Biobased Products: A Focus on Bioplastics

Connecting the Dots

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Biobased Products: A Focus on Bioplastics – August 17, 2011

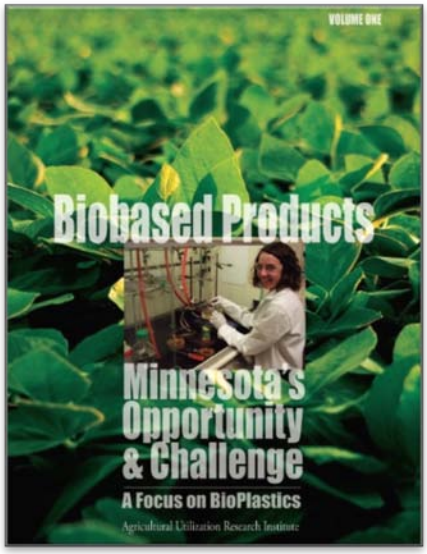
Connecting the dots to capitalize on the growing biobased products industry

Conference Agenda

10:00 am **Welcome -** Jim Palmer, Minnesota Soybean Growers

Minnesota Soybean Research and Promotion Council co-funded the Biobased Products: Focus on Bioplastics Report. Minnesota's soybean farmers not only feed the world, they also grow a crop that is used to make innovative "green" products that help protect the environment and reduce our dependence on foreign oil.

10:05 am **Biobased Products: A Focus on Bioplastics**
- Carol Russel & David Buchholz, Authors



Carol and David have extensive backgrounds in market research and agriculture respectively. Working together with AURI, Carol and David systematically garnered insights from some four dozen interviews with biobased materials experts, manufacturers, agriculture leaders, researchers, economic development officials, start-up companies and others to develop the insights found in this report. Additionally, the report includes a survey of Minnesota manufacturers regarding their perceptions and use of biobased materials. Carol and David will walk through key findings from the report and recommendations on moving forward.

10:45 am **Biobased Opportunities in Practice: Perspectives from Manufacturing, Technology, Research, and Finance**

- Gary Noble, CEO Bio-Plastic Solutions, LLC
- Jim Lunt, PhD, Managing Director Jim Lunt & Associates LLC
- Dean Webster, Prof. North Dakota State University Dept. of Coatings and Polymeric Materials
- Doug Cameron, Founder and Managing Director, Alberti Advisors

This panel is packed with experience and expertise. Gary, Jim, Dean and Doug will share with us their vision for a vibrant biobased industry in our region. The panel will also respond to key

points in the Biobased report and take questions from the audience. Collectively, these individuals represent some of the most important components of a biobased industry. Whether your concerns are the manufacturer's experience or the challenges of finance, we have the expert for you!

11:45 am **Lunch**

Enjoy lunch and use this time to connect with others! Bring your business cards.

12:20 pm **Keynote -** Congressman Tim Walz

U.S. Congressman Tim Walz is currently serving his third term representing Minnesota's First Congressional District. Walz is a member of US House of Representatives Committees on Agriculture, Transportation and Infrastructure, and Veterans Affairs. Walz is an advocate for Minnesota's agricultural and manufacturing industries. He will speak about the importance of innovation and emerging opportunities like biobased products in our nation's future.

1:00 pm **Moving to Action -** Dick Gross, Facilitator

This is a time for us to truly begin connecting the dots. Review the report recommendations, listen to industry leaders in the morning, digest the findings over lunch and then start working. Bring your ideas, your reactions, and your knowledge to the table!

The Biobased Products: A Focus on Bioplastics report includes several recommendations and potential action items. The afternoon session will be dedicated to connecting with others interested in moving to action. Teams will focus on: Research & Technology, Manufacturing & Industry, and Economics & Venture Development.

3:00 pm **Next Steps**

Review of the day and a brief discussion on where we go from here.

3:15 pm ***Post Event Reception***

Please join us for a relaxing treat and more networking before you hit the road.

Event Sponsors Include: Agricultural Utilization Research Institute, Southern Minnesota Initiative Foundation, Minnesota Soybean Research and Promotion Council, Minnesota Corn Research and Promotion Council.

Morning Session Notes
** These notes serve as a snapshot from the topics discussed in the morning session. A link to video from the day's event is available at www.auri.org.*

Welcome - Jim Palmer, Minnesota Soybean Growers

Minnesota Soybean Research and Promotion Council co-funded the Biobased Products: Focus on Bioplastics Report. Palmer set the tone for the day noting the importance of connecting the dots and working together to build the biobased industry.

Biobased Products: A Focus on Bioplastics
- Carol Russell & David Buchholz, Authors

Russell and Buchholz provided an overview of the Biobased Products: Focus on Bioplastics Minnesota's Opportunities and Challenges report. This presentation covered Minnesota manufacturers' perspectives on bioplastics and biomaterials, an overview of market drivers, an assessment of Minnesota's strengths in this area, and recommendations for growth. A copy of their presentation, the executive summary of the report and the complete report is available at www.auri.org.

Biobased Opportunities in Practice: Perspectives from Manufacturing, Technology, Research, and Finance
- Gary Noble, CEO Bio-Plastic Solutions, LLC
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What does the future for biobased products look like, and are there other market opportunities not addressed in the study?

There are three dynamics: conventional materials to compostable, building blocks of conventional materials displacement by biobased, and making new materials from renewable resources with unknown properties.

We are a converter. The future is going to look dramatically different from today. It will depend upon those willing to try something. The future is wide open.

There are a lot of uses of polymers beyond plastics. The future landscape is a mess in terms of chemicals that we could derive from biomass. I get excited about the brand new monomers and materials that have very interesting properties that cannot be achieved with petrochemicals.

One big area that was not addressed in detail was biobased chemicals in general, not just plastics. Just about every petrochemical in use is being developed from biobased sources by many different companies. With almost every polymer (PET, PE, nylon, etc.), there is an effort to make them biobased.

What are the parameters for obtaining venture capital funding and what is the availability of funding?

The first way to think about it is that venture capital (VC) is a very unique kind of funding that is not appropriate for every company. It is frustrating for individuals when they are not a good fit and cannot get it. Angel funding is great and can probably get a lot of the companies launched to reach the point of cash flow. VC is looking for

really big returns. Think of it as funding on steroids. You need to be sure you want their funding before you take it because you are either going to take off through the roof or crash and burn. For some companies in their early stage, VCs are looking for passionate and really credible founders that know the industry and have new ideas (not strong management teams because the VC will provide that); disruptive technology with huge buyout potential; strong intellectual property (IP). Look at Segetis, BioAmber, etc.

There are different flavors of VCs, and you have to know what kind your business needs: seed/series A are more tolerant of risk and don't need to see balance sheets; whereas seed B and C are more interested in the financials.

In trying to start an early stage VC fund, there is a trend that new funds want to look at agriculture and renewables, such as Doug Cameron's company and True North out of Chicago.

What emerging technologies or opportunities are there for technology transfer for biobased product development and manufacturing in Minnesota?

Technology developers do not always know what the end users are looking for. There is a need to marry the properties of the materials being developed to the needs of the end users. Sometimes, individuals try inappropriate materials and do not have a good experience. We need to stop the confusion of manufacturers and match the right technology to the right manufacturer. Opportunity exists in moving away from potential food-based feedstocks.

Build value on intellectual IP and don't talk about it until you have a contract. This is hard to manage. You need money to protect IP. This stance can sometimes hinder sharing, but it is important.

PLA is out there in a big way, and it is getting adapted. Lots of things are going on in the labs and they are trying to find out who can benefit (looking for licensees) such as end users. The license offices at Universities do not always know the characteristics and cannot sell the technology. These offices often wait for people to come to them.

From your perspective, what is the single most important thing we need to address in order for the biobased industry to take-off in MN?

Natureworks is here, and one of the issues is connecting the dots. Many individuals do not know what materials are available and do not know the properties and performance of the products. Most products are based on sugar feedstocks, and there is an ongoing debate of food vs fuel. Education is needed for manufacturers. There is also opportunity to move away from a food-based supply to biomass. We have to engage the large companies that can answer these needs…like Cargill, General Mills, 3M.

We need engagement by customers and the financial world. We also need networking! We need to get people to try things and need someone to take the first step. The financial industry needs to be patient.

Networking meetings like this are a great way to do this.

Connecting the dots is all about being networked, but there are a couple things about MN that are slight weaknesses: there is little manufacturing of plastic here in the state. It is good to have Gevo, but what about Natureworks and BioAmber? Where are they manufacturing? Also, having the capability to do the formulation and outsource initial studies, blending, product performance testing to someone. If Cargill knew how much work Natureworks was going to be doing, they probably would never have gone that direction. It has lost a lot of money, but now is starting to do well.

U of MN has to work with a department on development of IP. What is NDSU's approach?

Ownership goes with inventorship; some are joint between NDSU and the sponsor. If it is IP that the University owns, they are willing to enter into a variety of licensing arrangements. The University is not willing to assign patent rights.

How do we resolve the issue of the lack of plastics manufacturers?

Take advantage of ethanol, and some of those plants can be adapted similar to what GEVO is doing. It comes down to cost of feedstocks and infrastructure, the availability of those resources will make the decision. What about the timber industry and looking at cellulosic feedstocks? It might be a good idea to talk to Jim Illes and find out why BioAmber is not being built in MN.

Is there an advantage or disadvantage to licensing IP as opposed to owned IP?

Early stage VC is investing in the technology. A strong license would be okay. However, if there is no IP available for the VC, it is highly unlikely that the VC would be interested in the company. Once funded, they would ramp it up and require them to have their own in-house patent counsel. Project finance groups such as banks are also a good option.

What are you seeing in other parts of the country/world that MN could learn from?

If MN became a manufacturing center, MN cannot sustain a biobased products industry inside MN alone. We need to export. We need to look at the supply chain and figure out what makes sense and develop products that work globally. We will need to learn how to adapt to meet various industry needs.

It would be helpful if we could develop more low cost feedstocks. However, to build a powerful cluster in biobased products, other components would have to be here as well (infrastructure regulatory, legal, lifecyle analysis, etc).

Keynote - Congressman Tim Walz

Congressman Walz shared with the group his excitement about the biobased industry. He noted that the collaborative nature of Minnesota is a surprise to his colleagues in Washington DC. Efforts like today's event are an example of how organizations, businesses, and individuals are working together to make things happen. He noted that focusing on biobased products only makes sense. He is encouraged to see the development of a sector that would support the Minnesota agricultural and manufacturing industry.

Afternoon Facilitated Session Notes

Dick Gross coordinated the facilitators and scribes for the afternoon breakout sessions. Before the groups were formed, he noted the ground rules, overall objectives and goals for the afternoon breakout sessions:

Ground Rules

- Stick to the agenda
- Everyone is equal
- No relevant topic is excluded
- Respect each other's opinions and the time
- Silence on decisions is agreement
- Make sure the scribe captures what you mean
- Have fun

Overall Objectives

- Take a strategic approach
- Think in terms of creating an innovative ecosystem
  - Entire biobased system
  - Producers to consumers
  - Sustainable systems
- Continue to connect the dots
- Take a regional approach
- Think in terms of an innovative community, beyond those directly involved in biobased products

Goals of the Afternoon Agenda

- Focus on the needs of the industry
- Use thought leaders' and the report recommendations as the basis for your approach
- Get to specific action items—determine who does what by when
- Build engagement, involvement and commitment of the participants and others who need to be involved

Biobased Event Afternoon Session

Research & Technology

Date: 08-17-2011

Prepared By: Jennifer Wagner-Lahr, AURI

Team Leader: Doug Root, AURI

Participants:

Becky Aistrup, MN Science and Technology Authority/SBIR
Julie Bleyhl, Minnesota Farmers Union
Kathy Brynaert, Minnesota House of Representatives
Vince Copa, Chippewa Valley Ethanol Co.
Yanling Cheng, University of Minnesota
Tim Goodman, Aspen Research
Nalladurai Kaliyan, University of Minnesota
Paul Kresge, Kresge Consulting
Gregg Mast, BioBusiness Alliance of MN
Denise Pech, Starchtech
Michael Sparby, AURI
Bao Wang, University of Minnesota
Dean Webster, North Dakota State University
Pat (Peterson) Werre, Aveda Corp
Bruce Werre, Loon Call Products
Ginger Wange, MN High Tech Assn.
Mike Youngerberg, MN Soybean Growers Assn.

Reasons for attending:

- Interested in new ideas to pursue
- Interested in research on PLAs
- To learn
- Share information about biomaterials and biopolymers
- To learn how and if new biobased products are tested in order to determine if they are actually biodegradable
- See how to be a partner for biomaterials
- See where tech intersects with research
- Learn about mechanisms to foster innovation beyond current uses for commodities as productivity increases

- Learn about funding opportunities
- Possible application for a new product
- Synthesis of new biobased materials

General impressions of report recommendations:

Combined with next section.

Participant Efforts or Other Key Initiatives in this area:

- Bioindustrial Partnership of MN (BBAM/LSA) is focused on connecting throughout the supply chain and filling in the gaps along the chain.

- MN Green Chemistry Forum is a collaboration to raise awareness (not advocacy) of green chemistry in formulation activities.

- MN Biorefinery Campus is looking at the biodiesel industry and how it can make higher value products. The challenge has been with financial resources. There has not been a belief that there would be continual progress in renewable energy. This group is looking for new innovations.

- Coatings have always used biobased products – linseed oil, cellulose esters. It is a challenge to meet the current mandatory performance standards.

- Upper Midwest Renewables Materials summit/renewable materials summit is another key initiative.

- Robust technology transfer – The legislature has done some work in the area of technology transfer in an effort to move research out of the universities into industry much more quickly. We also need to assist with the transfer of IP and focus on how to keep the IP in the state.

- There are some conversations between higher education and biomaterials; however, questions remain regarding: How is the research happening? Is industry speaking with higher ed?
    - An industrial advisory board works with NDSU, but a breakdown occurs as far as what can be funded. There is a disconnect between what industry wants and what universities can get financed. Consortium research funding may be a possibility, as are centers for excellence programs.

    - Biobased products research and education do not just reside in one home. There are many necessary parts within institutions and across the state/region that create the whole biobased picture.

- Produce students, not IP?

    - This may that be a divide that we bridge. Can MHTA play a role in this area?

- But we want a certain type of technology also, not always just students. Companies can carve out IP space even with licensing rights. It is a win-win to talk about carving up IP space, not a barrier.

- Coming from the private sector and working with a small tech firm, I know that small companies have issues with paying for rights to IP. P & G could pay for it, but what about smaller companies.

- One component that could have been expanded upon more in the report was end of life issues. What about closing the loop? What happens at the end of life for the products? How do we build the infrastructure for disposal? Education is necessary at recycling collection facilities. We need to bring governmental entities into the mix for partnership opportunities.

- There are technologies looking for homes. Someone has a material that needs an application. And the other way around. We do not have a good clearinghouse for this matchmaking and connecting those with ideas to those who have a use/need/means to get it into the marketplace. What is the public responsibility for helping publicly funded research move from institutions to industry? How can we facilitate these connections? How can we accelerate these connections? Is it through meetings, or are theire social networking vehicles for doing so? Other ideas?

- The discussion was dealing with technology transfer and connecting those with ideas to those who have a use/need/means to get it into the marketplace. How can we facilitate these connections, how can we accelerate these connections? Is it through meetings or are their social networking vehicles for doing so? Other ideas?

Missing or New Action Items:

- What would be the purpose of another meeting?
- To bring additional folks to the table (GPI, NRRI) and to have report-backs from the small groups.
- To help develop novel biobased ingredients, including personal care ingredients, local biobased materials for food, personal care industry.
- To learn more about what and how to scale-up. Examples of things to discuss: How to get more bolt-on capabilities, biomass extraction, what is ready to scale up, and what process?

When to expect progress?

Action Item	Point Person(s)	Participants	Next Steps	Other Notes
Biobased Product Approval/definition/end of product life analysis -start conversation with potential regulatory agencies	Tim Goodman Kathy Brynaert	Denise Pech Pat Peterson Werre Gregg Mast Brendan Jordan	Tim and Kathy will do some checking with what exists state and federally. Will share info with group	BPI, NCF? Standards/testing; murky at best… degradable vs biodegradable.
Connection between STEM higher ed and	Ginger Waage	Dean Elde	MHTA is currently going through a	Room for improvement; MN

Industry Needs; robust TT			strategic planning process and will discuss throwing it into the mix. Connect with office of tech transfer	Office of Tech Transfer - BioMall
Clearinghouse for connecting people with shared interests	AURI			AURI: Use Linked In. *This is also an Action Item for the Manufacturing and Industry Group.*
Consumer Awareness and Government Support	This is not a research objective.			
Biobased Pilot Lab	Aspen Research, U of MN, NDSU and AURI		Organizations will meet and discuss capabilities	Larger scale of biobased materials
Biorefinery campus				

Follow-up or Future Plans:

See Above Table.

Biobased Event Afternoon Session

Business & Venture Development

Date: August 17, 2011

Prepared By: Randy Hilliard

Team Leaders: Kari Howe, Minnesota Employment and Economic Development

Pam Bishop, Southern Minnesota Initiative Foundation

Participants:

James Gibson, MN Ag. Interpretive Center
Randy Loula, CHS, Inc. Oilseed Processing
Man Ting Auyeung, Noah Genetics International
Patrick Kenney, Green Harvest Technologies
Tom Byrne, Byrne & Company Ltd.
Art Brandli, AURI Board
Jenny Stratton, IRETI
Gary Noble, Bio Plastic Solutions, LLC
Dave Buchholz, Consultant
Bruce Stockman, AURI
Randy Hilliard, AURI

Reason for Attending:

- Interest in new soy-non-eatable markets
- Interest in end use economics
- To learn more
- Concerns about downturn in economy, looking for opportunities
- Interest in creating an early stage venture capital firm
- Need to better understand economic impediments that limit the growth of this market
- Need to find better ways to get to end-use consumer
- Want to help tell the story of “today in Agriculture”
- Interest in seeing HWY 14 near Waseca become a bio-business corridor
- Interested in the economics of renewable energy and bio-products
- Interested in exploring the opportunities for bio-products from switch grass and other feedstock from Minnesota

General impressions of report recommendations:

- Some members of the group indicated that the Biobased report was consistent with other reports, and market research that noted consumers will not buy just because a product is bio-based. We need to focus research on bio-based products that can compete on a value basis.

- Marketing-wise, we need to show that products have more value than just being green.

- The group found agreement with the report that there is a need to nurture an investment market to support the biobased industry. It is difficult to find funding for fledgling industry such as bio-based products. Specifically, we need to develop an approach that helps early stage companies. Angel Investment Networks are good resources, but we need to indentify additional resources. It is important that whatever stage of development, the company needs to find the appropriate funding source. We need to communicate that not all funding is appropriate for all business development stages. There should be an effort to educate entrepreneurs/businesses about which pairings are appropriate.

- Minnesota's abundance of raw materials and feedstocks will give the state's biobased industry a competitive advantage from a resource perspective.

- There is a need to educate investors and entrepreneurs on bio-based products, bio-materials, chemicals, etc,.

- People, organizations, and businesses should try not to duplicate each other's efforts. Concentration and synergy is needed as the state figures out how to develop this industry cluster.

- Develop pilot laboratory capability for manufacturing and material development (green chemistry, materials science). Investment community is not interested in funding research and development for pilot-level development; therefore, it is imperative that this research and development function can be supported by other means. Is there an opportunity to set up a third party pilot research facility for research and development? Such a pilot research center would need to get products to a prototype stage of development.

- What can we learn from medical IP clusters, and why that industry was/is successful in Minnesota?

Participant Efforts or Other Key Initiatives in this area:

- The Department of Employment and Economic Development is working on addressing the gaps in financing assistance on a state level.

- MN Angel Investment Network and DEED's Angel Tax Credit are great resources that are addressing some of the finance environment issues.

- The MN Cup and Clean Tech Open are other initiatives that are supporting emerging biobased products businesses.

- Large corporations are researching and developing new materials. It is difficult for new players to get into this field.

- NDSU and Aspen Research may both have equipment and research expertise to help with product development. Since Aspen is no longer affiliated with Anderson Windows they may have more flexibility to work with a variety of industry members to support biobased product development needs.

- The University of Minnesota has a new consortium program called IPrime that could be useful to the biobased industry. This is an industrial partnership that focuses on materials engineering and research. The consortium creates opportunities for professionals in industry to collaborate with students and researchers at the University.

- The medical device industry's experience with developing a cluster and dealing with intellectual property is an asset for MN.

Missing or New Action Items:

- We need to tell our story through the state and national press.

- We need to nurture a financial environment that will support the further development of the biobased industry in Minnesota. We need to be able to answer the following questions: Why would a business want to locate a bio-based business in Minnesota? Do we need more or different incentives?

- We need to improve technology transfer at the U of M and other Universities in Minnesota. Limited spin-off companies and technology coming from the universities has hurt our state's creativity and ability to innovate.

- How do we keep the dialogue and engagement for the biobased industry going? Bio-Fuels Digest hits all of the top issues and is a good resource with a small staff. We could potentially develop a Bio-Materials Digest in Minnesota (run by AURI or other organization).

- There is a need to track and share industry standards and lessons learned.

- Who else needs to see the report?

- Consumer education is needed in order to build stronger market demand for biobased products. Education on the supply/value chains may help consumers understand the sustainability benefits of biobased products.

Action Item	Point Person(s)	Participants	Next Steps	Other Notes
Nurture Investment Environment by Focusing on Education	*Needs to be identified*	*Needs to be identified*	Need to further define which education efforts will take precedence. Potential Tools Discussed Include: 1. Hold a	Before an investment environment can be nurtured, there needs to be an effort to educate consumers,

			Summit/Roundtable 2. Develop Bio-Products Digest/Newsletter 3. Create List of Hurdles for the Industry and How to Overcome 4. Develop Portal for Resource Information 5. Finance Demo Projects	financiers, entrepreneurs and manufacturers. Marketing to consumers needs to be more than just green. Need to better tell the story of biobased products.
Research Industry Standards and Lessons Learned	*Needs to be identified*	*Needs to be identified*	*Needs to be identified*	
Develop a Pilot Lab to Provide Bankability	*Needs to be identified*	(NDSU, Aspen, Mankato State possible partners)	Gap Analysis of Current R&D Facilities and Services	Investors need to know manufacturing needs and manufacturers need to know customers needs. "Profit Center" pilot plant. Work with the Research team to coordinate.
Finance Demonstration Project	*Needs to be identified*	*Needs to be identified*	Gap Analysis of Financing Program Available for Demo Projects	Research Israel process

Follow-up or Future Plans:

* Team Leaders and AURI staff will follow-up with participants to identify individuals interested in leading and/or participating in the above action items. Randy Hilliard from AURI will be contacting participants to schedule a conference call to determine the next steps.

BioBased Event Afternoon Session

Manufacturing & Industry

Date: August 17, 2011

Prepared By: Dennis Timmerman

Team Leader: Roger Hurd, Enterprise MN

Participants:

William Riesbeck, ExTech Plastics, Inc
Christian Nelsen, ECS
Dave Kleinhulzen, Hardwood Creek Nursery
Dennis Kvam, MCG Bio Composites LLC
Lori Creighton, Rolco Inc
Rick Burnton, Aspen Research
Taryl Enderson, Minnesota Soybean Processors
Sam McCord, MCG BioComposites LLC
Matt Niles, Starchtech
Jim Lunt, Jim Lunt & Associates
Annette Bair, Southwest Regional Development Center
Kate Paris, AURI
Kevin Hennessy, AURI

Reasons for attending:

- Interested in innovation
- Want to hear about the current state of the industry
- Networking opportunity
- Interest in understanding next steps for the industry
- Share an understanding that change will occur in incremental steps
- Want to get the word out about the industry' successes and major hits

General impressions of the report recommendations:

The initial discussion surfaced several needs of manufacturers and the overall biobased plastics industry. Identified needs include:

- To educate manufacturers and OEMs about biobased materials and their appropriate uses.

- To create and manage a large online database of manufacturers, materials and manufacturing processes and product qualities and specifications.
- To provide onsite assistance to encourage adoption and up-scaling of manufacturing capacity.
- To encourage supply chain partnerships.
- To create opportunities to connect with other manufacturers and industry.
- To standardize biobased products and industry specifications. For example, at what percentage of biobased products does a material become eligible to make claims of being a bioplastic?
- To develop standards of compostable products.
- To better understand the costumer. Manufactures need to ask customers what the plastic needs to do. Are costumers primarily interested in performance standards, comparable cost or do they want to use a specific plastic resin? Most companies want the same performance from biomaterials as they get from petroleum based plastics.

Participant efforts or other needed initiatives to advance the industry:

- Educate manufacturers about biobased materials and appropriate uses.

- Create and manage large online database. This recommendation came from the report. The group noted that there were several databases that are already in existence. There may be opportunity to make them more useful, but they do exist. The group noted that it is important not to recreate the wheel.

- Provide onsite assistance to encourage adoption and upscaling the use of biobased products.

- Encourage supply chain partnerships. Often times, manufacturers go to the material supplier for information about the material. It is important to note that manufacturers are very involved with technology and are less focused on the end-consumer. The end consumer is more of a concern for OEM.

- Remember that price is the driver for product choices. This is a key issue for any initiative.

- We need to work together to advance the use biobased products—value of connections.

- We need to build the market in baby steps. It starts with the creation of a culture for the biobased products industry.

New Action Items:

Action Item	Point Person(s)	Participants	Next Steps	Other Notes
Review of current industry standards for biobased products – What organizations are doing what?	Denny Timmerman & Kate Paris	Bill, Dave, Sam, Jim	Contacting SPI, APC, BioPreferred, SPE	Group will share via email
Create List-serve for group to communicate	Kate Paris			This will also be shared with the Research &

what is found in the first action item and additionally share information about linked-in groups				Technology group.
General discussion about a need for more manufacturing education and consumer education	The question was asked if Natureworks has an interest in leading efforts to create an awareness of the opportunities posed by widespread use of bioplastics among consumers.		Jim checking to see if or how this would work.	

Appendix

Definitions

Biobased: Products that are made from biological renewable raw materials such as plants and trees. The term excludes food, traditional paper and wood products, but also biomass as an energy source. Biobased products are often considered a substitute for fossil-based products, and are felt to leave a smaller ecological footprint (i.e., generate less waste, use less energy and water).

PLA: Stands for polylactide – a versatile polymer that is made from lactic acid. Lactic acid is made from dextrose by fermentation. Dextrose is made from cornstarch, which is derived from carbon dioxide and water.

Biodegradable: Describes products that can be decomposed – but not necessarily 100 percent degraded – in a microbial environment after disposal.

Compostable: Products that are 100 percent biodegradable.

Recyclable: Products that are not biodegradable or compostable, but still have useful physical or chemical properties after serving their original purpose and can, therefore, be reused or remanufactured.

Sustainable: Encompasses issues of environment, health, social and economic justice, as well as material resource sustainability throughout the entire life cycle of bioplastics from feedstock production to management of the bioplastic product after its intended use.

Biobased Content: The amount of biobased carbon in the material or product as fraction or percent weight of the total organic carbon in the material or product.

Bioplastics: Plastics in which 100 percent of the carbon is derived from renewable agricultural and forestry resources such as corn starch, soybean protein, and cellulose. They are not a single class of polymers but rather a family of products that can vary significantly from one another.

Organic: Material(s) containing carbon based compound(s) in which the carbon is attached to other carbon atom(s), hydrogen, oxygen, or other elements in a chain, ring or three-dimensional structure.

Biomaterial: Any material made from annually renewable plant matter (as opposed to non-renewable prehistoric plant material, fossil fuels), including agricultural crops and residues, and trees. Sustainable biomaterials are those that are sourced from sustainably grown and harvested cropland or forests; manufactured without hazardous inputs and impacts; healthy and safe for the environment during use; and designed to be reutilized at the end of their intended use such as via recycling or composting.

Biobased Event Afternoon Session Outline

Afternoon Goals:

- Keep focused on the needs of industry.
- Discuss report and thought leader recommendations for team's topic area.
- Get to specific actionable items and have a follow-up plan.
- Build engagement and involvement – we are not looking to create a list of to-dos for someone else, we are looking to start working together to accomplish or address action items identified in the report, by industry, or by those participating in the August 17th event.

Agenda:

Conversation 1 (1:25-1:45 pm)

- Introduce yourself
- Indicate what you do with regard to bioproducts, and
- Give an indication as to why you joined this team (what in the report or what did you hear this morning that moved you to join this group)

Conversation 2 (1:45 -2:15 pm)

- Impressions of report recommendations
    - Have you or your organization been working on any of these recommendations, anticipate doing so, or have seen others doing so?
    - Are there other key initiatives within the region that address the issues this team is focusing on?
    - What is missing? Are there other action items that are needed?

Conversation 3 (2:15-2:45 pm)

- Of the action items listed, are there any that you or your organization is interested in working on or leading the effort to achieve?
    - Additionally, what resources could you or your organization be able to contribute (meeting space, contacts, marketing, expertise, etc.)
- Are there any action items we need to further breakdown into more manageable chunks? If so, which ones and what does that look like?

Conversation 4 (2:45-3:00 pm)

- What are the next steps?
- Who does what by when?
- Whether and when a group like this or portion of this group should get together again.
- Set a potential host/site.

Biobased Products "Connecting the Dots" Teams

Overall Objectives of the Biobased Event (These are priorities for the thought leaders that are overarching; other priorities are addressed by specific teams)

1. **Encourage a strategic approach.**
2. **Create an innovation ecosystem that includes the entire biobased materials system from production to consumers and focuses on sustainability.**
3. **Continue additional efforts to "connect the dots"**
4. **Evolve this group and others into an innovation community.**
5. **Take a more regional approach.**

Team	Action Items From Report and Thought Leaders' Meeting	Team Leaders	AURI Contacts
Economics & Venture Development	Nurture an investment environment more favorable to stimulating innovation and market development, including the provision of an infrastructure/clearinghouse mechanism. • Pilot lab to provide extra "bankability" for companies searching for financing • Support financing of demonstration projects • Support the development of closed system collection, recycling and composting of biobased plastics in large companies, athletic facilities, etc. (e.g. U of MN, Cargill, Target Field) • Others from SMIF and GEA/DEED? • Others from participants?	Pam Bishop, SMIF Kari Howe, Green Enterprise Authority/DEED	Bruce Stockman Randy Hilliard
Research and Technology	Leverage Minnesota's strong bio-fuels foundation in the next-generation green chemicals marketplace. Investigate ethanol plants as potential centerpieces for a bio-refinery campus, including incubators for start-up green chemical companies, biomaterials research and development, and manufacturing using biobased materials. (potentially structured as co-ops) • Search for specific technologies to support biorefinery campus development • New technology forums & webinars • Efforts to build capacity via short courses and exposure to the experts • Biobased Pilot Laboratory – what resources are available? • Develop more robust technology transfer, guide or website that incorporates services available to increase biobased opportunities. • Use of biomaterials as plastics strengtheners. • Others from AURI and U of MN? • Others from participants?	Doug, AURI U of M	Jen Wagner Lahr Michael Sparby

Manufacturing & Industry	Educate manufacturers about biobased materials and their appropriate use (this is pre-consumer education). • Creation and management of a large online database of biobased material properties that manufacturers can access for specs and educational purposes. • Onsite assistance to manufacturers to further encourage adoption and up-scaling of biobased production and innovations • Encourage supply chain partnerships • Others from EM? • Others from participants?	Roger Hurd, Enterprise MN	Denny Timmerman Kevin Hennessy
Other Important Areas Noted in the Report			
Public Awareness	Proactively shape awareness, attitudes and understanding of the biobased materials industry, including what it is today, address the food versus biobased industry, and sustainability issues. • Aggressively raise the media profile of what is happening in MN related to biobased plastics, green chemicals and biobased products. • Comprehensive and coordinated legislative actions in such areas as agricultural, environmental and industrial policy. • Create a clear and more positive regulatory environment for sustainability. • Conduct a pilot educational study of a community-based composting infrastructure whereby residents would bring compostable materials – including bioplastics – to a single neighborhood composting location.		
Talent Development	Support MN educational institutions in shaping the skills and mindsets necessary for sustainable development. • Explore industry needs and current avenues for education in biobased product development and manufacturing? • What are aligned industries whose employees would need similar experience? • Conduct a talent needs assessment with the plastic manufactures to assess what skills and areas of focus are needed to move biobased materials forward in Minnesota		

* Action Items listed are a starting point for the August 17th conference. Action items listed were generated by the Biobased Products: A Focus on Bioplastics Minnesota's Opportunity and Challenge report.

** At this time, participant interest is focused in the areas of Economics & Venture Development, Research & Technology, and Manufacturing & Industry. Given this concentration of interest, the August 17th event will focus its efforts on addressing the top three teams. When interest in participating in Public Awareness or Talent Development efforts increases, development of these teams will be addressed at that time.

First Name:	Last Name:	Company:	
John	Ahlberg	Agristrand Biocomposites, LLC	
Becky	Aistrup	MN Science & Technology Authority	
Man Ting	Auyeung	Noah Genetics International	
Robin	Bergeron	Twin Cities & Western Railroad	
Pam	Bishop	Southern Minnesota Initiative Foundation	
Julie	Bleyhl	Minnesota Farmers Union	
Art	Brandli	AURI	
Kathy	Brynaert	State of Minnesota	
David	Buchholz	Russel Herder	
Rick	Burnton	Aspen Research	
Thomas	Byrne	Byrne & Company Limited	
Doug	Cameron	Alberti Advisors	
Yanling	Cheng	University of Minnesota	
Michael	Chorney		
John	Considine	Region 9 Development Commission	
Vincent	Copa	Chippewa Valley Ethanol Company	
Lori	Creighton	Rolco Inc.	
Dr. Joe	Eckert		
Taryl	Enderson	Minnesota Soybean Processors	
John	Frey	IRETI	
Cheryl	Glaeser	Southwest Initiative Foundation	
John	Goihl	AURI Board of Directors	
Tim	Goodman	Aspen Research Corporation	
Dick	Gross		
Ashley	Harguth	AURI	
Kevin	Hennessy	AURI	
Randy	Hilliard	AURI	
Kari	Howe	DEED Green Enterprise Authority	
Lisa	Hughes	DEED	
Roger	Hurd	Enterprise Minnesota	
Dennis	Hvam	MCG BioComposites LLC	
Nalladurai	Kaliyan	University of Minnesota	
Patrick	Kenney	Green Harvest Technologies LLC	
Dave	Kleinhuizen	Hardwood Creek Nursery Inc.	
Jill	Klinger	Greater Mankato Growth	
Paul	Kresge	Kresge Consulting	

David	Krueger	AgStar Finanical Services	
Dan	Lemke	AURI	
Randy	Loula	CHS INC	
Jim	Lunt	Jim Lunt & Associates	
Dave	Mack	CHS Inc.	
Gregg	Mast	The BioBusiness Alliance of Minnesota	
Sam	McCord	MCG BioComposites LLC	
Dave	Mulert	Agristrand Biocomposites	
Christian	Nelsen	ECS	
Matt	Niles	StarchTech	
Gary	Noble	Bio-Plastic Solutions	
Jim	Palmer	Minnesota Soybean Growers Association	
Kate	Paris	AURI	
Denise	Pech	Starch Tech	
Mike	Riebel	Biovation, LLC	
Milton	Riebel	Biovation	
Ryan	Riebel	Green Bubble Technologies LLC	
William	Riesbeck	Ex-Tech Plastics, Inc.	
Doug	Root	AURI	
Carol	Russell	Russell Herder	
Mark	Sanderson	IRETI MN	
Teresa	Spaeth	AURI	
Michael	Sparby	AURI	
Bruce	Stockman	AURI	
Jenny	Stratton	International Renewable Energy Technology Institut	
Denny	Timmerman	AURI	
Jen	Wagner-Lahr	AURI	
Tim	Walz	Congressman	
Bao	Wang	BBE, University of Minnesota.	
Ginger	Wange	MHTA	
Dean	Webster	North Dakota State University	
Bruce	Werre	Loon Call Products	
Pat	Werre	Loon Call Products	
Mike	Youngerberg	Minnesota Soybean Growers Association	
Sam	Zieger	Minnesota Soybean Growers Association	