

ATIP Foundation Regional Bioeconomy Forumsⁱ:
“Addressing the Challenges & Opportunities of Advancing the Billion Ton Bioeconomy”

Summary Report on Five Regional Bioeconomy Forums Convened in 2016

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EXECUTIVE SUMMARY

This report reflects input received from 223 thought leaders on both the opportunities and challenges of expanding the bioeconomy in the United States. That is, utilizing organic materials such as those that farmers and foresters grow as inputs for refining and manufacturing. The participants are drawn from six broadly defined sectors of stakeholders in five geographically diverse regions of the country.

The fundamental premise of the forums was the projection that the United States has the ability to sustainably produce over one billion tons of biomass annually, by 2030, for industrial purposes including fuels, chemicals and consumer products. The activity could expand current production and contribute additional economic, conservation, and national security benefits to the nation. This vision was articulated by the Biomass Research and Development Board and published in their *Federal Activities Report on the Bioeconomy*, released in February 2016 at the Advanced Bioeconomy Leadership Conference in Washington, DC.

These forums were conducted in partnership with the U.S. Departments of Agriculture and Energy. Their purposes was to provide information to and receive input from key stakeholders, relative to the challenges and opportunities inherent in advancing the bioeconomy, as well as to determine their priorities and interest in enacting regional strategies as an outcome of the forum. As an economic development tool, the bioeconomy has been shown to stimulate both wealth and job creation, particularly in rural America.

In evaluating the input received, we have drawn three fundamental conclusions: (1) there is strong, consistent interest, across the various stakeholder groups, in advancing the bioeconomy; (2) there are significant regional differences, in terms of participant stakeholder views, on both opportunities and challenges that must be addressed on a regional basis; and (3) there are six significant, relevant, overarching themes, universally expressed and supported by all five forums, relative to specific issues and recommendations, to be addressed by federal and state agencies, and the broader stakeholder community. The six themes are as follows:

Finance: stated as the ability to successfully finance the growth of the bioeconomy, focused on (1) public funding and (2) general access to capital. Regarding public funding, government loan guarantees were cited, relative to a lack of knowledge, awareness, or understanding of the process required. Also, federal agencies should consider funding more small scale demonstration projects, rather than fewer large scale ones; incentivize public private partnerships; and provide a level playing field for bioenergy investments and allocations, comparable to those of fossil fuel and nuclear energy.

Regarding general access to capital, the high risks perceived by private sector investors, was based on inconsistency in federal incentives, the lack of off-take agreements, and broadly stated, a lack of understanding of the bioeconomy.

Public Education & Awareness: stated as the need for clear, understandable definitions for the "bio-economy" and "sustainability"; and a robust, orchestrated public educational awareness campaign, inclusive of thoughtful articulation of the value proposition of the bio economy, and "Case for Support", relative to why it makes both business and economic sense.

Public Policy: stated as the need to create a level playing field for the bioeconomy, with long term, stable government incentives and tax credits that are competitive and comparative with other energy programs. Also regulatory requirements and controls, in general, and in particular by EPA, are viewed as overly burdensome, especially to small & medium sized businesses.

Supply Chain: stated as the need to ensure the supply chain logistics/capacity/capabilities are in place, to support the movement of biomaterial from the source to final production/processing facilities, and then to market. As a specific example, one recommendation was that more bio-bass accumulators (biomass depots) are needed to reduce distance from farm/forest to processing facilities. This also reduces cost, and aligns with the recommendation to fund more small models/projects rather than fewer large models/projects.

Workforce: stated as the need to engage the US Departments of Education & Labor, to ensure the publicly funded workforce system is aware of and focused on the development of the workforce needed to support the growth of the bioeconomy. Recommendations include building the talent pipeline; addressing the lack of technical training; the need to create early awareness of opportunities by the 8th grade; and addressing the lack of training opportunities and options in rural areas.

Federal Resources: stated as a general lack of awareness, and a request for federal support of regional collaboration. In terms of awareness, there was a general lack of knowledge of the research and resources available through and from the federal agencies. Outside of academia, most participants were unaware of patent license agreements, cooperative research and development agreements, the scope of federal research, technical assistance and support, such as loan guarantees.

In terms of collaboration, participants stressed the need for economic growth to be seen, perceived and approached on a regional basis, since generally speaking, regional economies do not follow geographic or political boundaries. They viewed federal agency collaboration at a regional level, in partnership with academia, the private sector, and the broader stakeholder community, as a critical component necessary to grow the bioeconomy.

From the ATIP Foundations perspective, based on the input received, these six themes, relative to their issues and recommendations, should be a primary focus of federal and state government and the stakeholder community, in terms of providing the leadership necessary to address the issues raised, in order to stimulate the growth of the bio-economy.

Overview

This “Summary Report on Five Regional Bioeconomy Forums” provides a synthesis of issues identified by participants in the regional forums that captures both common issues across the geography of five regions as well as their unique strengths and regional priorities in advancing the bioeconomy. We strongly recommend that, in addition to reading this summary report, interested parties also take the time to read the synopsis of each regional full report (Attachments 1-5) to more fully understand the challenges and opportunities that each region has expressed and prioritized. For the full report of each regional bioeconomy forum, go to www.atipfoundation.com.

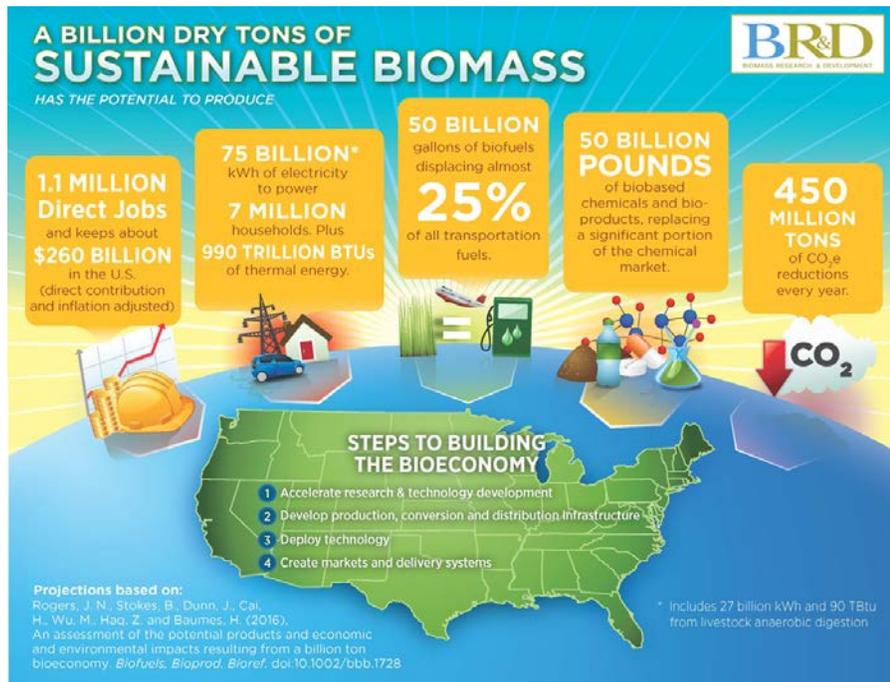
Introduction

In late 2013, the seven agencies and the Office of the President that constitute the Biomass Research and Development Board¹ (hereafter referred to as the “Board”) began development of a vision to promote the expansion of the bioeconomy. With the projection that this nation, by 2020, will sustainably produce a billion tons of biomass annually, the “Vision” was published as the “*Federal Activities Report on the Bioeconomy*,” released in by United States Department of Agriculture (USDA) Under Secretary Cathie Woteki at the 2016 Advanced Bioeconomy Leadership Conference (ABLC) in Washington, D.C. (February 2016; for a copy, go to https://www.biomassboard.gov/pdfs/farb_2_18_16.pdf). “The goal of the Billion Ton Bioeconomy Vision is to develop and implement innovative approaches to remove barriers to expanding the sustainable use of America’s abundant biomass resources, while maximizing economic, social, and environmental outcomes.”

Based on this Vision, stakeholder outreach began with a “listening session” at the conclusion of this national ABLC conference where representatives of the Board introduced a graphic depicting the potential of sustainable biomass (Figure 1.) Subsequently, beginning the month of April, 2016 USDA and the Department of Energy (DOE) co-led informal listening sessions at three other major national conferences: 2016 International Biomass Conference and Expo in Charlotte, NC (April 11-14); World Congress on Industrial Biotechnology in San Diego, CA (April 17-20); and the Symposium on Biotechnology for Fuels and Chemicals in Baltimore, MD (April 25-28). In addition, a webinar on the Vision was conducted jointly by USDA and DOE on May 5, 2016. Input garnered from these five events helped shape a subsequent document, titled “*The Billion Ton Bioeconomy Initiative: Challenges and Opportunities*,” released in November 2017 by the Board (for a copy, go to https://www.biomassboard.gov/pdfs/the_bioeconomy_initiative.pdf).

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.

Figure 1. Potential of a billion tons of sustainable biomass on job creation, energy production, bioproducts, and reduction in carbon dioxide emissions.



Methodology for Regional Bioeconomy Stakeholder Forums

Board representatives contracted with the ATIP Foundation --- a non-profit consortium of State Economic Development organizations --- to develop and co-host with coordinating state entities, a series of regional bioeconomy forums in the latter part of calendar year 2016. These were developed for two purposes: first, to garner input from a broad range of stakeholders on the Challenges & Opportunities in advancing the bioeconomy from their regional perspective, in order to help shape a federal “multiyear implementation plan,” expected to be prepared and submitted by the Board during fiscal year 2017 to the Office of Science and Technology Policy (OSTP). The second purpose was to engage the primary regional stakeholders to determine their priorities in addressing the challenges and opportunities, and their interest in developing regional strategies as a result of the forum.

The goal of each regional bioeconomy forum was to bring together a mix of stakeholders (about 40-60 participants) from various sectors to seek their input, relative to the initiative’s vision, strategies, and implementation. These sectors (with their inherent subcategories) were broadly defined as (1) industry; (2) state and local government; (3) economic and workforce development; (4) investment & finance; (5) academia; and (6) agricultural and environmental organizations. State co-hosts, with the assistance of the Board’s Operations Committee members, derived the list of by-invitation-only participants.

Forums were convened in the Southeast with the Georgia Institute of Technology as co-host (**September 16, Renewable Bioproducts Institute, Atlanta, GA**), in the Southwest with the Mineral Wells Chamber of Commerce,

Mineral Wells, TX, **(September 29, Holiday Hills Country Club, Mineral Wells, TX)**, in the Pacific Northwest with Washington State University **(October 3, Sea-Tac Conference center, Sea-Tac airport)**, in the Northeast with The University of Maine, **(October 18, Orono)**, and in the Midwest with The Ohio State University **(November 15, Schisler Conference Center, Wooster, OH)**. Co-hosts arranged for the meeting room, a modest noon meal, and a dedicated note taker with real-time display so the participants could verify their remarks, as necessary.

Forum Structure and Role of the Foundation and Co-hosts

The agenda for each forum included welcoming comments by the ATIP Foundation, representatives of the Biomass Research and Development Board (hereafter referred to as the “Board”), and the regional co-host. At each forum, a slide set presentation was made by one of the representative of the Board (Harry Baumes, USDA Director, Office of the Chief Economist; Todd Campbell, USDA Senior Advisor on biofuels / biobased, and Rural Development; Valerie Reed, USDA Senior Advisor for Bioenergy; Alison Goss Eng., DOE Program Manager, Feedstock Supply and Logistics and Advanced Algal Systems; Jonathan Male, DOE Director for the Bioenergy Technologies Office). In addition, a “discussion document” was provided by the Board representatives to the participants. The remainder of the day consisted exclusively of stakeholder attendees from the six sectors participating in discussions on the discussion questions. Notes were taken (attributed to the commenter) on the fly by representatives of the co-host. Follow the forum, participants received a link to a Google Document and a 2 week window of opportunity to edit their specific comments, or add additional comment. Thereafter, the document was closed by Richard Brenner of the ATIP Foundation, who reviewed comments, clarified with authors as needed, redacted all names of comment contributors, and annotated with his comments from the Foundation.

In advance of each forum, confirmed participants were presented with a “read ahead” document, prepared by representatives of the Board’s Operations Committee that listed seven challenges and ten opportunities in advancing the bioeconomy. These were based on the Vision of sustainably producing a billion tons of biomass annually by 2030. Following the overview presentations by representatives of the Board at each forum, the moderator asked participants to identify the top three priorities among the lists (3 “votes”).

Results and Conclusions

Invitations and Participation by Region and Sector

An inspection of participation rates by each sector may provide some insight into how engaged each sector is in advancing the bioeconomy. Tables 1 and 2 provide descriptive statistics, expressed as numbers (Table 1) and percentages (Table 2), on invitations and participation by the broad sector designations for all five regional forums. Overall, 637 invitations were issued by co-hosts resulting in 223 attendees. The largest proportion of invitations was made to industry and academia, and the fewest to the investment and finance sector (4.6%), and agriculture & environmental organizations (5.7%). On average 37% of the invitations went to industry, but only 21% of attendees were from that sector. Academia accounted for 22% of invitations, yet averaged 29% of participants. The Investment and Finance sector accounted for an average of only 4.6% of invitations issued across the five forums; they accounted for approximately 4% of participants (9 persons, with 4 attending the forum in Washington).

Table 1. Descriptive statistics on number of invitations issued by five regional co-host within broad sector designations, and the actual number that attended each regional forum.

Region	No. Invited by sector							No. Participated by sector						
	Industry	State&Local gvmnt.	Economic & workforce	Investment / finance	Academia	Ag. & environ.	Total	Industry	State&Local gvmnt.	Economic & workforce	Investment/ finance	Academia	Ag. & environ.	Total
GA	60	12	18	1	26	7	124	7	4	3	0	15	3	32
TX	41	27	23	2	49	11	153	6	8	15	1	9	2	41
WA	25	11	17	9	28	21	111	3	4	11	4	14	8	44
ME	42	13	4	6	13	4	82	12	13	4	3	13	5	50
OH	60	42	18	9	25	13	167	22	11	6	1	10	6	56
Totals	228	105	80	27	141	56	637	50	40	39	9	61	24	223

Table 2. Invitations and participation in five regional forums, expressed as percentages represented by broad sector designations.

Region	% Invited (no. invited per sector/total no. invited per region)							Participated (no. participants by sector/total no. participants per region)						
	Industry	State&Local gvmnt.	Economic & workforce	Investment / finance	Academia	Ag. & environ.	Total	Industry	State&Local gvmnt.	Economic & workforce	Investment/ finance	Academia	Ag. & environ.	Total
GA	48.4	9.7	14.5	0.8	21.0	5.6	100	21.9	12.5	9.4	0.0	46.9	9.4	100
TX	26.8	17.6	15.0	1.3	32.0	7.2	100	14.6	19.5	36.6	2.4	22.0	4.9	100
WA	22.5	9.9	15.3	8.1	25.2	18.9	100	6.8	9.1	25.0	9.1	31.8	18.2	100
ME	51.2	15.9	4.9	7.3	15.9	4.9	100	24.0	26.0	8.0	6.0	26.0	10.0	100
OH	35.9	25.1	10.8	5.4	15.0	7.8	100	39.3	19.6	10.7	1.8	17.9	10.7	100
Mean (n=5)	37.0	15.6	12.1	4.6	21.8	8.9	Mean (n=5)	21.3	17.3	17.9	3.9	28.9	10.6	
(n=5)	12.7	6.4	4.4	3.4	7.1	5.7	(n=5)	12.1	6.6	12.5	3.6	11.3	4.8	

Agricultural and environmental organizations had a high average response rate, but they accounted for an average of less than 10% of invitees. Clearly, there is reasonable interest from this sector in addressing the bioeconomy, and perspective of environmental organizations is important in addressing multiple uses of agricultural and forested lands to accommodate multiple purposes for growing food, growing feed (for food animals), producing fiber (e.g., cotton), biofuels, and wildlife habitat. Regarding investment and finance, among all participants this sector were greatly underrepresented in attendee discussions on this important challenge in advancing the bioeconomy; consequently, there is little confidence in assessment of their priorities on challenges and opportunities for advancing the bioeconomy.

Conclusion on Invitations and Sector Representation: On the assumption that optimal representation by sectors would be met with each sector contributing about 17% of the attendees, co-hosts of future bioeconomy forums should seek to increase engagement of investment and finance, as well as agricultural and environmental organizations, perhaps with slightly less focus on academia. This likely will require greater attention to RSVP rates and further outreach as warranted.

Regional Variation in Prioritizing “Challenges” and “Opportunities” in Advancing the Bioeconomy

Table 3 illustrates that each regional forum generally had different priorities on which challenges should be addressed first.

Table 3: Regional variation by participants in identifying the top 3 priorities to address from the list of “challenges” in advancing the bioeconomy, as presented by the Board. Numbers reflect priorities as determined by a vote of hands (1 is highest priority). Each participant had 3 votes to distribute among the challenges.

Challenge	Regional forums listing Challenge as among top 3 priorities				
	SE	SW	NW	NE	MW
Major technical hurdles for development and scale.	3 (tie)		3 (tie)	2 (tie)	1
Steep competition from traditional petroleum-derived resources.	2		1		2
A lack of necessary infrastructure.		2			
Access to capital for large financial investments.	3 (tie)	1		1	
Uncertainties about sustainability—understanding environmental, social, and economic outcomes.	3 (tie)		3 (tie)		3
Growth instability and increased investment risk caused by policy uncertainty	1		2	2 (tie)	
The need for a strong and capable workforce.		3			

Both the SW (Mineral Wells, TX) and the NE (Orono, ME) identified “access to capital for large financial investments” as the most important regional challenge. Other regions identified “growth instability ... caused by

policy uncertainty” (SE), “steep competition from petroleum-derived resources” (NW) and “technical hurdles for development and scale” (MW). Regarding the latter, it should be noted that their focus was on bioprocessing for bioproducts (not energy) and more fully utilizing a variety of biomass feedstocks in developing a wide range of polymers. It is also noteworthy that three regions identified “growth instability and increased investment risk caused by policy uncertainty” as either highest (SE, Atlanta) or second highest (NW, Seattle; NE, Orono) priority among challenges.

Some cautions on over interpreting or overemphasis are warranted. In part, “voting” may partially be reflective of sector representation at these forums. Additionally, votes in the SE forum (the first of the regional forums) should be taken perhaps with some skepticism, in that voting occurred post-forum as this process was not refined until the second forum, and only a third of SE forum participants responded to the email request for voting. Please see the report for the SE forum for specific information on sector participation, and voting responses.

Table 4: Regional variation by participants in identifying the top 3 priorities to address from the list of “opportunities” in advancing the bioeconomy, as presented by the Board. Numbers reflect priorities as determined by a vote of hands (1 is highest priority). Each participant had 3 votes to distribute among the opportunities.

Opportunities	Regional forums listing opportunity as among top 3 priorities				
	SE	SW	NW	NE	MW
Develop feedstock and fundamental innovations that reduce cost and technology risk in the supply chain.	3 (tie)		2 (tie)		1
Seek opportunities to utilize low-cost waste resources.	3 (tie)				
Quantify, communicate, and enhance beneficial effects and minimize negative impacts.				2 (tie)	
Create increased public demand for biomass-derived products in a bioeconomy.	3 (tie)	1	2 (tie)		2 (tie)
Develop bioproducts that can accelerate biofuel production.	1				
Enable the testing and approval of new biofuels and bioproducts.					
Expand the market potential for biomass.	3 (tie)			2 (tie)	
Encourage private-sector financing	3 (tie)	2 (tie)		1 (tie)	
Support stable, long-term policies.	2		1	1 (tie)	2 (tie)
Ensure a ready workforce to meet the needs of the bioeconomy		2 (tie)		1 (tie)	

Table 4 illustrates variation in “voting” responses to identify the top three priorities to address in “opportunities” presented in advancing the bioeconomy. As with the “challenges” voting, priorities differed among regions, but with much more variable responses (many ties). Four regions identified a different top priority; this may be viewed as encouraging in that each region sees opportunities to expand the bioeconomy in ways that may be unique to their region (i.e., all regions can benefit from a broad initiative to expand the bioeconomy). However, 4

of 5 regions felt that “support stable, long-term policies” was first (NW, NE) or second priority (SE, MW). Noticeably absent was an interest to “enable the testing and approval of new biofuels and bioproducts.”

Conclusion on “Challenges” and “Opportunities”: We are encouraged that participants perceived their regions as having definable and relevant priorities in both challenges and opportunities to advance the bioeconomy. These data do suggest that subsequent forums on the bioeconomy can be tailored to the region and their perspectives on top priority issues. Logical next steps in these future forums would be to begin the process of identifying solutions or processes to address their priority issues.

This naturally led to discussions on potential pilot projects within each region, but at no time during these forums was there any suggestion (either from organizers and co-hosts) that government funding sources would be identified, beyond the existing programs under USDA, Department of Energy, or other federal agency authorizations. It was apparent, however, that there is a need to increase education and awareness of existing federal programs to stakeholders wishing to participate in advancing the bioeconomy. In general, there was recognition of the value of developing public private partnerships in addressing regional issues, so that all regional stakeholders with a vested interest in addressing the many facets of advancing the bioeconomy can participate and commit to the initiatives.

Again, with the caveat that these data may be inherently biased by the sector representation at each forum, the Foundation makes the recommendation to sponsors and regional co-host organizers that future forums be conducted in each region in a manner that ensures adequate sector representation, and that co-hosts use these tables as a guide to discussing issues and formulating action plans.

Common Themes Across All Regions

Discussion in each forum that followed the voting reflected their interests that are apparent in these tables. Again, we note that the first forum in Atlanta was convened without the voting; please see the report for the SE regional forum for further specifics.

Six common themes were gleaned from the discussions at the forums. The following paragraphs identify these themes, issues, and recommendations.

Financial issues.

- Access to capital was an important component of this; challenges and availability of government loan guarantees was cited as an important issue, as well as high risks perceived by private sector investors.
- Public funding --- there were recommendations to incentivize public-private partnerships, to focus on scalability, and to provide a level playing field for bioenergy investments and allocations with those of fossil fuels and nuclear energy

Education and Awareness.

- Clear definitions for “bioeconomy” and “sustainability” are needed.

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- A robust orchestrated educational awareness campaign should be developed, including thoughtful articulation on the value proposition of the bioeconomy, and the case for support (why supporting and advancing the bioeconomy matters and why it makes economic sense).

Policy.

- Create a level playing field for the bioeconomy, with stable incentives and tax credits that are competitive and comparative with other energy programs. This should also address federal loan guarantees for bioenergy and bioproducts.
- Provide incentives to reduce risks using purchasing agreements.
- Create greater awareness of technology know how within the federal lab system that could enhance productivity and reduce costs.
- Regulatory requirements and controls by EPA are viewed as overly burdensome, especially to small and medium-size businesses.

Supply chain.

- Logistics must focus on improving the slowest node, by increasing capability to move biomass from the source to the final processing facility, which is not well developed.
- Integration --- many different feedstocks will be needed in the billion ton bioeconomy; processing facilities must be able to handle these varied feedstocks.
- Many biomass accumulators (biomass depots) may be needed to reduce distance from farm / forest to pre-processing facilities (removal of water to reduce shipping costs ; grinders; pelletizers)
- Research is needed to develop better ways of pre-processing biomass.

Workforce.

- Department of Labor and Department of Education are not members of the BR&DB (consider expanding BR&DB) however, they are important agencies to engage if we are to develop the workforce needed, particularly in rural America.
- Skills development: there is a lack of technical training related to the bioeconomy
- There is a need to build a talent pipeline
- Awareness of the bioeconomy and job opportunities should start in 8th grade education.
- Rural areas have a shortage of available employees resulting from a lack of training options and opportunities.

Federal Resources.

- There is a general lack of awareness / knowledge of federal research and opportunities that the private sector, state administrators, and academia can access and utilize. These include:
 - Access to relevant intellectual property through Patent License Agreements (PLA) with agencies
 - Cooperative Research and Development Agreements (CRADA) with federal agencies
 - Cooperative Research Agreements with universities
 - Federally funded research focus needs to address industry problems; industry needs to articulate its needs.
- Federal support for regional collaboration is needed.
 - Among federal regional offices
 - Developed within economic regions

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- Supported by federal and state agencies
 - Support for co-ops also is needed (e.g., biomass accumulators)

Additionally, there were four general comments not tied to these themes. (1) Waste: there is the need for more focus on how to utilize wastes from landfills, food wastes, and municipal wastes along with discussions on waste utilization versus purposely grown biomass. In part, this was addressing optimization of land use for multiple markets that makeup the bioeconomy purposes of food, feed, fiber, bioenergy, and wildlife habitat. (2) Balance: comments were made on the need for bioeconomy discussions to have better balance of fuel versus bioproducts. (3) Annual regional conferences: unanimous desire was expressed to have annual regional conferences on biomass. (4) Regional project: there was strong interest to develop regional projects with the possibility of federal technical assistance.

Unique Regional Strengths and Issues

As noted in Tables 3 and 4, participants in the 5 regional forums had different perspectives on the challenges and opportunities inherent in advancing the bioeconomy. At each forum, participants were asked what they saw as the unique strengths in their region, as well as the unique challenges. The succeeding paragraphs paraphrase those thoughts and comments.

SE Regional Forum (Atlanta).

Participants in this forum included representatives of several industries, including forest, pulp and paper, biofuel, wood pellet, aviation, and agriculture, as well as researchers in academia from several southeastern states. The pulp and paper industry is a major component of the biomass industries in this region and has robust expertise, infrastructure, supply chains, workforce, and successful operating markets. Participants suggested that this component of the bioeconomy could serve as a springboard for expansion with other segments of the bioeconomy. The wood pellet industry is strong with a predominant focus on export markets. Participants suggested this industry should expand domestic markets with somewhat different products.

There are a number of biofuel companies in the SE U.S., and some that have failed in the recent past, resulting in some skepticism on the sustainability of biofuels. Participants felt such skepticism could be harnessed for developing stronger programs. The SE U.S. also has a strong infrastructure of rail and air transport systems, deep water ports, and coastline on the Atlantic and Gulf waterways, making access to domestic and international markets easy.

The greatest challenge identified by participants was in regard to policy. Substantial progress on the bioeconomy requires either a significant policy signal or a disruptive market change. Weak policy signals have resulted in incremental change. There was discussion throughout the forum of the need for a sustained policy, technology or economic impetus sufficient to support bioeconomy initiatives. Other issues which might affect bioeconomy prospects in the southeast included current forest ownership and management patterns (public lands vs private forest operations), workforce availability and training, competing industries, state and local policies, and others. Participants concluded that while all of these factors have some influence, there was general consensus that these issues could be sorted out if there were sufficient impetus for bioeconomy initiatives. The meeting was well-received. Participants suggested that this event should become an annual meeting; this is a signal of the positive potential of engagement and commitment to the bioeconomy.

SW Regional Forum (Mineral Wells, TX).

Discussions in Mineral Wells highlight several issues specific to their region beyond the primary need of a strong national policy statement accompanied by incentives to support the development and sustainability of a bioeconomy. This forum had a high attendance by the Department of Labor (workforce development), many of whom were entirely unfamiliar with the bioeconomy. Workforce training and availability of skilled workers in this region has not received much attention to date. In fact, educating the public as to the definition of “bioeconomy” and “biomass” was identified as a high regional / local priority challenge necessary to address as a precursor to identifying or developing job opportunities and defining requisite skill sets needed. Jobs created will be technical and derived from an emphasis in STEM (Science, Technology, Engineering, and Math).

But education issues must be addressed beyond skills and rudimentary education that include overcoming soft skills deficiencies. Clearly, most citizens are already familiar with biofuels and their uses, but other bioproducts and the potential uses are largely unknown, and awareness will be a crucial element in overcoming doubts and skepticism related to the industry and its advancement. Furthermore, participants stressed that educating the masses must be approached beginning with the 8th grade level, and developed strategically to include overcoming emotions related to the competition with oil and gas that is strong and regionally unique in TX, OK, and Louisiana. This educational outreach would also foster an increase in demand for bioproducts and incentives to decrease risks for investment. Thus, participants suggested that a pilot project should be developed and focused on the creation of a comprehensive educational program that must include the Department of Labor and the Department of Education in addition to the agencies comprising the Biomass Research and Development Board.

Given that the highest concern in all regions was the issue of national policy on the bioeconomy, and the availability of capital, education is critical for investors, businesses, and consumers to realize the benefits of bioproducts. This must also support the building of an infrastructure for the bioeconomy beyond the existing infrastructure for a petroleum industry. Other considerations related to acquiring capital is in Identifying (a) what currently exists in the market, (b) whether there is a demand, and (c) quantifying the potential for profits to commodity producers and end-product manufacturers. Other concerns raised at the forum touched on whether markets for these commodities are static or volatile, and whether investors and/or lending institutions are willing to take a risk on supporting the development and growth of the bioeconomy industry. The Foundation’s assessment is that these questions reflect valid concerns and should be openly recognized and addressed in determining the probability of success in advancing the bioeconomy.

This region also identified a number of unique advantages. Presence of a strong oil industry can provide good cross-training for biofuels, as there are a number of common elements between petroleum and biomass refineries. Additionally, coastal areas are also amenable to algae biomass opportunities and these should be explored. This region, as with the SE U.S., should be a preferred bioenergy crop area due to the inherent traits of abundant sun and warmth.

NW Regional Forum (Seattle-Tacoma, WA).

Among advantages identified by participants in the Pacific Northwest (PNW) regional forum, is the recognition that the PNW has some of the highest biomass production potential from varied sources such as public and private forests, grazing land, and irrigated fruit operations and crops for producing high value products. The geographic

location positions PNW as the gateway to the Pacific Rim, thereby creating opportunities for export of biomass products. The presence of the Northwest Advanced Renewables Alliance promotes jet biofuel from forest residuals that are underutilized in this region. However, presence of a large number of petroleum refineries for processing abundant Alaska crude oil represents steep competition to biofuels in the region. Participants recognize the need for breakthrough technology to reduce costs of developing fuels from biomass, and therefore are strong supporters of research; strong universities in this region are a decided asset. Use of biomass as an energy feedstock, however, also faces challenges from abundance of other alternative energy sources such as hydroelectric generation, wind, and solar --- all considered substantially cleaner and cost effective. The strong research community could also be harnessed to address development of high value co-products from biomass.

This region has strong aerospace manufacturing and commercial aviation sectors that could benefit greatly from a sustainable biomass supply chain. The need for strong, thoughtful policy was cited by participants as a requirement in promoting the bioeconomy and biomass supply chain, as has been echoed by other regional forums. One example of how important this could be to the region is on the issue of land ownership. The federal government owns 53% of the state of Oregon and almost 29% of Washington. In the PNW, policy at the federal, state, and local level could be instrumental in advancing the use of bio-wastes as energy sources (including aviation fuel) from the forests, as well as marine, and municipalities. Uniqueness of land ownership and the strong aviation industry would suggest that a partnership of federal, state lands, and industry / key private sector players, including the regional sophisticated investors, should be considered to formulate a unique pilot project for PNW.

NE Regional Forum (Orono, ME).

In some respects, the NE region is a case study in contrasts. As a positive, the New England natural-growth forestland is largely viewed as being sustainably managed and harvested. As a negative, this is a disadvantage in terms of qualifying for Renewable Fuel Standards and generation of Renewable Identification Number credits for the entire Northern Forest region encompassing Maine, New Hampshire, Vermont and New York. This region also has both geographic advantages and disadvantages in terms of infrastructure. For example, they have deep water ports that could be utilized for exports to Europe, but lack an east-west railway infrastructure because of mountainous terrain. The region is characterized by a strong pulp industry, but a declining paper industry. Twenty percent of the U.S. population is in the northeast region, but Maine is at the terminus characterized by diminished supply chain logistics. On the positive side, presence of strong research universities and industry engagement can promote development, of co-products utilizing nanocellulose for a variety of new products ranging from polymer reinforcement, 3D printing resins, adhesives, and biocomposites for lightweight structural elements.

Participants felt that policy changes (unspecified), and federal / state / regional incentives are critical to expanding the bioeconomy, and would subsequently have a positively impact on infrastructure development and diminishing investment risk. Improvements in supply chain logistics would benefit pulp, sawlog, and bioproducts export opportunities.

MW Regional Forum (Wooster, OH).

Participants cited their central location, a robust infrastructure of roads, rails, rivers, and the Great Lakes, abundance of grains and a strong food industry as unique regional strengths. The region has a strong history of polymer development, citing that 45% of all U.S. polymers are produced within a 500 mile radius of Columbus, OH.

Strong universities and a robust history of public private partnerships will continue to facilitate new opportunities in the bioeconomy. Challenges faced in the MW again emphasized the need for stability of policies at the federal level, and then mirroring these at the state level. Regulatory policy was cited as a detriment to expanding the bioeconomy. Attendees felt that strong stable policies should be accompanied by incentives for such as processing community waste instead of depositing it in landfills, and bio preferences to increasing market demand. Participants proposed incentives that would be similar to the biofuel sector such as tax benefits, streamlined permitting process, and first market assistance; these were perceived as necessary to overcome barriers to advancing the bioeconomy. Workforce development was not seen as an issue in the MW, but educating the public --- starting at junior and senior high levels – should focus on the benefits of the bioeconomy to society as a means of increasing demand. Participants also felt that Ohio should expand regional engagement to other Midwest states with special emphasis on industry networking.

Concluding Remarks

The ATIP Foundation appreciates the opportunity to work in partnership with the US Department of Agriculture and the US Department of Energy, to coordinate and facilitate these five regional forums on the bioeconomy. Based on the input received from the agencies, we chose co-host partners who possessed a broad regional knowledge of the stakeholders in the bioeconomy. We also chose them on their expressed willingness to continue to provide leadership within their region to advancing the bioeconomy following their forum. Four of the five co-hosts were strong universities in their region; the fifth an exemplary Chamber of Commerce in rural West Texas. All are capable of leading and coordinating each region in addressing many of the issues raised at the forums, including the important role of articulating state/regional policy needs to those who can implement them. Each of the regional co-hosts expressed both a desire and a willingness to continue partnering with the ATIP Foundation in establishing a working group/advisory council to begin the process of developing a viable and sustainable coordinating group, representing all sectors in their region. The major purpose of a coordinating group would be to plan subsequent forums, and shape a region-specific pilot demonstration project, to address the highest priority issues identified in each forum, and to demonstrate the viability of the bioeconomy strategies in enabling job and wealth creation, subsequently resulting in economic growth.

We believe, based on the input received from all five forums that the case has been made that the ATIP Foundation and regional co-hosts stand ready to facilitate development of regional working groups to provide a sustainable mechanism for advancing the bioeconomy in each region. This includes the development of at least one demonstration project in each region.

We would expect those groups and projects to address the six (6) critical areas that were common themes across all regions: (1) Finance, including public funding and general access to capital; (2) Education and Awareness, including articulation, public awareness, and a clearly understandable value proposition/case for support; (3) Policy, focused on creating a level playing field and addressing regulatory challenges; (4) Supply Chain, inclusive of the logistics necessary, and integration of various feedstocks, supported by access to research; (5) Workforce, inclusive of skills development, and the need to develop a talent pipeline, particularly in rural areas; and (6) Federal Resources, focused on creating awareness and knowledge of resources available, and enabling regional collaboration among federal, state and regional entities.

We close by noting that the ATIP Foundation looks forward to continuing our partnership with the Board and our regional co-hosts to facilitate sustainable efforts to advance the bio-economy, in order to enable wealth and job creation, thereby resulting in economic growth and opportunity, particularly in rural America.

Attachments:

Attachment 1_Synopsis of Report to Participants in the SE Regional Bioeconomy Forum September 16, 2016 v.3.23.17

Attachment 2_Synopsis of Report to Participants in the SW Regional Bioeconomy Forum (Mineral Wells), September 29, 2016 v.3.23.17

Attachment 3_Synopsis of Report to Participants in the PNW Regional Bioeconomy Forum v.3.23.17

Attachment 4_Synopsis of Report to Participants in the NE Regional Bioeconomy Forum Oct. 18, 2016, Orono, ME v.3.23.17

Attachment 5_Synopsis of Report to Participants in the MW Regional Bioeconomy Forum Nov. 15, 2016, Wooster, OH v.3.23.17

ⁱ Monetary and in-kind support for this forum series was provided to the ATIP Foundation by USDA Office of the Secretary, Department of Energy's Bioenergy Technologies Office, POET DSM Advanced Biofuels, New Holland Corporation of North America, Georgia Institute of Technology, Mineral Wells (TX) Chamber of Commerce, Washington State University, University of Maine at Orono, and The Ohio State University.

**ATIP Foundation Regional Bioeconomy Forums:
 “Addressing the Challenges & Opportunities of Advancing the Billion Ton Bioeconomy”**

**Synopsis of Report to Participants in the SE Regional Bioeconomy Forum
 Georgia Tech co-host (Professor Valerie Thomas)**

Atlanta, GA

September 16, 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 SE U.S. Forum was moderated by co-host Professor Valerie Thomas, Anderson Interface Professor Industrial and Systems Engineering at Georgia Tech, assisted by Richard Brenner, Ph.D. , Director of the ATIP Foundation.

The agenda (see attachment) included welcoming comments by the ATIP Foundation, BR&DB representatives, and Norman Marsolan, State Host. A slide set presentation was made by the ATIP Foundation and co-host, followed by Harry Baumes, Ph.D., Director, Office of the Chief Economist, USDA with assistance 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 six questions.

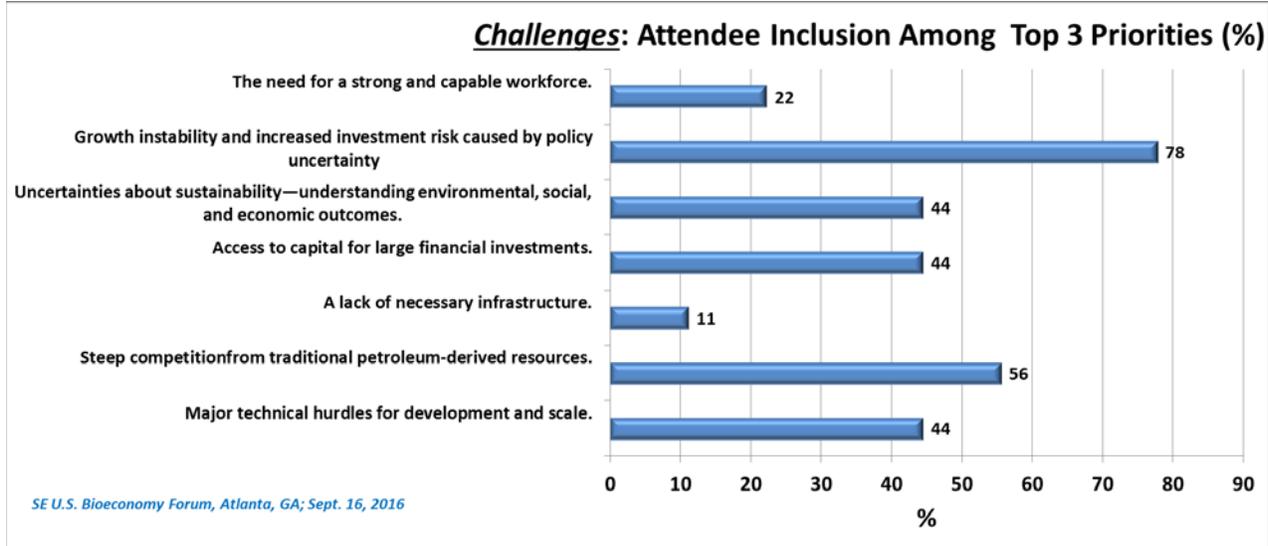
Notes were taken (attributed to the commenter) and were projected so all participants could review and correct as needed. The audio was also recorded from a laptop in case it was needed to clarify comments. Participants of the forum received a link to a Google Document and a two week window of opportunity to edit their specific comments, or add additional comment. Thereafter, the document was closed by Dr. Brenner, who reviewed comments, clarified with authors as needed, redacted all names of comment contributors, and annotated with his comments and/or Wes Jurey’s from the Foundation (noted by “Comment#(RJB)”. The document, as a record of the event, is available on the ATIP Foundation website along with participant reviews of each “challenge” and “opportunity” --- from their perspective --- and their assessment as to whether each was in the top 3 priorities of the SE U.S. It should be noted that the list of “Challenges and Opportunities was not available for the “voting” exercise at this first of five regional forums. Therefore, a separate poll was taken post-forum using an online survey tool. Only about a third of the forum attendees responded.

Table 1 describes the demographics of invitees by sector, and the actual number able to participate on September 16.

Table 1. Demographics (by sector) of invitees and participants, convened by co-host Georgia Tech, in SE Regional Bioeconomy Forum, Atlanta, GA, September 16, 2016 .				
Sector Name	Invited	No. Participants	% RSVP to Attend	% of Attendees
Industry	60	7	12	22
State and local government	12	4	33	13
Economic and workforce development	18	3	17	9
Investment & finance	1	0	0	0
Academia	26	15	58	47
Agricultural and environmental organizations	7	3	43	9
	124	32	26	100

Reporting of Participant Priorities

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



Participants considered “growth instability and increased investment risk caused by policy uncertainty” as the dominant challenge faced by the bioeconomy industry, followed by steep competition from petroleum-derived resources. Access to capital for large financial investments, technical hurdles, and uncertainty of sustainability were tied for the 3rd priority.

Categorize as... Filter by Category Search responses

Showing 3 responses

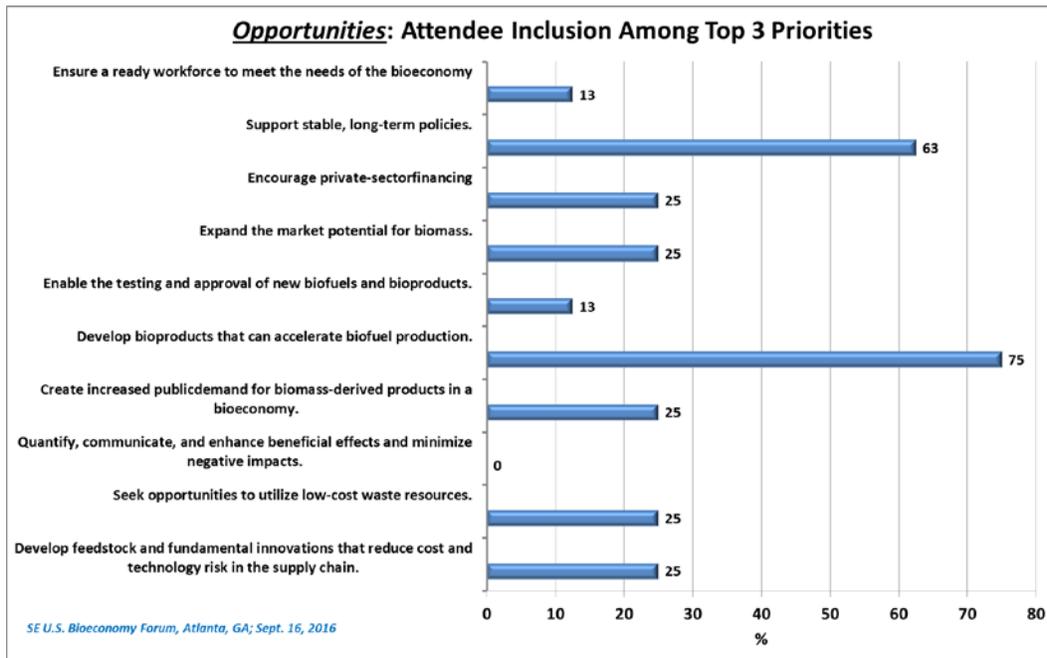
Initiate use of biomass for high value products
10/25/2016 7:45 AM [View respondent's answers](#)

Nanolignin
10/17/2016 6:45 PM [View respondent's answers](#)

Most risks are associated with the current biomass=>biorefinery=>energy with others as co-products. Focus on developing performance properties for renewable materials because users require such performance is a better path forward.
10/17/2016 6:25 PM [View respondent's answers](#)

Some respondents to the online poll also provided comments or some additional “challenges”:

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



Developing bioproducts that can accelerate biofuel product was seen as the top “opportunity” (75% of respondents) for the SE Region. Stable long-term policies was a close second (62% of respondents), and all other opportunities received 25% or less in prioritization.

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

This section illustrates highlights of actual comments, selected by the Foundation, made by forum participants.

The full non-attribute comments by participants are available at the ATIP Foundation website.

On the issue of “**what are state/local/regional opportunities for the bioeconomy,**” specific comments suggested:

- Strengthening partnerships with federal agencies that were located in their region, as well as state agencies and regional stakeholders.
- Opportunity for regional production of biofuels, given the proximity of the Atlanta Hartsfield Airport, and a Gulfstream jet factory in Savannah. Currently, bioaviation fuel is trucked in from Southern California.
- Improved feedstock chains for the region utilizing many feedstocks such as those from the poultry industry, peanut industry, and woody biomass industry.
- Proximity to two oceans (Atlantic, Gulf of Mexico) meant good port facilities (infrastructure).
- With good ports, export market is strong for pellets, but should be expanded to include products for domestic markets (*enhance value proposition*).
- Strengthen research ties with universities and federal labs for product improvement (pelletizing) for more efficient transport.
- Strengthen workforce development by engaging Department of Labor and Department of Education to develop training programs that allow greater cross-over of skilled petroleum workers to biomass refiners;
- Communication plan to address health and environmental issues; workforce development to build skill sets, and to find niche markets that have environmental benefits.

- Broaden partnership network to include Government, University, Industry, Research Roundtable (GUIRR), perhaps suggesting a “bioeconomy initiative” to expand demand for biomass products.
- Clarify and strengthen both state and federal policies on biomass to favor investment and finance of projects to better utilize damaged woods (fire-damaged, diseased) and healthy woods for more efficient management of our SE forests. i.e., increase product demand from low value biomass and high value biomass (lumber) with incentives to use biomass.

There were some key points made on “how can we help create a regional demand for the bioeconomy”

- Enhance partnerships: Consider consortia and coops to provide value to production from small operations, serving as “biomass accumulators” locally for more efficient transport to local / regional biorefineries and processing plants.
- Strong consensus partner among industry players to maximize utilization of materials and make more bioproducts.
- Coordination / consortium to optimize supply chain (including logistics of transport) and provide stability for a bioeconomy market.
- Government should provide incentives that encourage small company growth in new / risky areas of the bioeconomy. Government policy can create new stable market opportunities.
- *There was strong consensus among participants that government incentives are needed to advance the bioeconomy.*

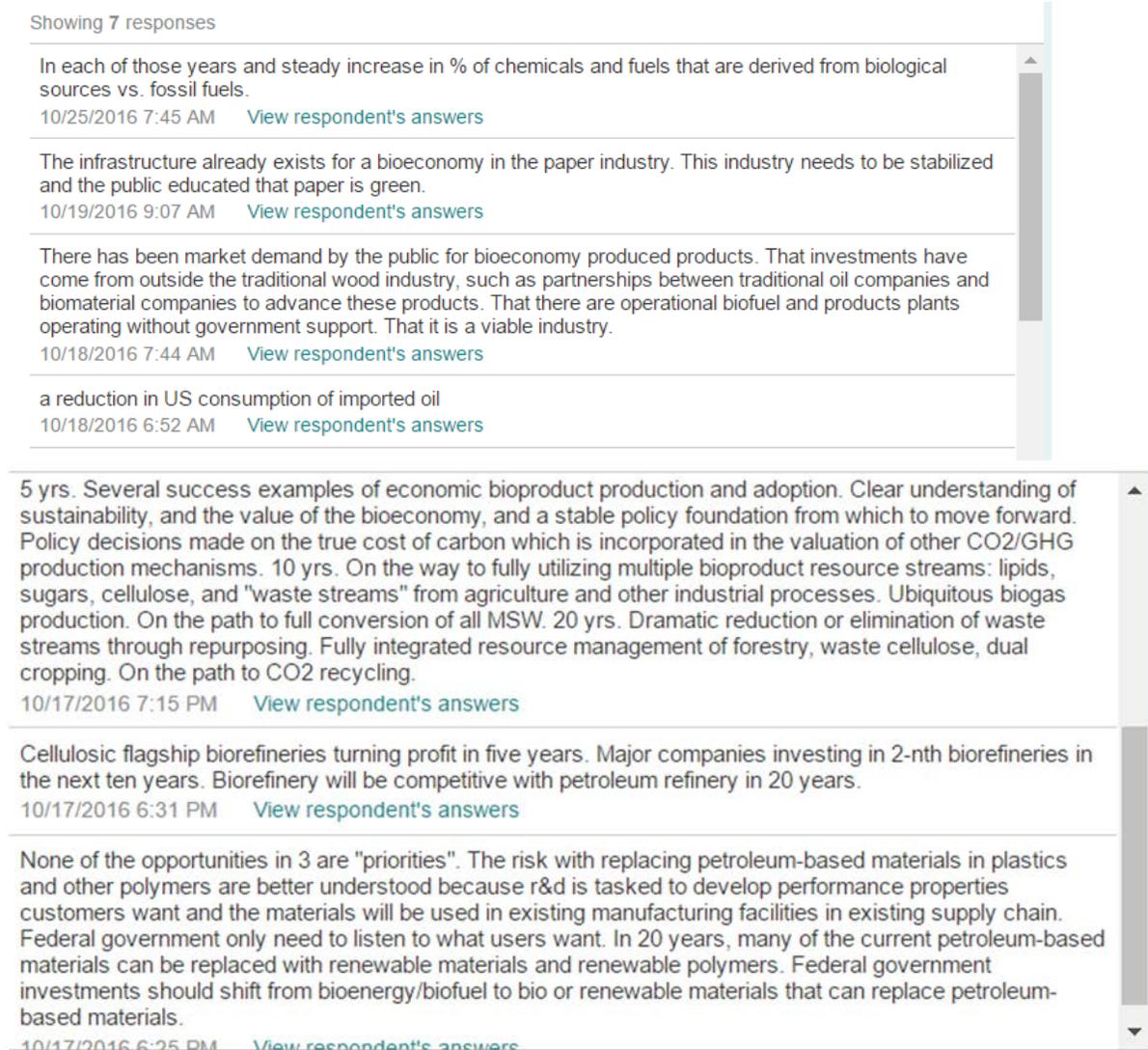
On the topic of “how can we best engage the interested public in the Southeast in the process of developing a “billion Ton Bioeconomy,” there was much discussion that focused on how best to market the bioeconomy products through some specific campaigns with industry, universities, and the Department of Education to begin getting the message to youth.

What would success look like in the coming years?

- Steadily increasing % of fuels and chemicals derived from biological sources and not fossil resources.
- There has been market demand by the public (through enhanced communication efforts), such that investments have come from outside the traditional wood industry, such as partnerships between traditional oil companies and biomaterial companies to advance these products.
- Following early government incentives, that there are operational biofuel and products plants operating without government support --- evidence that it is a viable and sustainable industry.
- Dramatic reduction or elimination of waste streams through repurposing; fully integrated resource management of forestry, waste cellulose, dual cropping --- on the path to CO₂ recycling.

Using the survey tool, the following questions were also asked post forum: **What would success look like in 5 years? >5 years?**

Seven responses were received, and are captured below (because survey responses necessarily were captured as an image of the online screen, resolution is not crisp):



Can you identify other groups in the SE that support the bioeconomy?

- The participants proposed that they develop a “SE Bioeconomy Planning” organization and plan for an annual event.

What can federal agencies do to increase likelihood of private financing the SE to build the bioeconomy?

- Discussion was clear around two points:
 - Find ways to reduce financial risk --- if you don't, you won't get private financing in any meaningful way. Aviation is starting to see a change --- have unlocked a couple \$B from institutional finance. Why? In part, competitive price point for biofuel (long term off-take

- agreements, and a high capacity biorefinery repurposed / renovated from a defunct petroleum refinery.
- Tax incentives for longer term investment. “With bioproducts on the cusp of commercialization, it is hard to get commercial investors because they don’t know how sustainable the effort will be.”

Summary Statement from ATIP Foundation

SE 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 Conservation 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 in-state / 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 Southeast 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 most forums, there was significant discussion on what the bio economy 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 Southeast 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 all forums (none in Atlanta).

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 Georgia Institute of Technology 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 bioeconomy can become a reality.

Summary Statement from Co-Host

Southeast U.S. Bioeconomy ATIP Foundation Forum Summary

Valerie M. Thomas

Regional Host

Anderson Interface Professor

Georgia Institute of Technology

This meeting was co-sponsored by the Renewable Bioproducts Institute and the Strategic Energy Institute at the Georgia Institute of Technology.

The Southeast forum brought together representatives of the forest industry, the paper industry, the biofuel industry, the wood pellet industry, aviation, agriculture, and researchers from several southeastern states.

Key highlights and findings are summarized below.

- The pulp and paper industry is substantial and can be a springboard for growth of the bioeconomy. This industry has a basis of expertise, infrastructure, supply chains, workforce, and successful operating markets.
- The wood pellet industry is strong and could expand from its current export focused structure to also include somewhat different products for the domestic market. The wood pellet industry has developed and adapted existing wood products industry infrastructure; this approach could be successful for a wider range of products.
- A number of biofuel companies are in place in the region with potential for and interest in production activities. There have been biofuel failures in the southeast which have left many in the region cautious and negative about biofuels; however this experience also provides hard-learned lessons and a healthy skepticism in which strong programs can succeed.
- The southeast has coastline on two sides and excellent ports, rail, and air transport infrastructure. These provide a supply chain basis for domestic and international markets. The wood pellet industry is an example of successfully building industry for international markets. Other opportunities could also benefit from potential for export as well as for domestic shipping.
- Substantial progress on the bioeconomy requires either a significant policy signal or a disruptive market change. Weak policy signals have resulted in incremental change. There was discussion throughout the meeting of the need for a sustained policy, technology or economic impetus sufficient to support bioeconomy initiatives.
- There was extended discussion of a range of factors which might affect bioeconomy prospects in the southeast: current forest ownership and management patterns, workforce availability and training, competing industries, state and local policies, and others. While all of these factors have some influence, there was general consensus that these issues could be sorted out if there were sufficient impetus for bioeconomy initiatives.
- The meeting was well-received. Participants suggested that this event should become an annual meeting; this is a signal of the positive potential of engagement and commitment to the bioeconomy.

--- End of synopsis report ---

Attachment: agenda and “discussion document”



SE BIOECONOMY REGIONAL FORUM AGENDA

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

Date: Friday, September 16, 2016

Time: 9:30 AM – 5 PM

Location: Renewable Bioproducts Institute, 500 10th Street NW, Atlanta, GA 30332

Purpose: To outline 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 hear 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 Introductory Remarks

- Rick Brenner, Director, ATIP Foundation
- Jonathan Male, Biomass Research and Development (BR&D) Board¹, Operations Committee (Director, Bioenergy Technologies Office, U.S. Department of Energy)
- Todd Campbell, BR&D Board, Operations Committee (Senior Energy Advisor, U.S. Department of Agriculture)
- Norman Marsolan, State Host

10:00 AM–11:00 AM—Overview of the “Federal Activities Report on the Bioeconomy” and the “Billion Ton Bioeconomy Initiative: Challenges and Opportunities” Report

- Presentation by the BR&D Board, Operations Committee, led by Dr. Harry Baumes (Director, Office of Energy Policy and New Uses, Office of the Chief Economist, U.S. Department of Agriculture)
 - o Establishes issues from the federal agencies and frames the topics for discussion

11:00 AM–3:45 PM—Stakeholder Comments and Discussion

- 12:30 PM—Working 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



Critical Discussion Points

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?
7. What are specific regional barriers that need to be addressed to grow a bioeconomy?
8. How can we help create a regional demand for the bioeconomy?
9. Where do you perceive, if any, a lack of workforce readiness to support the bioeconomy?
10. How can we best engage the interested public in the Southeast in the process of developing a Billion Ton Bioeconomy?
11. What would success look like in the short term (<5 years), and in the long term (>5 years)?
12. What can federal agencies do to increase likelihood of private financing in the Southeast to build the bioeconomy?
13. How do biomass-derived feedstocks benefit the Southeast region?
 - o What is the potential for these benefits to grow?
 - o Can feedstock commoditization help reach this potential?

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.

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

Synopsis of Report to Participants in the SW Regional Bioeconomy Forum
Mineral Wells Chamber of Commerce, (co-hosts)
Mineral Wells, TX
September 29, 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 SW U.S. Regional Bioeconomy Forum was moderated by Wes Jurey, CEO of the ATIP Foundation, assisted by Ryan Roach, CEO of the Mineral Wells Chamber of Commerce. Notes were taken (attributed to the commenter) by Ms. Nikki Bossaller, who projected these so all participants could review and correct as needed. The audio was also recorded from a laptop in case it was needed to clarify comments.

Table 1 describes the demographics of invitees by sector, and the actual number able to participate on September 29, 2016.

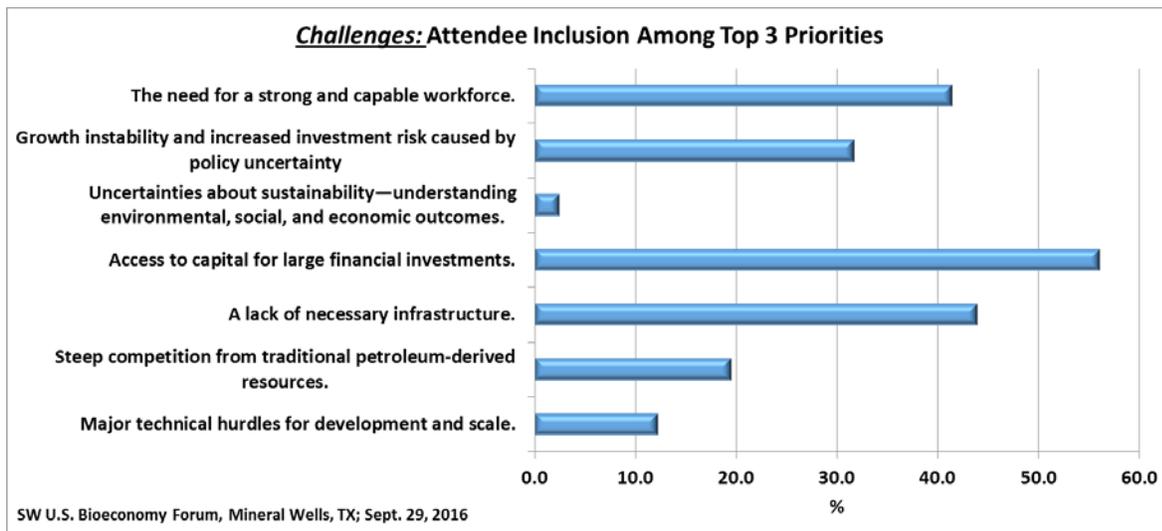
Table 1. Demographics (by sector) of invitees and participants, convened by co-host Mineral Wells Chamber of Commerce, in SW Regional Bioeconomy Forum, Mineral Wells, TX , September 29, 2016 .				
Sector	Invited	No. Participants	%RSVP to Attend	% of Attendees
Industry	41	6	15	15
State and local government	27	8	30	20
Economic and workforce development	23	15	65	37
Investment & finance	2	1	50	2
Academia	49	9	18	22
Agricultural and environmental organizations	11	2	18	5
	153	41	27	100

The agenda (see attachment) included welcoming comments by Ryan Roach, Mineral Wells Chamber of Commerce (state co-host); Mayor Mike Allen, City of Mineral Wells; Wes Jurey, ATIP Foundation; and Todd Campbell, Biomass Research & Development Board representative. A slide set presentation was made by the ATIP Foundation and co-host, followed 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 six questions and others posed by the Foundation.

Participants of the forum received a link to a Google Document of the “attributed” notes taken by Ms. Bossaller, and were given a two week window of opportunity to edit their specific comments, or add additional comment. Thereafter, the document was closed by Dr. Brenner, who reviewed comments, clarified with authors as needed, redacted all names of comment contributors, and annotated with his comments and/or Wes Jurey’s from the Foundation (noted by “Comment#(RJB)”). The complete SW Bioeconomy Report that includes all comments by participants, as well as the slides presented document, is available on the ATIP Foundation website, and serves as a comprehensive record of the event.

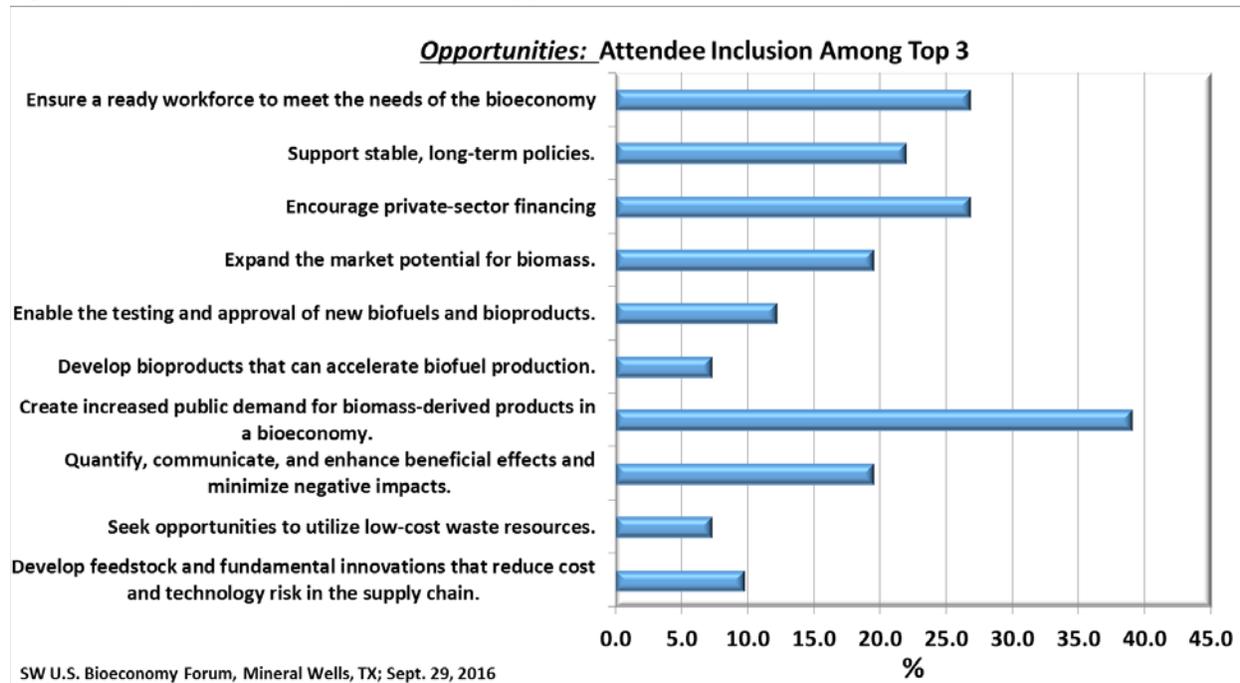
Reporting on Participant Priorities

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



Participants considered “access to capital for large financial investments” as the dominant challenge faced by the bioeconomy industry in the region (55%), followed by “a lack of necessary infrastructure,” (42%), “the need for a strong and capable workforce,” (41%), and “growth instability and increased investment risk caused by policy uncertainty.” Of interest, only 20% of participants from this oil-rich state deemed “steep competition from traditional petroleum-derived resources” among the top 3 challenge priorities.

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



“Create increased public demand for biomass-derived products in a bioeconomy” was seen as the top “opportunity” (39% of respondents) for the SW Region, followed by “ensure a ready workforce to meet the needs of the bioeconomy,” and “encourage private-sector financing, both at 27% of respondents. “Stable long-term policies” was a close 4th at 22%.

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

This section illustrates highlights of actual comments, selected by the Foundation, made by forum participants. Items appearing as [NOTE: ...] are additional comments by the ATIP Foundation post-forum. The full non-attribute comments by participants are in Attachment 4.

On the issue of “what are state/local/regional challenges for the bioeconomy,” specific comments suggested:

- Logistics and supply chain: Based on cotton transport not economically feasible beyond a 50 miles radius, same theory applies to biomass. Companies want a transportable product immediately.
- Education and Awareness: There is active backlash concern over bioproducts. Education component needs to be stressed so people understand the advantages [of biobased]. What is petroleum industry going to say? The represent a formidable challenge.
- Until participant got materials for forum, didn’t know what biomass was. Education needs to go back to square 1. Woody biomass is a new word to many people. Education.
- Transportation & financial components are missing.
- Workforce [development]: In the future, this needs to start in 8th grade; stress “skills needs” to students & parents to learn skills for new jobs. If not, workforce won’t be there.
- Workforce development *overemphasizes a college education. Support is needed for strong vocation programs.* 40% better suited to vocational programs. Education system needs to rethink priorities.

- Univ. of North Texas has no ag program. [However] we *are establishing a certificate program for renewable bioproducts engineering. Lots of wood industry. Looking for engineering students to know something about agriculture so they can feed well into that job market. Bioproduct engineering.*

There were some key points made on “**How the federal agencies can help address these regional challenges**”

- One challenge is hiring practice of agencies (USDA, etc.) for graduates. Time scale is too short for window of opportunity. *Federal agencies advertise internships too late. [NOTE: this is an actionable item]*
- Training and education: Oil is in biggest bust since 2008. Lots of highly skilled workers unemployed in Texas. Bio & oil are tied at hip. Demand is down dramatically. Govt. should help more (**subsidies, tariffs, taxes, incentives, cost competitive**). Companies aren't going to want to make the investments b/c of risks involved in oil dropping. My company has had 3 layoffs and other energy sectors companies continue to make cuts. There are many highly skilled people still looking for jobs. **[NOTE: this dovetails with other comments on training and education for cross-over training from oil refineries to biorefineries. This argues for transition training programs that Dept. of Labor, Department of Education, and State Workforce Development could do jointly. See supporting comments elsewhere in document.]**
- Cross-training for transition from oil ↔ biofuel: Half the people used to be with oil industry. Similar skills overlap. Similar industries are in bioeconomy. How do we bridge the gap to easily transition when petroleum sector has a lapse? Companies are trying to figure out that natural pivot. How do we close that gap to transition? **[NOTE: All strong arguments for a pilot program to develop transition training that works in both directions oil ↔ biofuel. Again, with Department of Labor and Department of Education]**
- In Waco, a large number of troops in Ft. Hood were getting ready to be released. The Federal government in conjunction with TWC provided training on how to transition skills from Army to civilian jobs. Many workers possess the needed skills just don't have experience in specific market. HR professionals and potential applicants need training so they are both speaking the same language.
- Invest in research. Funding percentage is only 3%; lots of good ideas are being left on the table.
- Produces polysaccharide. Don't have funding to scale up. Too many orders. Gap in funding. *How do you take an entrepreneur with no funding?*

Comments and suggestions from the ATIP Foundation in response to comments made:

- Opportunities for cooperative research agreements. Often at issue for industry is the high overhead structure that most universities charge.
- Perhaps a joint venture for partnerships between industry and federal scientists through CRADAs
- SBIR – each agency has mandatory funding available to prospective grantees. Check each agency for amounts and application deadlines (e.g., USDA, DOE, DOC, DOD, EPA, ...)

On the topic of “What are state/local/regional opportunities to the bioeconomy?” ...

- Use of marginal lands. Lots of areas that don't have a lot of rain. Need to be able to produce vegetation specific for needs of that land.
 - Curious about marginal land development & development of algae. Any way to use prickly pear cactus? [Note from ATIP Foundation: <http://gizmodo.com/this-humble-cactus-could-help-power-our-drought-stricke-1715966241>]
- Arlington Independent School District has a \$663 million bond being used for partnership with Tarrant County College & their certification programs. Career and Technical Higher Education Investigations course to see if they could communicate opportunities available in areas of vocation.
- We have coastline to look at algae production. Microalgae research. Different from other regions of the US. Look further into. Marginal lands & prime lands in eastern Texas. Terraces in forests had cotton at one time. Those forest thinning could be used as biomass & then replanted as other crops for energy. Good opportunities for east Texas.
- Identify skilled workforce-College Credit for Heroes. Vets can look at their skills set & how they translate to civilian jobs. Can complete program or degree faster b/c of skills credits. Program will help cover the training costs. Helping businesses train workforce with new technologies. *Better education is needed why communities are green.* Career networking-anyone looking for bioeconomy job & identifying where those jobs are. Better build that data set. Tends to be clearing house for that type of information. [Note: <http://www.twc.state.tx.us/jobseekers/college-credit-heroes>]
- UNT is establishing labs; <https://www.unt.edu/search-results?search=bioeconomy&sa=Search>
- Guayule is a natural rubber crop that fits well for the southern region (southern Texas, new Mexico and Arizona). I am currently working at Arid Land Agricultural Research Center (ALARC), Maricopa, Arizona to improve rubber production, and adaptation to grow in desert area. [Note: <https://search.usa.gov/search?utf8=%E2%9C%93&sc=0&query=Guayule&m=&affiliate=agriculturalresearchservice&commit=Search>] As well I am working on improving the industrial oil crops, camelina and brassicas, for non-food, bioenergy purposes including biodiesel and Hydrotreated Renewable Jet Fuels to grow in stress conditions (drought and hot conditions) [Note: <https://search.usa.gov/search?utf8=%E2%9C%93&sc=0&query=hydrotreated+renewable+jet+fuel&m=&affiliate=agriculturalresearchservice&commit=Search>] . In general we are looking for crops that can be accommodated in this area (marginal, semi-arid and arid land). We need to think out of the box for these crops. Arid lands will be good for non-food non-traditional crops. Cotton uses lots of water.
- Wild pig problem in Texas. Develop land into farms & use pigs for something other than shooting practice.

Comments on the issue of “What impact does the Texas oil industry / economy have on advancing the bioeconomy? How might that shape your implementation of expanding the bioeconomy in this region.

- They are distributing product for any fuel product we produce. Embrace as partner.
- When the booms are happening in Oil & Gas, those companies are a competitor for resources (steel, labor).
- Water transportation for irrigation of bioproducts and removal of process water are large expenses. Why not create a pipeline system to transport water. This system could help reduce long-term droughts and pump water away from flood zones along the Mississippi. Between the government and insurance companies billions of dollars are spent each year on natural disasters. Money that is currently being budgeted for those disasters could be used to repay loans for the construction of the pipeline system.

- Additional note from participant post-forum: “The comments concerning produced water from active oil and gas wells and water returned to the surface after fracturing, are not correct. Pipelines and transport trucks are expensive and time consuming. Our company has developed mobile equipment that treats this water at the location so that it may be used for agricultural or other useful purposes. There are several companies working on similar technologies that will yield useable water at the wellsite. Shortly, it will no longer be necessary to move these large quantities of water. **[Note from Foundation: <http://www.buzzfile.com/business/Pump-and-Coil-Tubing-940-327-8189>]**

Summary of Challenges and Opportunities for SE Bioeconomy

- Education customers & stakeholders what biomass is.
- Need a viable bioproduct enterprise available. Economic climate has to be available to move forward.
- Needs incentive, research, financing, policy (dysfunctional energy policy). Hard to get investment if new administration that is going to turn everything upside down.
- Predictability in policy needed. Establish fed task force to establish regional bioproduct project. No red tape. Put structure in.
- Federal government can help the bioeconomy industry by providing tax credits that will create equity needed to finance the projects. To finance any project, the lenders require 30-40% equity. If tax credits were structured similar to the New Market Tax Credit and the Renewable Energy Certificates, then the bioeconomy industry would be able to obtain the needed equity to fund the projects.
- Federal agencies must put biomass info on their websites. Can’t be advertised on TV . Very eye catching verbiage to make people aware of bioeconomy.
- DOE & requests for proposals that come out that deal with development to prove scale of what you need. Proposals need 50% match. Companies don’t have that much. That is a huge hurdle that smaller companies. Reduce or eliminate match. **Actionable.**
 - **[Note from Foundation: One approach would be to form public-private partnerships where private sector can contribute funds toward matching requirements. If done under a CRADA, then private sector contributor also has first right of refusal to negotiate an EXCLUSIVE license to any technology (intellectual property) developed under the partnership without Federal Register Notice.]**
- Bring Small Business Development Centers (SBDC) in as partnerships. Bioeconomy is a new concept to those offices; however, they have the resources available to connect experts in the industry for them to be consultants in the development and growth of any project.
 - **[Note from Foundation: Mineral Wells participants should consider adding this dimension to a pilot. Bringing in Department of Commerce, along with Department of Labor, and Department of Education would be the most comprehensive partnership among federal agencies, given that BR&D Board includes 7 other agencies plus the Office of the White House.]**
- We need to separate between the use of food & non-food (bioenergy and industrial) crops, and where we can grow each group. Southern region has the high potential to grow new non-traditional, non-food, bioenergy crops in its marginal land.
- The region is a preferential bioenergy crops (east TX to LA) & across the south. SE quad of US is best location for bioenergy crops.

Participants all agreed it would be good to reconvene in a year

Summary Statement from ATIP Foundation

SW Regional Bioeconomy 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 Conservation 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 in-state / 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 Southwest 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 bio economy 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, although the US Department of Labor, the Texas Workforce Commission, and representatives of local workforce boards were active participants in the Southwest 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 Mineral Wells Chamber of Commerce 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

**SW Regional Bioeconomy Forum Summary
Ryan Roach, President
Mineral Wells Area Chamber of Commerce
November 7, 2016**

The Mineral Wells Area Chamber of Commerce hosted the Southwestern Regional Advancing the Bioeconomy Forum in Mineral Wells on September 29, 2016. Forty-one individuals attended the event held at the Holiday Hills Country Club that included representatives from various sectors from across the area and beyond to participate in a discussion about advancing the Bioeconomy. The Chamber along with the City of Mineral Wells is grateful for the opportunity to host the Forum and looks forward to establishing a presence related to developing and enhancing this initiative.

Much of the day focused on allowing participants the opportunity to preview the research and vision behind the Bioeconomy as well as presenting potential challenges and opportunities to be considered as the project moves

forward into further development and implementation. The questions asked to the attendees focused on a variety of topics, however much of the time focused on issues related to the regional issue of relying on a qualified and reliable workforce. While this issue is highly regarded as a major issue locally, the needs for strong labor exists across the state of Texas and even the country. Skilled workers are in high demand in many areas of our region because of the focus on everyone needing a college degree. In developing a new industry, such as the bioeconomy, that the jobs created will be technical and derived from an emphasis in STEM (Science, Technology, Engineering, and Math). Issues must be addressed beyond skills and education that include overcoming soft skills deficiencies.

The highest priority among attendees was that of financing and capital available to businesses who potentially would consider becoming engaged in the bioeconomy. Other considerations related to acquiring capital is identifying, what currently exists in the market, is there a demand, what is the potential for profits to commodity producers and end-product manufacturers? How static or volatile are the markets for these commodities, and will investors and/or lending institutions be willing to take a risk on supporting the development and growth of the Bioeconomy industry? These types of questions are valid concerns and should be addressed in determining the success of advancing the bioeconomy.

Another topic of discussion revolved around educating the masses on what the bioeconomy is. Most citizens are already familiar with bio-fuels and their uses, but other bio-products and the potential uses are highly unknown. Education was a major component of the groups focus and must be very strategic to include overcoming emotions related to the competition with oil and gas, educating investors, businesses, and consumers to the benefits of bio-products. Awareness will be a crucial element in overcoming doubts and skepticism related to the industry and its advancement.

While many different questions were posed to the attendees and a variety of responses were given, the event proved to be worthwhile in acquiring the needed information to continue to develop the initiatives for advancing the bioeconomy. One of the recommendations determined was considering regional pilots as a basis for exploring and developing the markets necessary to support the bio-industry. Mineral Wells is supportive and willing to assist in implementing a pilot program to further the Bioeconomy. The area has many assets to support this industry and looks forward to being a leader in advancing the Billion Ton Bioeconomy.

--- End of synopsis report ---

Attachment: agenda and “discussion document”

**SW Regional Bioeconomy Forum
Mineral Wells, TX**

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

Date: September 29, 2016 Time: 9 AM – 4 PM (local time)
Location: Holiday Hills Country Club, 4801 Highway 180 East

Meeting Purpose: To introduce the “Federal Activities Report on the Bioeconomy,” and the subsequent “Bioeconomy Challenges and Opportunities for the Billion Ton Vision” report and to hear 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 introductory remarks

- Wes Jurey, Chairman, ATIP Foundation
- Dr. Cathie Woteki, USDA Under Secretary for Research Education and Economics, and Co-chair, Biomass Research and Development (BR&D) Board¹
- TBD, State Host

10:00 AM – 11:00 AM Overview of “Federal Activities Report on the Bioeconomy”, and the “Billion

Ton Bioeconomy Initiative: Challenges and Opportunities” Report

- Presentation by Todd Campbell, BR&D Board, Operations Committee (Senior Energy Advisor, U.S. Department of Agriculture)
 - Establishes issues from the federal agencies and frames the topics for discussion

11:00 AM–3:45 PM—Stakeholder Comments and Discussion

- 12:30 PM—Working 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

¹The 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.

Not for Distribution

Critical Discussion Points
(from Biomass R&D Board representatives)

- What are state/local/regional challenges to the bioeconomy?
- How can the federal agencies help address these regional challenges?
- What are state/local/regional opportunities to the bioeconomy?
- How can the federal agencies help leverage these regional opportunities?
- What is the value proposition of a bioeconomy?
- How can you contribute to the Billion Ton Bioeconomy?

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

**A Report to Participants in the PNW Regional Bioeconomy Forum
 Sea-Tac Conference Center (Washington State University, co-hosts)
 Seattle, WA
 October 3, 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 PNW U.S. Bioeconomy Forum was moderated by Wes Jurey, CEO of the ATIP Foundation, who was assisted by a team from Washington State University (WSU) including John Gardner, CEO of the WSU Foundation. Members of the BR&DB Operations Staff made presentations that reviewed the FARB and posed questions related to advancing the bioeconomy.

Demographics by sector: Table 1 describes the demographics of invitees by sector, and the actual number able to participate on October 3, 2016

Table 1. Demographics (by sector) of invitees and participants, convened by ATIP Foundation co-host Washington State University for NW Regional Bioeconomy Forum, October 3, 2016.					
Sector Designation	Invited	% of invited	No. Participated	%RSVP to Attend	% of Attendees
Industry	25	23	3	12	7
State and local government	11	10	4	36	9
Economic and workforce development	17	15	11	65	25
Investment & finance	9	8	4	44	9
Academia	28	25	14	50	32
Agricultural and environmental organizations	21	19	8	38	18
Total	111	100	44	40	100

The agenda (see attachment) included welcoming comments by the ATIP Foundation, BR&DB representatives, and Beth Osborne, Deputy State Director for US Senator Patty Murray. Slide set presentations were made by the ATIP Foundation followed by Todd Campbell (USDA) with assistance from Valerie Reed, Deputy Director, Bioenergy Technologies Office, Department of Energy. 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) on the fly by Alyssa Patrick who projected these so all participants could review and correct as needed. The audio was also recorded from a laptop in case it was needed later to clarify comments.

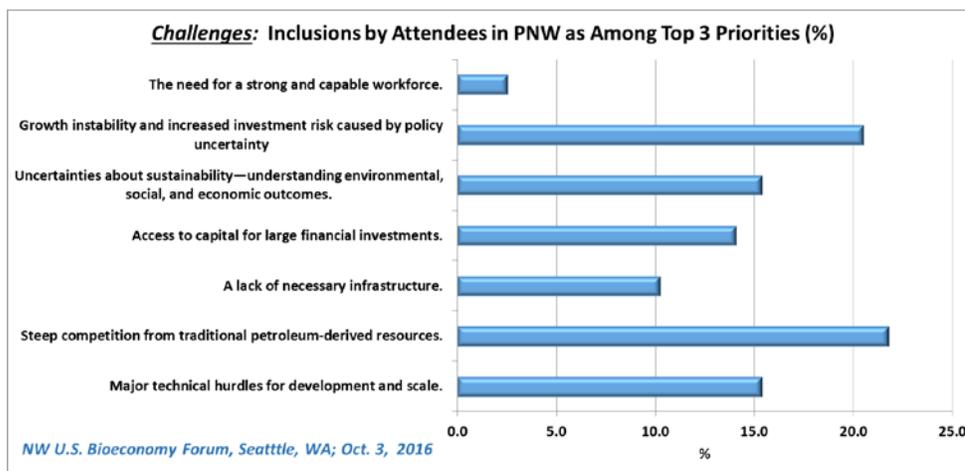
Participants of the forum received a link to a Google Document and a two week window of opportunity to edit their specific comments, or add additional comment. Thereafter, the document was closed by Washington State University, and ownership was transferred to Dr. Rick Brenner, ATIP Foundation, who reviewed comments,

clarified with authors as needed, redacted all names of comment contributors, and annotated with ATIP Foundation comments (designated in margins as Comment [RJB#]). The complete PNW 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.

Reporting of Participant Priorities

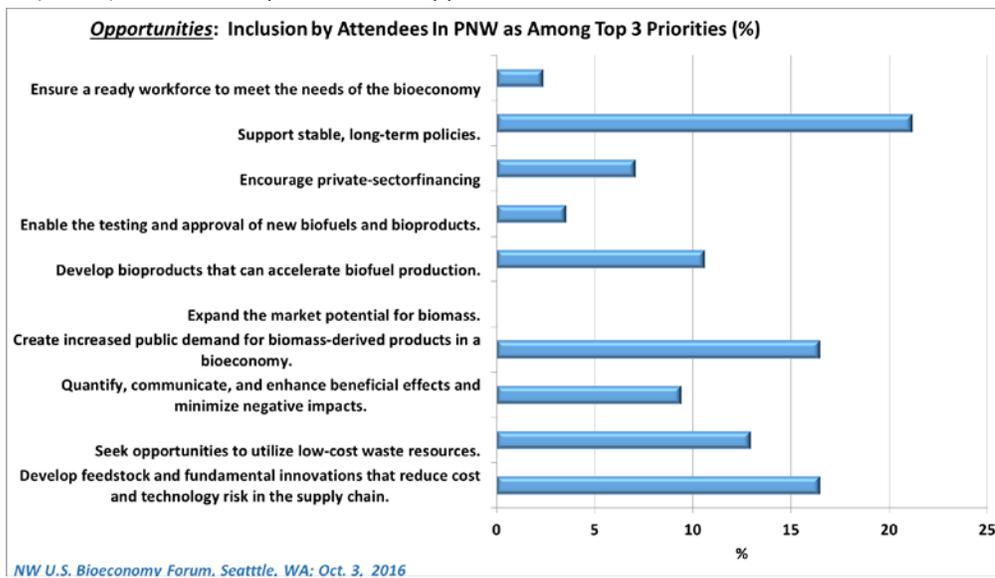
Participants prioritized each “challenge” and “opportunity” --- from their perspective --- to determine whether each was in the top 3 priorities of the PNW U.S.

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



The top two issues for PNW participants were “steep competition from traditional petroleum-derived resources” (21.8%) and “Growth instability and increased investment risk caused by policy uncertainty” (20.5%). “Uncertainties about sustainability—understanding environmental, social, and economic outcomes,” and “major technical hurdles for development and scale” were tied for the 3rd top priority at 15.4% of respondents.

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



Participants clearly identified “support stable, long-term policies” as the most important opportunity for advancing the bioeconomy (21%), followed by “create increased public demand for biomass-derived products in a bioeconomy” and “develop feedstock and fundamental innovations that reduce cost and technology risk in the supply chain” (16% each). “Seek opportunities to utilize low-cost waste resources” was just behind at 13% of respondents suggesting that it was among the top 3 opportunities.

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

There were a number of comments from the PNW region that characterized regional issues, but also a number of comments that were fairly common issues across the 5 regional forums. Below, are selected non-attribute comments from participants, as well as notations by the ATIP Foundation. Regarding the latter, these are preceded by “[NOTE:...],” and are also reflected as “Comment[RJB#] in the full report available on the Foundation website.

Regarding comments to the “challenges” list:

- “A lack of necessary infrastructure” ---
 - Commenter [1]: I would say: Need of new infrastructure and identification of synergistic opportunities with existing infrastructure!
 - [other commenter] is not certain this is correct for many cellulosic sources in the PNW - particularly woody biomass. In fact there are a number of “stranded assets” in the form of pulp and paper mills, lumber mills, transportation assets (trucks and rail), log depots, chipping and densification equipment, etc.
- “The need for a strong and capable workforce.”
 - It seems that the farm digester company Regenis (www.Regenis.net) might offer models for building a trained, functional and profit-focused workforce in/for the bioeconomy.
 - It is important to highlight the experience of the Walla Walla Community college and their AAAS degree in plant operations

Additional challenges offered by participants:

- Insufficient incentives to drive investment and markets **[Note: this has been a theme heard in most forums]**

General notes on “Challenges”

- In reviewing the Federal Activities Report on the BioEconomy (FARB), I would like to see what the funding levels are -- in terms of authorizations and appropriations for each program and agency described in the report. It would also be very useful to present the total federal funding directed towards BioEconomy developments over the past few years. *This would provide insight into how big is the federal government effort in funding programs for the bioeconomy initiative.* Although it might be controversial, providing high-level comparative funding levels for BioEconomy initiatives relative to aggregate federal funding for fossil fuel and nuclear energy resource and technology programs would contribute to a clearer policy assessment of federal government funding priorities across all major energy options.
- [another commenter] ... would also recommend that the FARB include a section that highlights the BioEconomy related research being conducted at our National Laboratories (e.g. NREL, Argonne, Lawrence Livermore, Idaho, etc.). It would be useful to describe the national labs’ major programmatic leadership assignments and funding levels. This could help the private sector identify sources of technology innovation and potential public/private partnerships for further research and development. **[Note: the Foundation would suggest we provide funding levels for both intramural and extramural research from the various BR&D member agencies that relate to the Bioeconomy. An obvious follow up would be an annual research report highlighting outcomes to date, available technologies, and a request for partnerships to address specific issues (e.g., CRADA or cooperative agreement. This idea is further supported by [RJB7] comment in Attachment 4, and provided attached to comment below.**
- Should we revise FARB and put numbers behind programs to show size of federal funding? **[RJB7] I think an annual report on bioeconomy-related R&D outcomes would be a great idea. Currently federal agencies are required to publish an annual report on Technology Transfer that covers all innovations arising from intramural R&D in all agencies. Extramural R&D funded outcomes are published by AUTM (Association of University Technology Managers) but only addresses IP licensing.**
- [research] ... The ability to continue to research transportation logistics is important, any region with raw material is going to need this work. Infrastructure and transportation logistics of biomass are crucial elements. Most recent cellulosic plants are in Iowa. Raw materials are found within 50 miles, but the big issue is how to transport that efficiently? How to transport with a minimal amount of costs and distance. Iowa State University and private companies doing work on this.
- We should be working with the tribes as well. Lots of opportunity as well as mutual interests. **Note: Sounds like an opportunity for a Pilot Project Consortium to better utilize lands of Native Americans for creating new opportunities.**
- Distance - we are very far north and we do not have volume produced here in the Pacific Northwest. We need to see a combination of infrastructure and incentives to help improve. **Note: this has been a common theme among regional forums.**
- Much of the inland PNW is dry with less than 14” of precipitation per year. Dryland biomass yields are too low under the dry growing conditions to contribute significantly to the Billion Ton goal. Those crop residues are needed to protect soil from wind erosion and maintain soil organic carbon. We will need to balance between biomass production and environmental stewardship. This is an important issue; as crop residues (e.g. Wheat straw, corn stover, etc.) are viewed as significant feedstocks for advanced cellulosic biofuels and bioproducts. Sustainable production of these feedstocks will require location specific and crop rotation specific residue management and allocation practices to protect against soil erosion; improve soil moisture retention and add Soil Organic Carbon. **Note: These are formidable problems in PNW. Dedicated biofuel crops help wheat production, but the money crop is still the wheat. This region may want to explore other biomass feedstocks for developing biorefineries (e.g., tallow, ocean / seafood residues, etc.).**

- State and local economic incentives helped spur the development of the biofuels industry in Iowa. State and local economic incentives helped spur the development of the biofuels industry in Iowa. **Note: perhaps the process should be replicated in PNW.**
 - Don't have the same kind of support in Washington, need more business and policy engagement and support

Responses to the “opportunities” list

- “Seek opportunities to utilize low-cost waste resources.” -- We should make opportunities for local communities to benefit from the bioeconomy, rather than strictly adapting a model that’s scaled up to a refinery miles away.
 - Other commenter: We still need to be aware of the differing definitions of some common terms related to development of a bioeconomy. The term biorefinery may look very different depending on the source of biomass and the intended products. A dairy farm by itself can be reclassified to be called a biorefinery. Offsite organics and woody biomass can be brought on to the farm to be anaerobically digested or thermochemically converted; however, the radius from which to derive this biomass is relatively small and serves as an economic boost rather than a critical pillar of the process. This is as contrasted with a biodiesel biorefinery which might need to draw feedstock from a 50+ mile radius or not be viable.
- “Create increased public demand for biomass-derived products in a bioeconomy.”
 - We’ve done prototypes, but public isn’t seeing those - we need to increase awareness and understanding; social cost of carbon, other ecological services and environmental benefits.
 - Would suggest that highlighting clean air, water, and improved soil while gaining the benefit of renewable biofuels and bioproducts is a message that would be more universally accepted.
 - Bluntly, highlighting climate change/global warming as a reason to change and then insisting on individual acknowledgement of a need to change to support society just will not work for nearly 50% of the US population. Instead of confrontationally dragging this group in, publicize and highlight the local benefits of these projects.

Additional opportunities suggested:

- At regional level, it is challenging to bring infrastructure together; if there isn’t money going to the region to collectively solve a problem, we shouldn’t be surprised it is not getting coordinated. How can the federal government coordinate regional efforts? Need to put at least millions into the region to coordinate the efforts
 - The regional biomass economy programs were in place for decade or more, stood up by DOE, but managed by governor offices. Not big dollar, but were for meetings, convening partnerships. These are the kind of actions we can put to your observations and recommendations. **Note: This comment suggests that a regional pilot project may be a recommendation from PNW attendees.**
- Leveraging public entities for long term energy purchase agreements or market stability - merchant generation not possible for biofuels... EX: RNG producer needs a gas purchase agreement in order to capitalize a new facility, not many entities have the planning horizon to purchase energy on a long term agreement, except traditional energy companies which fail to value the “green” attributes.
 - Other Commenter: Look at King County (WA) separate sale of environmental attributes of landfill gas, along with "merchant gas" from their Cedar Hills landfill to Puget Sound Energy. This is a model for monetizing RNG added value.

General notes on opportunities

- The crops that qualify as specialty crops are specially designated. You have to go through a process to get that designation. **Note:** <https://www.ams.usda.gov/about-ams/programs-offices/specialty-crops-program>
- When considering purposely grown crops, competition with food production (in terms of land, water and input requirements) becomes a much more sensitive issue. It entangles the price of biomass feedstocks

with the larger and often volatile agricultural commodity markets. It also has the difficult challenge of convincing US farmers that they should change their farming practices in order to cultivate new types of crops (e.g. camelina, switchgrass, etc.). Unless there are long term public policies that provide incentives and reduce risks, major changes in farming systems are unlikely to be quickly adopted. As we develop opportunities and action items, we need to apply different techniques/resources to each.

- Note: Recurring theme among regional forums; however, in this region, crop rotation should be considered to get both a biofuel crop as well as improved wheat production in rotation.
- I want to make a comparison to the information revolution - in beginning they were not developing computers to do what they do today. Bill Gates and other visionaries turned the informatics revolution into what it is today. With the biomass economy we are in a similar starting phase - how it evolves depends on the “genius” that will help it take shape. We may need to produce a fuel that doesn’t look like petroleum. Right now we are looking to replace existing molecules, but since we are working with new feedstock, there may be a possibility for fuel that we haven’t seen yet.
 - Other commenter: There may be opportunities for fuels and chemicals that we haven't seen yet. The technologies and knowledge that we are developing for the biomass economy could catalyze a revolution in other areas (for example in the way we handle and use our urban wastes!)

What sets the NW / PNW 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?

- We are a gateway to the Pacific Rim; export options open towards Asia.
- Demand from the aviation industry; track record working with Port of Seattle, SeaTac, WSU, Port of Spokane, and more; all have said they would like to use aviation biofuels. We have relationships with Alaska and Horizon Airlines who are saying if you build it we will come, which says a lot about partnerships in the state.
 - This is an important issue. Similar to the incentives provided to early stage photovoltaic and wind power generation through grid utility power purchase agreements with substantially higher than market prices per kwhr; initial biofuel purchase price premiums could be offered to biofuel producers, where the final blended fuel cost/price could be more competitive with conventional petroleum derived fuels. **Note: government incentives**
 - The better we can quantify the environmental services, the better we can reflect true value of fuel provided. Offtake agreements, the small percent of blended fuel being used, if you can space that over a lot of gallons, it is a small cost to companies. Airlines are currently using 30-40% of budgets on fuel. Let’s create an alternative now while companies have money to invest. USDA Rural Development is willing to share some of the risk with standing up plants/biorefineries. We should share risk to get the first plants off the ground. Doesn’t have to be the most profitable, just need to reduce the risk so we can move on to more developed options. **Note: Start with this URL <http://www.usda.gov/wps/portal/usda/usdahome>**
- I’m surprised the conversation hasn’t focused on bioproducts more. If we want to focus on fuel, I don’t think we will get there if we don’t talk about the high value products that will be needed to make it successful.
 - Commenter: Agriculture systems did not play a large roll in this meeting; however, the focus on anaerobic digestion of animal wastes is now less on how to produce electricity from the biogas and more on how to extract usable and potentially valuable co-products. While the digester is the central component of the facility, it is the nutrient recovery and water upgrading components that are going to drive future adoption. The challenge is now to monetize those co-products for the local bioeconomy--we don't want to be shipping biofertilizers across the country unless there is some other critical need.
- On the East Coast of NE Florida, there are two major manufacturing plants that receive about 400 log trucks a day. Six months ago Rainier Advanced Materials entered into a joint agreement with Borregard in Norway related to lignin. This joint venture called Lignotech LLC, received tax credits from the county,

and a new plant is getting built there, on Amelia Island where the existing plants are. Essentially, this makes better use of a biomass (lignin) that was previously burned for energy at the plant. Once the new plant is in operation (2017), the lignin will be used to create high value products --- and the local economy benefits with more job creation, and higher value products on the market.

- **Note: Example of turning low value biomass waste into high value products because of research, IP, and new partnerships that provides industry with a 20 year advantage of establishing new markets and products.**
- NARA is the Northwest Advanced Renewables Alliance of which Mike Walcott of Washington State University is an integral member. I thought I said that you can't get RINs from federal lands, as is the case. The federal government owns 53% of the state of Oregon and almost 29% of Washington. I was trying to make the point that environmentalism and its inherent love of national forests is very strong in the Pacific Northwest, unlike the southeast section of the U.S. Thus, those who work in the PNW forests, especially in the public sector, generally refer to the jet fuel made from trees as a bioproducts instead of feedstock since feedstock carries with it the emotional baggage associated with clearcutting and commodity production using wood. Thanks for your opportunity to attend this interesting and valuable meeting. PNW is different because of federal land ownership. Example: we were not included in the NARA analysis because you can't use renewable identification numbers on rural land. Here there is a deep attachment to forests, environmentalists don't want to see activity. We refer to it as a bioproduct rather than feedstock because of sensitivity towards national forests.
 - **Note: Uniqueness of land ownership would suggest that a partnership of feds, state lands, and industry / key private sector players should be considered to formulate a unique pilot project for PNW.**
- Policy has focused on replacement of certain molecules; instead of fixing molecule, we are going to have opportunity to develop molecules that react to the biofuel. Nature of molecule we are working on is different than petroleum molecules. We are going to find molecules that perform better than petroleum based molecules.
 - Commenter: The idea here is that by focusing on petroleum replacements we may be missing opportunities in other areas where biomass derived molecules could have competitive advantages.
- We've been focused on large scale plans, but the smaller scale plans haven't been provided. We have so many options, we don't have enough resources to know where to start. How do you do one thing at a time, get it done, and move to the next thing? The process is so distributed at the moment, how can we focus?
 - **Note: Appropriate for a public private partnership to garner federal, multi-state, and local resources to optimize novel traits of the PNW region.**
- Haven't talked about municipal solid waste, or water resources. Thinking about public perception; we need to address amount of waste, how it can be used in urban core - need to communicate that better to public.
- Other commenter: Related: Progressive companies and municipalities (SF, Portland, Seattle, Google, Microsoft...) are now moving aggressively to zero-waste strategies. These strategies involve collecting and separating large amount of materials, notably including valuable biologically-sourced types [food waste, etc.]. This is currently a burden, as was collection of quality recyclables such as glass and metal when recycling programs were initiated. But as with high-value recyclables, using digestion and other sophisticated reclaim processes, these "wastes" will be valued when and where they are produced. Again, digestion and other biologically-based waste management systems are highly amenable to down-scaling, reducing need for interconnecting infrastructures to transport these wastes to central plants, as is now the practice. This change of mode will require more trained service workers (to maintain the distributed bio-processors), which creates jobs.
- Cannot sell bioeconomy as if it is same for the whole country. Every region resonates with something different. For Iowa it's about corn, for Washington it is about aviation industry. In years to come, resource limitation is going to be the problem that drives to technology. We can start answering that question with development we are doing today.

- Other commenter: Our bio-economy marketing efforts have to be regional and have to be well integrated with the economic needs of the region!
- USDA has business services to provide access to capital in rural areas in a myriad of ways. Water quality - recent study shows that there are 66 million dead trees in Nevada, contributes to wildfires, and our waters are filtered through our forests. The recent environmental developments from insect infestations to wildfires - which cost money and environmental health - are why a bioeconomy makes sense here. These should be drivers of why we need to make use of biowaste, and look to new options in bio-feedstocks. Job creation, economic development, environmental services - all have a benefit. How do we quantify those benefits?
 - **Note: This argues for local / regional “biomass accumulators” and a coop structure to produce bioproducts for both regional use (e.g., biochar for soil / water enhancement), or energy-dense pellets for markets elsewhere.**
- Regional innovation centers - put out a proposal for this so region can decide what makes most sense for them to develop. Let them propose the deliverable. That combines research with the market infrastructure.
 - **Note: Back a proposal with a PPP with others at the table for greater likelihood of success.**
- We should also note that a major study (Proceedings of the National Academy of Sciences, “Impact of anthropogenic climate change on wildfire across western US forests”) has just been published that finds that more than half of all recent western US forest wildfires are directly attributable to climate change that has increased forest aridity. There was discussion in the Forum of how US Forest Service fire prevention programs should be significantly increased with funding for forest thinning operations that use smaller scale systems for harvesting and converting such thinnings into biochar.
 - **Note: <http://www.pnas.org/content/113/42/11770.full.pdf>**
- We need to be less concerned about the relatively higher capital cost per unit of production of smaller bioproducts operations. This is especially relevant in our current period of exceptionally low interest rates and cost of capital. This perspective would encourage smaller scale production facilities that could be distributed throughout the region; and could benefit many rural communities with increased jobs and incomes from a new, localized BioEconomy. The lead time required for such distributed development of different bioproduct production enterprises may also be shorter than for much higher capacity facilities.
- There’s not a conversation about biochar as an application of biomass. It offers opportunity of collocation of feedstock and end use. You gasify biomass, produce biochar, disposes of biomass in low cost way. Then you produce biochar that can help fertilize crops and remediate soil. It is an elegant use of biomass. There is incredible complexity of performance of biochar based on feedstock and way it has been processed - it has created a whole area of science about which much remains unknown. Our local universities are developing knowledge of biochar feedstock characteristics; production technologies; and field applications. However, our universities need much greater financial support for continued research and development of biochar materials in order to become centers of excellence that would help industry and the forestry and farming sectors to make sense of its value and open up new opportunities for economic growth.
 - **Note: These last two comments put forth good arguments for regional PPP that includes federal partners. Sounds like a good topic for a separate meeting on next steps in PNW.**

Follow Up Question: Should we keep collaboration among this group moving forward after this meeting? If so, how?”

- What partnerships do we need to form in this region? Can we do same thing next year with 150 people from many different aspects of this topic?
 - **Note: Group wanted to expand and bring more players into it.**
- We’ve had two regional projects for 5 years; they have filled a void in conversation across these regions. Both projects are sun setting. They have provided tremendous synergy across the states (WA, OR, MT). There are two different areas here - west and east - that span multiple states and offer different things to this conversation. Maintaining the regional collaboration will be key.
- Our PNW region has also greatly benefitted from the knowledge and capacity building that was

accomplished by the major USDA-NIFA five year grant to Washington State University, Oregon State University and the University of Idaho for “Regional Approaches to Climate Change - Pacific Northwest Agriculture” (REACCH). Although the REACCH program focused on wheat farming systems, the comprehensive knowledge gained regarding crop rotation strategies; soil and water impacts of different practices; and the impact of forecast climate changes on the region’s farming sector will contribute to our understanding of sustainable agricultural strategies for both food and other biomass products.

- We have tried to address needs for aviation industry through several collaborative forums and initiatives. ATiP would be able to bring all of those things together, bring this into a forum on the larger bioeconomy conversation.
- Yes, we should follow up. Grid modernization, built environment, and biofuels are all on the radar for the state, but biofuels have fallen off the radar a bit. We can bring that back by reconvening this group. These conversations are happening all the time, some larger force to bring us all together is helpful.
- The bioeconomy initiative has been in development for several years. We have gotten to this point and our goal is an action plan that will motivate the new administration. There is another umbrella - Mission Innovation. It is a global initiative, Obama has suggested support of. All countries that came together in Paris proposed doubling spending in R&D for next five years for clean energy technologies. Working on how USDA, EPA, others will play under that umbrella. No guarantees because of admin change. The EU is part of Mission Innovation, and have finalized \$320B - this could still play a role for U.S. too.
- \$1B leaves country every 3 days for petroleum. Would like to keep that circulating here in rural economies.

Summary Statement from ATIP Foundation

PNW Regional Bioeconomy 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 Conservation 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 in-state / 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 Pacific Northwest 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 Pacific Northwest 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 Washington 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

Pacific Northwest Regional / ATIP Bioeconomy Forum Summary

John Gardner

Regional Host

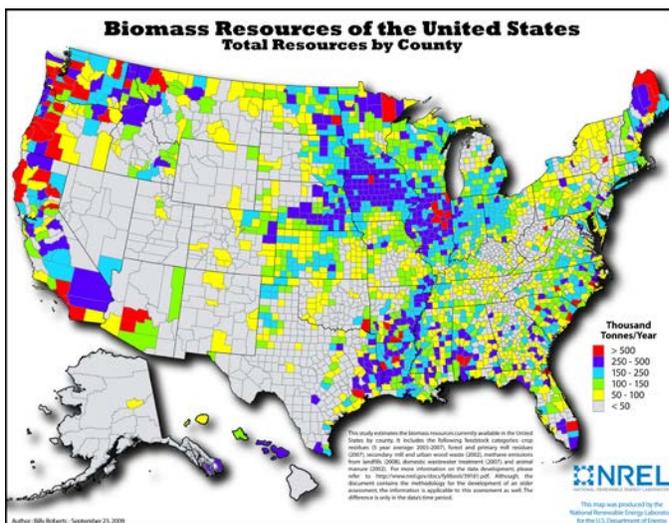
CEO Washington State University Foundation

Professor, Crop and Soil Science, Washington State University

This meeting was co-sponsored by Washington State University under the leadership of the team including Jim Moyer, Associate Dean/Director Agricultural Research Center, College of Agriculture, Human and Natural Resources, Mike Wolcott, Regents Professor, Civil and Environmental Engineering and Director for Institute of Sustainable Design, and Ralph Cavalieri, Associate Vice President for Alternative Energy.

The Seattle meeting represented an attempt at sampling the thought leaders in the bioeconomy from mostly the state of Washington, but also Oregon, Idaho and western Montana. This ATIP regional forum brought together representatives from academia (14), economic and workforce development (11), environmental/agricultural NGOs (8), active investors (4), state and local government (4) and industry broadly (3).

The Pacific Northwest region is among the highest in biomass production capability in the US, and has both public and private forests, grazing land as well as dryland and a substantial amount of irrigated vineyards, orchards and cropland dedicated to high value products.



The production potential of biomass in the region is great (NREL, 2009), but also is tightly linked to public policy (such as the forests) and food/consumer markets (high value crops). Forest/wood waste by-products, energy crops (including perennial and annual, woody and herbaceous), industrial and food wastes thus comprise the major categories of biomass potential.

Challenges

Given Washington's geography in the US and the presence of five petroleum refineries on the Pacific coast built for Alaskan crude (now also from Bakken) – these are among the contributors to the challenge expressed related to the competition from petroleum as a major barrier to further developing the bioeconomy in the Pacific Northwest. The region assumes a technological breakthrough in efficiency and pricing might be necessary to increase use of biomass, thus the emphasis on research/development and participation of the research universities and national laboratory.

Sustainability is another major challenge in further developing the bioeconomy in the northwest. Given public lands, forest management history, the sophistication of water use/allocation, the wide-spread development of renewable sources of energy from hydro, wind and solar, and the environmental mindset – there is a high bar to achieve an acceptable use of biomass. While it could also be considered an asset, one can't deny the importance of federal policy, be it land and water use or forest management in this region. Thoughtful, stable, long-term federal, state and local policy was deemed a requirement at this forum.

Another challenge expressed at the forum was the importance of place related to workforce and development of the bioeconomy. From the Pacific coast, to forests, to mountains, to desert and plains, the diversity of landscapes, ecosystems and opportunities are often closely tied to education and workforce capability. While a favorable attribute if the workforce stays in place, working across locales has revealed a real vulnerability with regard to the transferability of training and experience. Much of the northwest workforce is not capable of mobility.

Opportunities

Thoughtful, stable policy change could have a large impact on the bioeconomy of the northwest. With forest management policy the single biggest example, participants at the forum suggested both environmental and economic benefits were entirely possible given the land, water and bio productivity of the region. The region has relatively large reserves of untapped and under-utilized waste streams from forests, marine and urban communities that have potential for conversion and utilization for energy, products and co-products. Biochar is but one example.

Accompanying policy change, it was suggested a ready market for sustainable products and services could come from a developing bioeconomy. The environmental ethos of the region could provide a market pull if a sustainable supply chain was put in place. The most notable example is that of the aerospace manufacturing and the commercial aviation sector. The northwest is home to national, if not international, thought leaders of research and policy to lower the environmental impact of flight. Development of a sustainable bio-based jet fuel has been among their objectives for nearly a decade, which has demonstrated considerable progress with several alternative fuels now qualified, global policy among 191 countries agreed to, and daily commercial flights on biofuel originating from Los Angeles and Oslo, Norway.

The northwest region holds a strong belief that technological progress and disruptive innovations are possible, and could enable a growing northwest, national and global bioeconomy. This no doubt comes from the region's history but also the public and private research/development capability and a sophisticated investor community. Though most regional investors are used to shorter term, lower capitalization, and faster growth opportunities than found in most of the bioeconomy, there is a community of knowledgeable, committed investors in clean technology native to the northwest.

---- End of synopsis report ----

Attachment: agenda and "discussion document"

Northwest Regional Bioeconomy Forum Seattle, WA

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

Date: October 3, 2016 Time: 9:30 AM – 4:30 PM (local time)

Location: Conference Center at Sea-Tac Airport, 17801 International Blvd, Rm 6012M (inside Sea-Tac Airport), Seattle, WA

Meeting Purpose: To introduce the “Federal Activities Report on the Bioeconomy,” and the subsequent “Bioeconomy Challenges and Opportunities for the Billion Ton Vision” report and to hear 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 introductory remarks

- Fred Jarrett, Senior Deputy Executive, King County
- Wes Jurey, Chairman, ATIP Foundation
- Valerie Reed, Deputy Director, Bioenergy Technologies Office
- Todd Campbell, BR&D Board, Operations Committee (Senior Energy Adviser, US Department of Agriculture)

10:00 AM – 11:00 AM Overview of “Federal Activities Report on the Bioeconomy”, and the “Billion Ton Bioeconomy Initiative: Challenges and Opportunities” Report

- Presentation by Todd Campbell, BR&D Board, Operations Committee (Senior Energy Adviser, U.S. Department of Agriculture)
 - Establishes issues from the federal agencies and frames the topics for discussion

11:00 AM–3:45 PM—Stakeholder Comments and Discussion

- 12:30 PM—Working 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:

- Create increased public demand for biomass-derived products in a bioeconomy.
- Quantify, communicate, and enhance beneficial effects and minimize negative impacts of an enhanced bioeconomy.
- Enable the testing and approval of new biofuels and bioproducts
- Encourage expansion of the market potential for biomass.
- Develop feedstock to meet market demands and potential
- Develop bioproducts that can accelerate biofuel production.

- Support fundamental innovations that reduce cost and technology risk in the supply chain.
- Seek opportunities to utilize low-cost waste resources.
- Develop pathways for:
 - 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.

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

**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)**

- a) From the “Challenges” section of the above document, what would you list as the 3 highest priorities to discuss and address from the PNW region?
 - a) From that same list, what SHOULD be added to that list from our regional perspective? Does it change your prioritization scheme? (1=most important)
- b) From the “Opportunities” section of the above document, is anything missing from the list, and how would you prioritize these issues? (1=most important)
- c) What sets the NW / PNW 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?
- d) What other biomass would you like to consider in the discussion of advancing the bioeconomy? Animal wastes / carcasses / concentrated animal feeding operations? Municipal landfill biorefineries? Others?
- e) As a region, how can you enhance your bioeconomy through new partnerships in the region, or on a more global basis?

**ATIP Foundation Regional Bioeconomy Forums:
 “Addressing the Challenges & Opportunities of Advancing the Billion Ton Bioeconomy”**

**A Report to Participants in the NE Regional Bioeconomy Forum
 Wells Conference Center, University of Maine (co-hosts)
 Orono, ME**

October 18, 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 NE 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 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 University of Maine for NE Regional Bioeconomy Forum, October 18, 2016.					
Sector Designation	Invitee	% of invitee	No. Participate	%RSVP to Attend	% of Attended
Industry	42	51	12	29	24
State and local government	13	16	13	100	26
Economic and workforce development	4	5	4	100	8
Investment & finance	6	7	3	50	6
Academia	13	16	13	100	26
Agricultural and environmental	4	5	5	125	10
Totals	82	100	50	61	100

The agenda (see attachment) included welcoming comments by the ATIP Foundation, BR&DB representatives, and Mr. Fred Jarrett, Senior Deputy Executive, King County, and representatives from the offices of Senator Susan Collins, and Senator Angus King, and introductory comments also by Dr. Carl Lucero, U.S. Forest Service. Slide set presentation was made by the ATIP Foundation followed by Alison Goss-Eng (Bioenergy Technologies Office, DOE) with assistance from 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) on the fly by Renee Kelly, Assistant Vice President for Innovation and Economic Development University of Maine, and Director of Economic Development Initiatives & Co-Director of the Foster Student

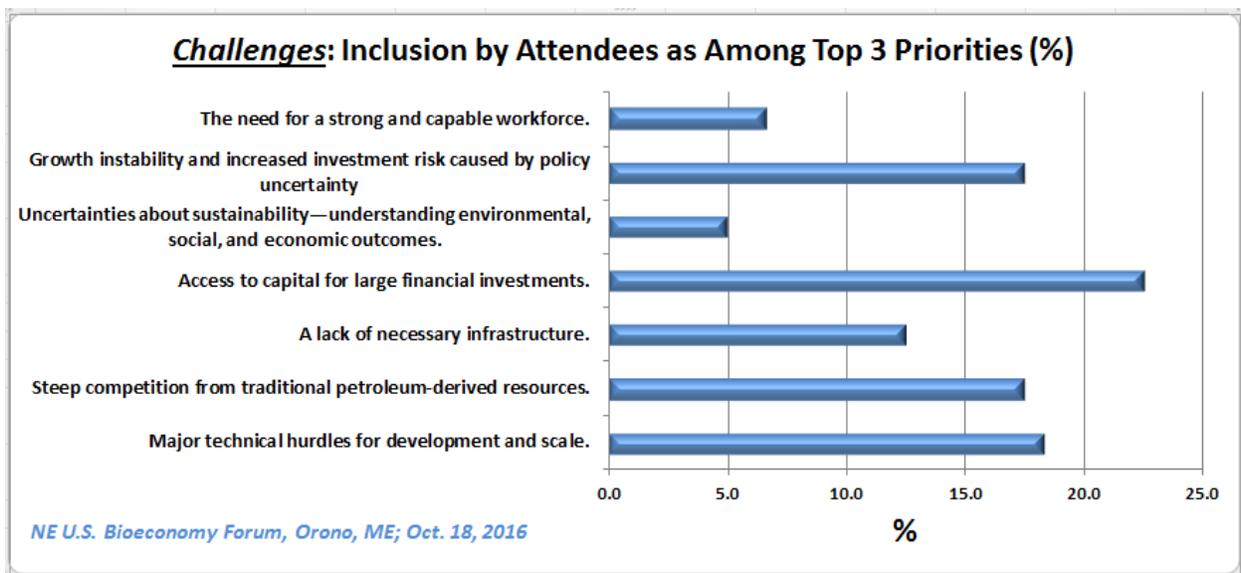
Innovation Center, Orono, ME, who projected these so all participants could review and correct as needed. The audio was also recorded from a laptop in case it was needed later to clarify comments.

Post forum, participants received a link to a Google Document 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 needed, redacted all names of comment contributors (rendering the comments “non-attribute,” and annotated with comments (RJB) from the Foundation. The complete NE 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.

Reporting of Participant Priorities

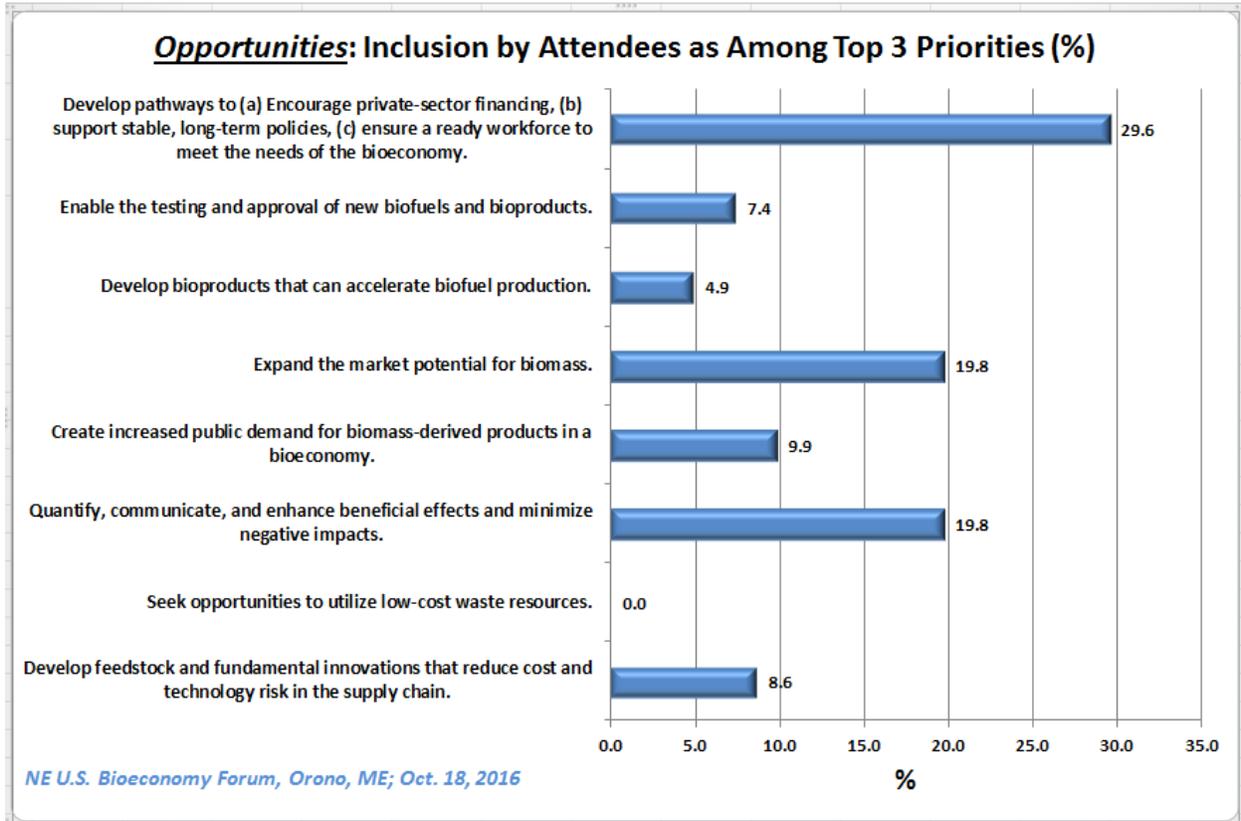
Participants prioritized each “challenge” and “opportunity” --- from their perspective --- to determine whether each was in the top 3 priorities of the NE U.S.

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



Having “access to capital for large financial investments” was considered to be the highest priority challenge in the NE (22.5%). Major technical hurdles for development and scale” was second (18.3%), with “growth instability & increased investment risk cause by policy uncertainty” and “steep competition from traditional petroleum-derived resources” tied for 3rd highest priority (17.5%).

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



The participants in Maine concluded that their top priority opportunities were a to develop pathways to (a) encourage private-sector financing, (b) support stable, long-term policies and (c) ensure a ready workforce to meet the needs of the bioeconomy; their score was 29.6%. Their other top two priorities were to “expand the market potential for biomass” and to quantify, communicate, and enhance beneficial effects and minimize negative impacts (19.8% each). Notably, participants had no interest to “seek opportunities to utilize low-cost waste resources,” ostensibly because of an abundance of woody biomass and the regional use for heat.

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

Preface from the ATIP Foundation:

The NE Regional Bioeconomy Forum was unique among the five regional forums in the amount of questions and discussion that followed the welcoming remarks and preceded the formal presentations on the bioeconomy by the federal agencies, and the subsequent discussion by attendees. Attachment 4 includes over 5 pages of these preliminary comments from the participants (thank you note takers!). Accordingly, the Foundation recommends careful review of these notes as a precursor to the “Critical Discussion Points” conversations that occurred subsequently and are highlighted below. Specifically, the Foundation has provided many explanatory notes and internet URLs to address some of these comments raised in the preliminary comments.

Regarding the “Critical Discussion Point” session, there were a number of comments from the NE 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 are state/local/regional challenges to the bioeconomy and how can the federal agencies help address these regional challenges?”

- We need help scaling up from lab and bench scale – we need public private partnerships
- The private portion of the public/private partnership need to have representation from both the demand and the supply side. How can they better manage the valley of death.
 - **Note: the ATIP Foundation can assist in either / or any of these issues described in these first 2 bullets. Email rbrenner@atipfoundation.com for further assistance.**
- Not doing a good enough job communicating to public - difficult to find the federal dollars to do that, for example, tall wood buildings in Boston, why and how it will benefit, public health, climate change, synthesize so we can communicate the story.
- Engineered wood products are a fine example of what we should be looking at as crucial building blocks of a bioeconomy that is not only sustainable but strengthen communities and serves such an improved profile for the region’s long term economic health.
 - **Note: Opportunity to partner with state PR, Chamber of Commerce, and federal agencies on successes? Communication appears to be a common theme from the Orono forum.**
- 30% tax credit for biomass ends this year; continues for others, lack of certainty is difficult for investments.
 - **Note: Lack of stable and predictable policy and incentives have been a common theme across all 5 forums.**

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

- Consistent, identified agency point people ideally located in Maine.
- Workforce Innovation and Opportunity Act calls for alignment, Department of Labor and Education need to be here.
 - **Note: Excellent point, and both DOL and Dept. of Education are NOT part of the BR&D Board. It makes sense to pilot their inclusion. We suggest a dialogue with USDA Under Secretary for Research, Education, and Economics who co-chairs the BR&D Board; ATIP Foundation can help with that.**
- Educate public about value of bioeconomy to environment and rural economy led by marketing.
 - We need to state facts that tell the long-term story of the importance of a sound forest products industry to the region in both economic and environmental terms. For many the use of corn for fuel is not seen as an environmental problem. However ask the same question about forest products coming from natural forests managed under third party certification and the simple act of cutting a tree, regardless of the true sustainability is viewed as a negative outcome for many.
 - Further the rural economies of so many Northern Forest towns once thrived on the woods and can again, especially when you consider the impact of multiple use and how that deepens the economic vitality of a town or region.

- We need to develop a more effective narrative on this based on well done research and very well developed and presented marketing. The public really has to buy in to wood and any biomass feedstock use before we can move the bioeconomy forward in my view.
- We need private public partnership to communicate benefits
- Education for the workforce; there is an aging workforce in logging, equipment, operations. Need skills training. [Commenter's] truck drivers are all older than he is. *Need to keep kids in rural areas. Community College created program for 15 wind turbines but not for logging in Aroostook.*
- Maine uses natural forest management, but regulators reward plantation style management because ours is harder to quantify, *agencies should look to reward natural management with higher renewable credits*

How is the health of the venture capital in this region?

- No shortage of capital if we come up with deals that look good, *need to work out a process to develop success stories of converting to biomass energy to show investment yields return.*
- Biomass processing should be done as close to the stump as possible to reduce transportation but shifts in how we move materials to market, *can DOT help us re-engineer?*
- Deep water port to Europe --- we have it, but how do we take advantage of that since there is no rail line there
 - **Note: Infrastructure was a key discussion in Orono because of geography, lack east-west connections, and being at the “end” of the NE corridor.**
- New diesel emissions standards EPA Tier 4 trucks aren't reliable. It's a big problem.
 - **Note: The Foundation suggests that EPA be invited into discussions on next NE Regional Bioeconomy Forum.**

What sets the NE Bioeconomy apart from other regions of the country? What inherent advantages do you have?

- Currently supply and a well-developed infrastructure for forest management. Likely a less impactful results, at least short-term from climate change. Think fires out west and other weather and health related impacts in the southern US. *The supply issue is driven as noted earlier by the decline in the pulp and paper industry leaving a large source of forest products available.*
- The region has a high concentration of education institutions;
- Tremendous amount of innovation and entrepreneurship;
- Natural resource management and bioproducts advantage, continual need to weed, material that gets left in the forest --- pre-commercial thinning material is an opportunity available to the bioeconomy”

What regulatory issues (or other) constrain success?

- Many. Upstate NY and New England are not friendly to heavy industry like big biofuels plants. *Good reasons to let the South have those and focus on small scale distributed approaches.*
- *Transportation, need a regional study, regional infrastructure policy to reduce costs*
 - *Goal here is that we need both enhanced systems for trucks and rail, but also a consistent set of regulations for transportation across the 4 Northern Forest states and Quebec.*

“What does success look like in the MW bioeconomy?”

- Zero use of fuel oil for heating
- Great silviculture and forest management, *with markets*
- Full employment so kids can stay in rural areas
- Connectivity of biomass into the [electric] grid
- Every landowner participating if they want to – even a small woodlot
- Double or triple enrollment in the University’s forestry school
- Would like to see that a logger can get pine logs to the mill, pulp to the paper plant, and biomass to a biomass processor.
- Respect for foresters and landowners, credit for environmental and other benefits of the bioeconomy industry in Maine.

What incentives would help you?

- We need some way to provide price stability. Analogy to corn, milk, cotton, and rice supports. USDA knows some things about these things. Throwing massive federal grants at investors, or conducting masses of unfocused basic research haven’t worked very well and won’t until we faced the price volatility problem squarely.
- Capital gains on forest land - current tax policy is a liability for maintenance of forest lands and promotes liquidation
- Federal tax policy is a disincentive to long-term stewardship as capital gains are not indexed to inflation. Further there are other elements of the tax code that reward short-term owners and penalize long-term ownerships. We need to integrate other government policies to create a better economic climate for the ownership, management and harvesting of timberland. ... carrots not sticks will serve this bioeconomy project very well.
- Change definition of renewable credits to allow forest biomass from naturally regenerating forests.

Would you support a recommendation to agencies to put grants out that insists on collaborative partnerships and structures 2-3 year with outcomes then phases out?

- Group consensus: yes
- More beneficial to filter money through existing community development organizations for impact.
- We need industry roadmap to success, legislative support, with university
 - **Note: recommendation to the BRDB.**
- The Northeast is a mega region, 20% US population; build for a regional market as an advantage. Need regional economic allies.

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?

- Municipal wastes, dairy and forest “products” and bi-products (don’t use the word “waste” because it has a negative image). Have a broad definition, such as “anything that can be grown” And then work on criteria.
- Aquaculture and fisheries wastes should be considered – there are lots of these

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

- federal agencies through Maine Forest Products Council
- Integration on both sides, across federal family and long-term commitment
- Roadmap partnership with industry and university, spruce budworm task force is a model for how this could work. Also look to benchmark what the Canadians across the border have been doing (i.e. Atlantic Canada Opportunities Agency;
 - **Note: see 3 URLs on page 14 of notes from Forum.)**
- We have unique situation because of the amount of privately held land. ... We are an importer of woods, but now markets have diminished (but we are still importers of certain species of the wood). *When policies change in Massachusetts, Rhode Island, Vermont, New York change, it affects them here.* Are scrambling to fill some markets that we have here?
- Need rail in this area for infrastructure. No major national rail carriers in this area. Most are small lines that have high turnover. ... The rail system must be enhanced to address the costs of rail transport due to multiple rail carriers and the “switching” costs from one carrier to the next.
- Ports. What are the barriers? *Underutilized, from a regional standpoint. Regional transmission of electricity, northern Maine is not connected.*

Summary Statement from ATIP Foundation

**NE 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 Conservation 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 in-state / 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 Northeast 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.

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 University of Maine 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

Northeast Bioeconomy ATIP Forum Summary

**Renee Kelly
Hemant Pendse
Stephen Shaler
Regional Co-Hosts
University of Maine**

The meeting was held on October 18, 2016 at the University of Maine. Forty-five participants represented all stakeholders of the forest-based economy in Maine. Sectors represented included forest landowners, pulp and paper mills, forest and bioproducts-related trade associations, state agencies (economic development, labor), federal agencies (USDA, DOE), University researchers, consultants, biomass energy producers, sawmills, environmental and other nonprofit organizations, investment and finance organizations and federal delegation staffers. One participant was from SUNY/ESF in New York with experience in woody bioenergy crops.

This meeting was held in juxtaposition with the current Economic Development Assessment Team (EDAT) process led by the U.S. Department of Commerce Economic Development Administration, which is focused on the forest-based economy in Maine. As such, the forum was timely and highly relevant with excellent representation from various stakeholder groups. The time frame of participant concerns and interests was predominantly immediate and near-term. The focus on forest-based aspects of the bioeconomy is particularly relevant for New England and northern New York - the landscape of which is predominantly forested.

Four themes emerged as consensus takeaways:

1. Maine's (and New England) forestland is sustainably managed and harvested, relying on natural-growth rather than plantation forestry. Sustainable biomass from Maine's forest needs to be treated fairly in federal definitions relevant to RFS2 compliance and qualification for RIN credits. This issue applies to the entire Northern Forest Region that includes Maine, New Hampshire, Vermont and New York. Tree residue from unmerchantable trees can provide sustainable biomass complementing slash, pre-commercial thinning and chipmill or sawmill wastes. The fact that naturally regenerated forests have no GMO stigma is a competitive advantage for selected markets.
2. Wood supply logistics in Maine and New England have not been globally competitive. Investment and policy changes are needed to improve rail, port, and trucking transportation infrastructure. This infrastructure is critical to sawlog, wood fiber, as well as biomass supply chains as well as to cost-competitive export of bio-based products to domestic and international markets.
3. An industrial eco-system exists for forest-based bioproducts that is characterized by extremely high utilization rates of all materials and significant business-to-business relationships. The success of new bioproducts will require an understanding of and integration within this cluster. Significant opportunity exists for co-product portfolios that include nanocellulose and/or cellulosic sugars using biomass feed. C6 or C5 sugar monomers can be used for conversion to biofuels and/or bioplastics. Cellulose nanofibers (CNF), more commonly called nanocellulose, offer emerging opportunities for use in a wide variety of applications such as polymer reinforcement, food packaging, 3D printing resins, adhesives, biocomposites, textiles, lightweight structural components, tissue implants, and foams. Targeted programs to support technology scale-up and deployments are key to de-risk new technologies and attract capital investment required for new manufacturing infrastructure.
4. With the recent loss of several pulp mills and biomass power plants, more than 3 million green tons of biomass - with an established logistics system - is available for new products/markets. A key for establishment of new manufacturing facilities will be the attraction of capital investments.

Near-term coordination with the Maine EDAT process will be very effective in providing Maine forest communities much needed economic development assistance, while laying a foundation for continued evolution of the forest bioeconomy for the Northeast region.

--- End of synopsis report ---

Attachment: agenda and "discussion document"

NW Regional Bioeconomy Forum Orono Maine Forum Agenda

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

Date: October 18, 2016 **Time:** 9 AM – 4 PM (local time)

Location: Wells Conference Center, University of Maine, Orono

Meeting Purpose: To introduce the “Federal Activities Report on the Bioeconomy,” and the subsequent “Bioeconomy Challenges and Opportunities for the Billion Ton Vision” report and to hear 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 introductory remarks

- Dr. Susan Hunter, President, the University of Maine
- Wes Jurey, Chairman, ATIP Foundation
- Carl F. Lucero, Director, Landscape Restoration & Ecosystem Services Research, U.S. Forest Service
- Alison Goss Eng, BR&D Board, Operations Committee (Bioenergy Technologies Office, Energy Efficiency and Renewable Energy, U.S. Department of Energy)
- Todd Campbell, BR&D Board, Operations Committee (Senior Energy Adviser, US Department of Agriculture)

10:00 Overview of “Federal Activities Report on the Bioeconomy”, and “Bioeconomy Challenges and Opportunities for the Billion Ton Vision” (1 hr.)

- Presentation by Todd Campbell, BR&D Board, Operations Committee (Senior Energy Advisor, U.S. Department of Agriculture), and Alison Goss Eng, Bioenergy Technologies Office, Energy Efficiency and Renewable Energy, U.S. Department of Energy, and
 - Establishes issues from the federal agencies and frames the topics for discussion

11:00 AM–3:45 PM—Stakeholder Comments and Discussion

12:30 PM—Working 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:

- Create increased public demand for biomass-derived products in a bioeconomy.
- Quantify, communicate, and enhance beneficial effects and minimize negative impacts of an enhanced bioeconomy.
- Enable the testing and approval of new biofuels and bioproducts
- Encourage expansion of the market potential for biomass.
- Develop feedstock to meet market demands and potential
- Develop bioproducts that can accelerate biofuel production.

- Support fundamental innovations that reduce cost and technology risk in the supply chain.
- Seek opportunities to utilize low-cost waste resources.
- Develop pathways for:
 - 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.

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

**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)**

- a) From the “Challenges” section of the above document, what would you list as the 3 highest priorities to discuss and address from the NE 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 NE region?
- c) What sets the NE 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 NE 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 / carcasses / concentrated animal feeding operations / seafood industry wastes? Municipal landfill biorefineries? Others?
- e) As a region, how can you enhance your bioeconomy through new partnerships in the region, or on a more global basis?

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”.

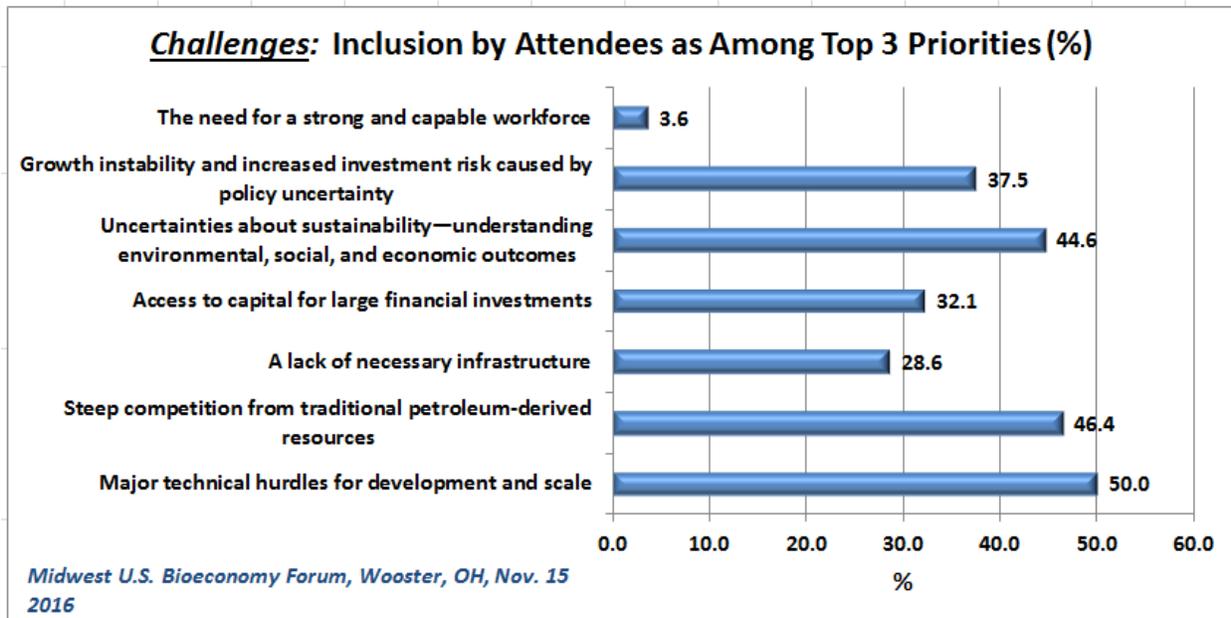
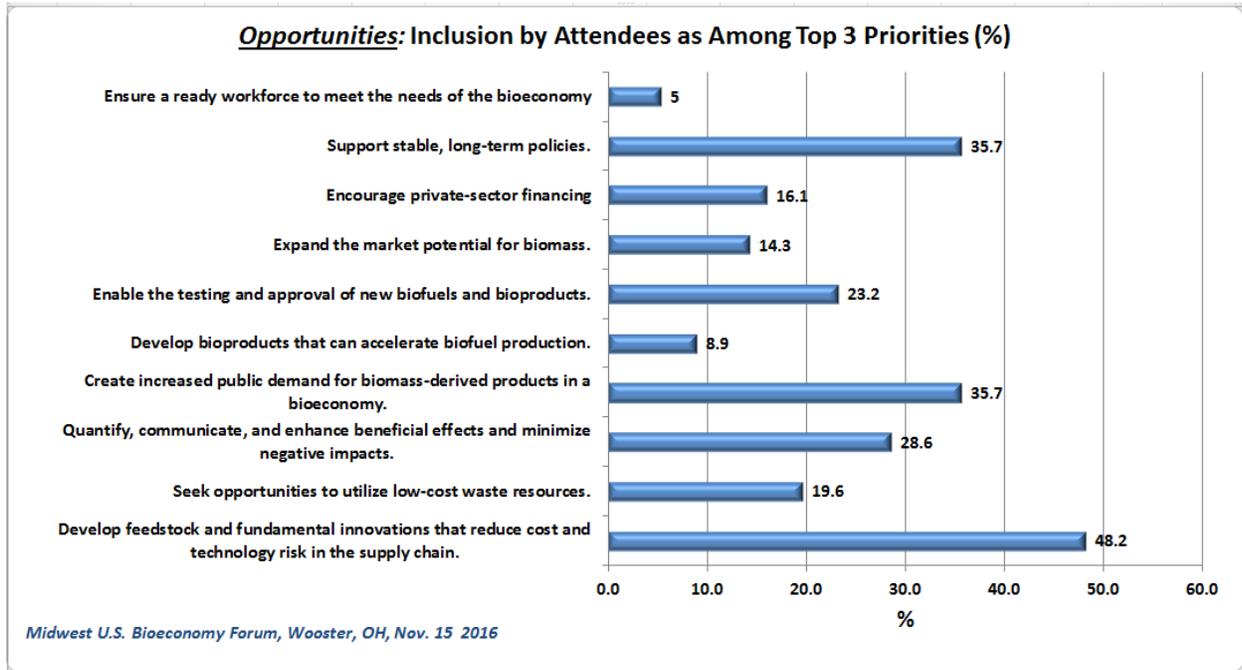


Figure 1b (below) reflects their priorities on “Opportunities.”



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-attributed 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 Conservation 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 in-state / 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”

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.

Not for Distribution

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