RD), and Shannon Ellis (OBIC, OSU). The audio was also recorded from a laptop in case it was needed later to clarify comments.

Post forum, participants received a link to a Google Document (notes of Jennifer and Shannon, combined) and a two-week window to edit their specific comments, or add additional comment. Thereafter, the document was closed and the ATIP Foundation reviewed comments, clarified with authors as warranted, redacted all names of comment contributors (rendering the comments "non-attribute," and annotated with comments (RJB) from the Foundation). The complete MW Regional Bioeconomy Report that includes all comments by participants, as well as the slides presented, is available on the ATIP Foundation website, and serves as a comprehensive record of the event. The document is presented (Attachment 4) as a record of the forum and it includes participant prioritizations of each "challenge" and "opportunity" --- from their perspective --- to determine whether each was in the top 3 priorities of the Midwest U.S.

Reporting of Participant Priorities

Figure 1a (below) reflects their perspective on these "Challenges".

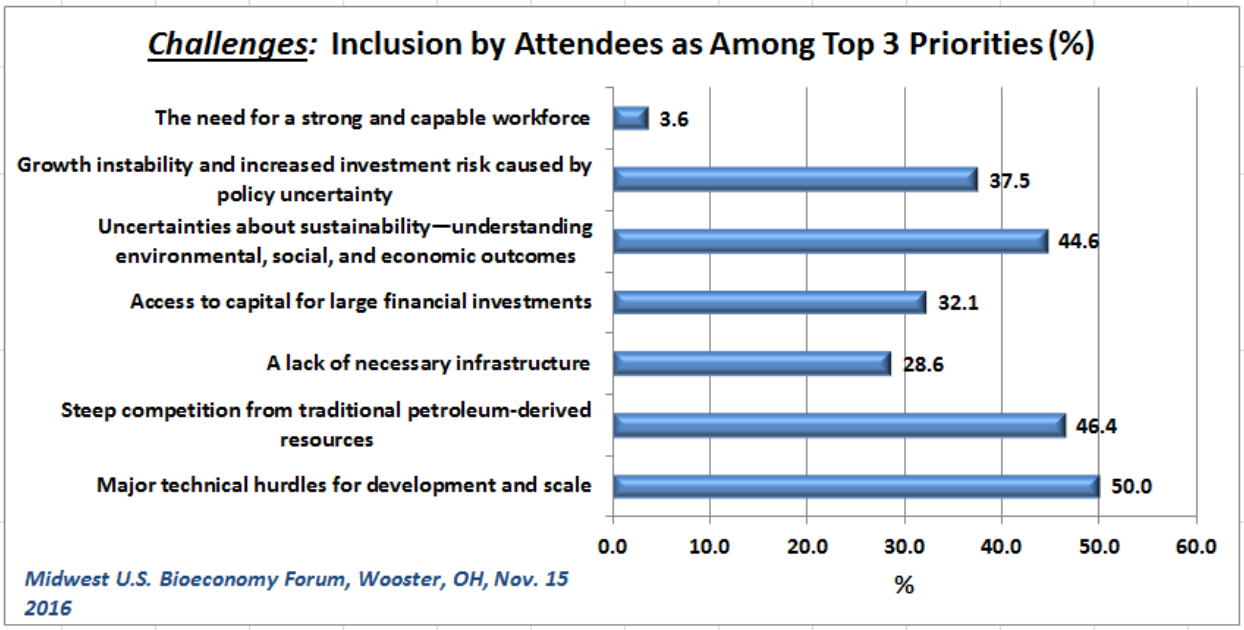
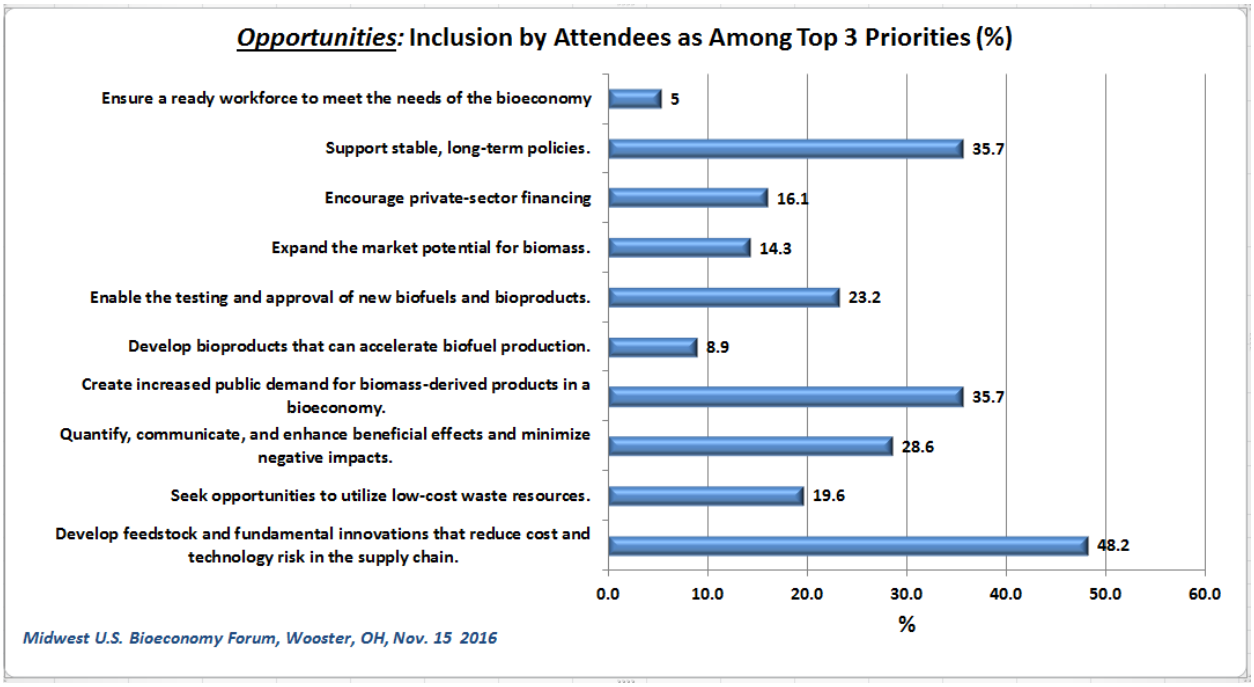


Figure 1b (below) reflects their priorities on "Opportunities."



Discussion: ATIP Foundation & Co-host Assessment of Themes, Issues, Regional Challenges & Opportunities

Regarding the "Critical Discussion Point" session, there were a number of comments from the MW region that characterized regional issues, but also many comments that were fairly common issues across the 5 regional forums. Below, are non-attribute comments from participants, as well as notations by the ATIP Foundation; the latter are preceded below by "[NOTE:…]," and are also reflected in Attachment 4 of full report available on Foundation website as "Comment[RJB#].

"What was missed in the "challenges" and "opportunities?"

- Life cycle thinking has to be included in any definition of sustainability. Social and economic factors also have to be included in sustainability. Quantify the benefits through a Sustainability Life Cycle Assessment.

"What are state/local/regional challenges to the bioeconomy and how can the federal agencies help address these regional challenges?"

- Finance: Funding for proof of concept, prototyping, pilot-scale facilities
- Finance: As to funding sources, need to engage the banking industry into the bioeconomy industry.
- An education program, which would get buyers informed.
    - ***Actionable item – focus on buyers and USDA biopreferred program.***
    - ***quantify and communicate benefits and minimize negative impacts – Communication aspect of benefits – biggest challenge***
- Finance: investment in technology for scale-up. If we are introducing new technology we have to have funding to take risk off the investors.

    - USDA has loan guarantees ***but we need gap financing.*** Need financial partners involved to address the gaps. Can there be an established clearing house for these products to get everyone on the same page?
- Workforce development area – Industry led internships that really make it practical. Opportunities can be very valuable --- Federal gov't could provide some incentives to make this happen.
- Wage matching program for interns. The Andersons had 35 interns this past year. Training students engages youth in industry and jump-starts workforce development.
- How do we get to a billion tons without some type of incentive for chemical products? RECOMENDATION

Comments on ***"What are state/local/regional opportunities to the bioeconomy and how can the federal agencies help leverage these regional opportunities?***

- To attract invest, have tax credit. Second – infrastructure related – industry not there for end of life products.
- Educate the public and the consumer **[Note: increases demand]**
    - Support cross-boundary meetings where we get people together from different industries. Need more workshops allowing people to connect and work to solve and discuss problems and issues.
    - What is the benefit that we tell the American public of achieving the billion tons? We need to educate the consumers. How do we define sustainability? Vision and clarity is needed. What does it mean at the end of the day? Suggestion – How do we define things like sustainability? Needs to be consistent definition and message of importance.
    - A company that creates biobased lubricants is struggling with definition of sustainability. Their struggle is scale. *The problem is they were hoping the Federal gov't fleet would be first adopters however, the definition of sustainability is getting in the way. The Federal gov't needs to make the definition clear that it's biobased.* Currently, if a fossil fuel based lubricant is mixed with more than 5% recycled lubricant, it can be classified as sustainable. The classification needs to be made very clear on what is considered sustainable
- Potential to connect end-users (polymer, paint, engineered products, food companies with University researchers, innovation programs and biomass producers.
- The sourcing of chemicals and materials in a sustainable and environmentally positive way.
    - We have to embrace sustainability and economy-wide opportunities. We are aware of current issues in our own industry/space, but not potential solutions from other industries E.g. CO2 sequestration need for power plants, etc.; this can be used as an input to make more sustainable products (agriculture) rather than dead-end storage (mineralization or down-hole injection) options. Requires cross-cultural discussion (facilitate people to get out of their silos).
    - Develop a "Circular Economy" – common in Europe, new in the U.S. *Materials Exchange Initiative (cloud-based platform) – companies can list their excess materials. Need to expand this to include the bioeconomy.*

- **Key summary of what the federal agencies can do**
    - (1) develop a favorable and stable policy at federal/state level that can be mirrored at state / local level; combined permitting process; incentives for private lending or capital. Tax incentives not long term enough.
    - (2) Create regulatory environment that is favorable: Fast track/ combine permitting with EPA/Building/Zoning.
    - (3.) Provide / create incentives for private lenders to participate

"What sets the MW Bioeconomy apart from other regions of the country? What inherent advantages do you have? **[Note from ATIP Foundation: This forum was among the most positive in clearly describing their inherent and diverse advantages.]**

- We are centrally located. This is a great place to be to get things to the rest of the country. Close to Great Lakes.
    - We also, have the Ohio River --- Low energy costs, Ohio River, Grain costs.
- The scale of polymers and materials, and agriculture.
- The strength of our universities and strength of public/private partnerships.
    - R&D is fantastic in the area.
    - **Need more support for R&D. [Recommendation]**
    - It is important for us to own the disruptive technology to make it work here, to keep jobs here.
- Focus on 4 main disruptive technologies (Additive manufacturing, Factory Automation, Advanced materials & Sustainability) that will affect our workforce for Ohio, because about 20% of Ohio's GSP comes from manufacturing products, and all of the above trends are disruptive to the manufacturing industry & its workforce. If we don't focus on attracting & nurturing innovators in these disruptive technologies, we'll lose our current edge.
    - focus on polymers and fine chemicals to use biomass as feedstock.
- Ag is Ohio's #1 industry and polymers is #2
- We have a large workforce in coal mine areas and steel valley. Is there a mechanism to target these regions? Any incentive for these areas?
    - Development in Appalachia. POWER initiative is EDA and ARC funding to allow the coal industry to reconfigure. This is an advantage for Ohio and the Midwest.
    - Mentioned targeted job areas for Ohio; match federal policy to state policy.
- From a manufacturing standpoint, we have a lot to offer.
- Besides corn and grain crops, we have the largest supply of animal tallow.
- Large land base with ability to not compete for food but available for other uses that are related to non-food items.
- Less weather-related variability as other places (such as droughts in western states).
- The entire infrastructure is here. We are close to raw materials (i.e. corn); close to refineries, farmers
    - 45% of polymers in U.S. within 500 mile drive. Lubrizol, Emery, Ashland are all located here.

"What other biomass would you like to consider in the discussion of advancing the bioeconomy? Animal wastes / carcasses / concentrated animal feeding operations / seafood industry wastes? Municipal landfill biorefineries? Others?"

- hog, poultry industry in Ohio – manure will become more of an issue; Phosphorus run-off an issue. How do you get the biomass from those farms?
- Ohio has a large food processing industry so we have large food waste.
- Municipal Solid waste/sewer treatment, one of Ohio strengths is the Ag Community (i.e., good partnering opportunity for ag sector to lend expertise to other community issues).

"As a region, how can you enhance your bioeconomy through new partnerships in the region, or on a more global ?"

- Include community colleges with the bigger universities. Even high schoolers.
- Most solid waste districts that own landfills have an incentive to landfill vs. find other uses for organic wastes that could be used as feedstocks for bioproducts and biofuels. For example a solid waste district usually receives a payment for every ton of material received at a landfill. These incentives need to be reversed so that they are disincentivized to landfill materials so that they will more actively seek opportunities to reuse and recycle them instead.
- Create formal networking that is steady and regular. Have monthly meetings/discussions to stay connected.
- What about economic agencies working with groups like JumpStart? Can they utilize federal funds to help start companies?
    - In the last 50 years, startups have been creating the jobs.
    - Focus on job creators.
    - Partner with Manufacturing Extension Partnership (MEP), JumpStart, etc.

Summary Statement from ATIP Foundation

MW Regional Bio-Economy Forum Summary
Wes Jurey, CEO, ATIP Foundation

The ATIP Foundation was established in 2011 at the request of the US Department of Agriculture (USDA), Agricultural Research Service (ARS), to serve as a third-party intermediary, engaging a variety of stakeholders with ARS research, programs, and initiatives. The initial goal of the Foundation was to enable a more collective, collaborative approach on behalf of the private sector, with each member representing one of the eight agricultural research regions in the USDA ARS infrastructure.

The fundamental premise behind this approach was the need to create greater awareness of the breadth and scope of USDA intramural research activity (and that of their federal and state partners such as Department of Energy, Department of the Interior, National Science Foundation), and possibly other collaborative agencies of USDA (e.g., Rural Development, Natural Resource Conversation Services, National Institute of Food and Agriculture), conducted in collaboration with 90 + ARS labs throughout the United States, and to foster an understanding that the federal research outcomes are available for use by business and industry, ultimately resulting in economic growth and development, in the agribusiness sector.

The Foundation was incorporated by eight state and regional technology-based economic development organizations, each individually serving as a federal partnership intermediary to USDA's ARS, with many members also having facilitation agreements with other federal agencies, as well as their own network of-instate / regional non-federal stakeholders on many aspects of federal / private sector partnerships.

The Foundation's approach to establishing the five "Advancing the Bioeconomy" forums was premised on identifying regions within the United States whose stakeholders were receptive to the idea that each forum would serve as a springboard to launch one or more demonstration projects within the region. These projects would utilize the scope of research and related outcomes resulting from the massive amount of federal research coordination overseen by the seven federal agencies comprising the Biomass Research & Development Board, formed by statute in 1999.

The ultimate purpose of the regional projects is to demonstrate that the federal research outcomes---combined with other federal / state / local agencies whose scope is in "implementation" of research outcomes, can result in economic growth and development, particularly in rural areas of the country, creating new businesses and enabling existing businesses to expand, resulting in job creation.

From the Foundation's perspective, based on the response from forum participants, we believe our premise is sound. At the conclusion of the Midwest forum, participants were unanimous in support of reconvening in a year, and working to formulate a specific demonstration project tailored to their region in the interim.

It is noteworthy to the foundation that, while each of the five regional forums offered some unique perspectives, relative to their region, six common themes resonated throughout all five forums, relative to each region's ability to make use of the federal research to enhance the growth of regional economies.

First, the need for public awareness is considered a major challenge. At the beginning of the forum, there was significant discussion on what the bioeconomy actually was, beyond biofuel.

Second, the lack of knowledge of and about the federal resources within the seven agencies was cited. Throughout the discussion it became apparent that most attendees knew little, if anything, about the scope of research conducted; the number of federal labs that existed; or the significant number of research scientists employed. Additionally, there was little knowledge in terms of how to access the federal resources available, even if one were aware of them.

Third, the need to develop a talent pipeline for current and future workers was a strong concern. It was noted that although seven federal agencies were members of the BR&D Board, the Departments of Education & Labor were not engaged at the federal level. At the MW Regional forum, there was discussion on the need to include them in subsequent forums and pilot projects; none participated in this regional forum.

Fourth, development of the type of supply chain necessary to sustain the bio economy was expressed as a critical priority. It was noted that moving agricultural by products and waste more than 100 miles was a significant inhibitor of the growth of this industry.

Fifth, the need to finance the growth of demonstration projects, establish new businesses, and expand existing businesses, by seeking federal, state, and private sector financial assistance is a critical concern. It was further noted that the financial community was the least represented in the forum.

Sixth, it was noted that federal policy is one of the most critical issues, and is an underlying issue to the first five cited. Policy uncertainty means high risk to institutions that provide financial assistance. It determines the allocation of federal resources, the priorities of the public workforce system, discourages the establishment of a supply chain uncertain of the sectors future, and makes articulating a vision for the bio economy more challenging.

In our report to the BR&D Technical Advisory Committee in November 2016, and the BR&D Board in December, our findings, and particularly the six commonalities, were well received.

In conclusion, the Foundation looks forward to working with The Ohio State University and the participants in the initial forum, to expand the stakeholder base, in order to begin the development of a regional demonstration project.

We look forward to doing so in partnership with the seven member agencies of the BR&D board, optimistic that the vision of a billion ton bio economy can become a reality.

Summary Statement from Co-Host

Dennis Hall Summary Notes of
Midwest Bioeconomy Forum
Wooster, Ohio November 15, 2016

Participants

The Midwest Forum included 55 stakeholders; including 25 representatives from industry, 10 from academia, 9 from non-governmental organizations, and 10 from governmental institutions. Only one individual attended from the finance sector. The tone of the meeting was positive and constructive with excellent participation from virtually all attendees. Many of the stakeholders have been active in the bioproduct and materials industry. There were significantly fewer representatives of the biofuel and bioenergy sectors. Also, biomass producers were under-represented for this forum.

Challenges and Opportunities

The list of suggested challenges was prioritized around the key theme of competitiveness. While there are many products that were created to compete with oil at significantly higher prices, major technical hurdles in development and scale must be addressed to be successful in the current marketplace. In addition, uncertainty about sustainability (biobased relative to today's incumbent materials) and public policy in this economic climate limits growth. Solving these problems will generate new access to capital and infrastructure development. Workforce development is not seen as an issue at this time due to the relatively weak job market for bioeconomy employees.

Three key opportunities were identified. These opportunities relate to technology development, market demand, and policy stability. A fourth opportunity that seemed to grow in popularity throughout the day was to, "quantify, communicate, and enhance beneficial effects and minimize negative impacts". It was suggested that the opportunity of increasing public demand for bioproducts is more accurately described as a challenge. How do bioproducts earn the premium prices necessary due to higher production costs?

Other topics suggested included many related to communications (among industry, between industry and academia, to consumers, and with future workforce). Circular economy, life cycle assessment, climate change, and other sustainability measures should be emphasized. Incentives similar to the biofuel sector such as tax benefits, streamlined permitting process, and first market assistance are needed to overcome barriers.

Example of issues shared by stakeholders:

> *Company* went to the expense of developing a biobased polyol based on economics of that time. The price decline of petroleum made that product no longer competitive. If it is important to advance the bioeconomy, some sort of incentive will be necessary under this economic climate.
>
> Have developed a product in which the company has significant engineering data to illustrate the benefit of their technology and price competitiveness, but still struggling with market penetration as no one wants to be the first customer.
>
> Company has developed a biobased lubricant product and is disappointed by lack of support by federal procurement officials. Federal sustainability indicators favor recycled content over biobased content despite superior performance metrics.
>
> A specialty chemical manufacturer interested in increasing biobased content recommends creating an "Industrial Biorefinery Council" that includes companies like ADM, Cargill, International Paper, etc. In addition, suggest that the paper industry is well suited to repurpose their assets to make chemicals instead of paper.
>
> There is a large workforce in the steel valley. Is there a mechanism to target this region.
>
> To facilitate collaboration, it is less helpful for academia and other technology providers to know the list of capital assets than to have a list of questions or problems experienced by the company.
>
> The Midwest has lands that allow efficient production of crops like corn and soy. We should not abandon these feedstocks in the new bioeconomy. There are also lesser valuable lands (like strip-mined) where alternative crops may be more valuable. The Biomass Crop Assistance Program (BCAP) could be helpful in making this transition.
>
> USDA has loan guarantees, but gap financing is still needed.
>
> A National Network for Manufacturing Innovation (NNMI) is needed in the bioproducts/ biorefinery industry. Such a program should also include seed funding to support smaller bioeconomy projects.

--- End of synopsis report ---

Attachment: Agenda and "Discussion document"

ATIP FOUNDATION

Agricultural Technology Innovation Partnership

MIDWEST BIOECONOMY REGIONAL FORUM DRAFT AGENDA

"Garnering stakeholder perspectives and input to help shape the vision, strategic planning, and implementation to promote and expand the bioeconomy"

Date: Tuesday, November 15, 2016
Time: 9:30 AM – 5 PM
Location: Shisler Center, OSU Wooster, 1680 Madison Avenue, Wooster, OH 44691

Purpose:

- **To review the "Federal Activities Report on the Bioeconomy,"**
- **Introduce a synopsis of the subsequent "Billion Ton Bioeconomy Initiative: Challenges and Opportunities" report (not yet formally released), and**
- **Solicit input from stakeholders in (1) industry; (2) state and local government; (3) economic and workforce development; (4) investment & finance; (5) academia; and (6) agricultural and environmental organizations in order to accelerate the development of the bioeconomy.**

8:30 AM—Registration / Check-in
9:30 AM—Welcome and Introductions— Dennis Hall, OBIC Director, Ohio State University

- Tony Logan, State Director, USDA Rural Development
- Wes Jurey, Chairman, ATIP Foundation
- Todd Campbell, BR&D Board, Operations Committee (Senior Energy Advisor, U.S. Department of Agriculture)

10:00 AM–11:00 AM—Stakeholder Introductions

11:00 AM–12:00 PM— Overview of the "Federal Activities Report on the Bioeconomy" and the "Billion Ton Bioeconomy Initiative: Challenges and Opportunities" Report

- Presentation by Todd Campbell
- Establishes issues from the federal agencies and frames the topics for discussion

12:00 PM–3:45 PM—Stakeholder Comments and Discussion

- 12:30 PM—Networking Lunch

4:00 PM–4:30 PM—Facilitator Report Out and Next Steps

- Key comments, findings, and recommendations of the 6 sectors
- Includes next steps (timeline to review, prepare, and disseminate report) and feedback on session format

4:30 PM–5:00 PM—Closing Remarks / Adjournment

[1] The Biomass R&D Board consists of representatives from the U.S. Department of Energy, U.S. Department of Agriculture, U.S. Department of the Interior, U.S. Department of Defense, U.S. Department of Transportation, the National Science Foundation, the Environmental Protection Agency, and the Executive Office of the President of the United States.

The Billion Ton Bioeconomy Initiative: Challenges and Opportunities

Overview and Outline of Topics

Purpose of the Billion Ton Bioeconomy Initiative: Challenges and Opportunities Report:

In February 2016, the Board released the *Federal Activities Report on the Bioeconomy* (FARB) to highlight the potential for a stronger U.S. bioeconomy, specifically some of the impacts of increasing biomass utilization three-fold by 2030.[1] The goal of the Billion Ton Bioeconomy Initiative (Bioeconomy Initiative) is to develop and coordinate innovative approaches to expanding the sustainable use of America's abundant biomass resources, while maximizing economic, social, and environmental benefits.

Since the release of the FARB, the Board has engaged with the bioenergy stakeholder community to further develop the Bioeconomy Initiative. The new report, *The Billion Ton Bioeconomy Initiative: Challenges and Opportunities*, is the second in a three-part series intended to lay the foundation and serve as the public communication of the Bioeconomy. This report is foundational to the Board's objective to strengthen the commitment and coordination between the U.S. Government and the bioeconomy community. Early feedback from stakeholders has underscored the importance of biofuels, bioproducts, and biopower. This report details several challenges and opportunities that stakeholders have identified as critical to the success of the Bioeconomy Initiative.

Summary of Challenges and Opportunities:

This report discusses seven of the high-priority **challenges** recognized by the bioeconomy stakeholder community, identified below:

- Major technical hurdles for development and scale.
- Steep competition from traditional petroleum-derived resources.
- A lack of necessary infrastructure.
- Access to capital for large financial investments.
- Uncertainties about sustainability—understanding environmental, social, and economic outcomes.
- Growth instability and increased investment risk caused by policy uncertainty
- The need for a strong and capable workforce.

Specific **opportunities** within each challenge as potential growth areas for the future of the Initiative are detailed below:

- Develop feedstock and fundamental innovations that reduce cost and technology risk in the supply chain.
- Seek opportunities to utilize low-cost waste resources.
- Quantify, communicate, and enhance beneficial effects and minimize negative impacts.

[1] http://www.biomassboard.gov/pdfs/farb_2_18_16.pdf

- Create increased public demand for biomass-derived products in a bioeconomy.
- Develop bioproducts that can accelerate biofuel production.
- Enable the testing and approval of new biofuels and bioproducts.
- Expand the market potential for biomass.
- Encourage private-sector financing
- Support stable, long-term policies.
- Ensure a ready workforce to meet the needs of the bioeconomy

Disclaimer:

The Billion Ton Bioeconomy Initiative: Challenges and Opportunities is a product of interagency collaboration under the Biomass Research and Development Board and does not establish any new or explicitly reflect United States Government policy. Some information is based on activities conducted by the Executive Agencies as of May 2016. However, some of the views expressed in this document reflect stakeholder perspectives and do not represent United States Government policy. This report is not a policy or budget document nor an action plan, and it does not commit the federal government to any new activities or funding.

Critical Discussion Points

(from Biomass R&D Board representatives)

1. What are state/local/regional challenges to the bioeconomy?
2. How can the federal agencies help address these regional challenges?
3. What are state/local/regional opportunities to the bioeconomy?
4. How can the federal agencies help leverage these regional opportunities?
5. What is the value proposition of a bioeconomy?
6. How can you contribute to the Billion Ton Bioeconomy?

Additional Regional Discussion Points for Consideration
(from ATIP Foundation and Ohio Planning Committee)

a) From the "Challenges" section of the above document, what would you list as the 3 highest priorities to discuss and address from the Midwest region?

- From that same list, what SHOULD be added to that list from our regional perspective? Does it change your prioritization scheme?

b) From the "Opportunities" section of the above document, is anything missing from the list, and what would you list as the 3 highest priorities to discuss and address from the Midwest region?

c) What sets the Midwest Bioeconomy apart from other regions of the country?

- What inherent advantages do you have?
- What regulatory issues constrain success?
- What incentives would help advance business opportunities to advance the bioeconomy?
- What does success in the bioeconomy look like in Midwest U.S. now? In 10 years? In 20 years?

d) What other biomass would you like to consider in the discussion of advancing the bioeconomy? Animal wastes including aquaculture, manure and carcasses/ municipal landfills/ strip-mined land reclamation/ Others?

e) How can you enhance your bioeconomy through new partnerships in the region, or on a more global basis?

f) Should products made using fossil carbon, but using a biological process, be included in the national bioeconomy strategy? Example- algae produced from coal flue gas, methane to biopolymers via micro-organisms