Plants to Products
June 20, 2013

Today’s Speaker
- Mike Belliveau, Founder, Plants to Products
- Environmental science degree from MIT
- Expert in green chemistry
- Creative problem solver
- Alliance builder with industry, government, and academia
- Biobased products advocate
- Social entrepreneur

Agenda
- Consider the Growing Biobased Economy
- Review the Federal Government’s Role
- Introduce “Plants to Products” and Three Focus Areas:
  1. Cellulosic Sugars from More Sustainable Feedstocks
  2. Developing Value-Added Biobased Products
  3. A Biobased Economic Development Strategy
- Continue the Conversation

Growing the Biobased Economy

Rapid Growth in Demand

Global market for bioplastics to reach 3.7 million metric tons by 2016
- BCC Research

What’s Driving Demand
- High, Volatile Price of Oil
- Sustainability Goals of Corporate Brand Owners
- Consumer Demand for More Sustainable Products
The Plants to Products Path

- **Feedstocks**: Biomass will replace the fossil carbon in oil and gas with renewable carbon
- **Sugars**: The chemical building blocks of nature
- **Biobased Materials**: Conversion to biobased plastics, chemicals and fuels creates jobs
- **Consumer Products**: Meet growing consumer demand for safer, more sustainable products
- **End-of-Life**: Bioplastics should be composted, if biodegradable, or recycled, if not

The Biobased Economy Wins

The Challenges Ahead

- **Supply – Gen. 2 feedstock**: collection, processing
- **Cost – low cost sugars**: separation & purification, scale
- **Performance – strength**: heat resistance, processability

Collaborate to Bridge the Gaps

**Between**
- Companies, who are good at making, selling, and improving products... AND
- Researchers, who are good at basic science, applied research, and invention

Plants to Products helps to fill this gap

The Federal Role

Federal Players

- USDA
- Department of Defense
- National Institute of Standards and Technology
- National Science Foundation
Trends & News

Goals and Roles

- Focus collaborative expertise on removing barriers to the biobased economy at the research, commercialization and supply chain levels
- Close the gap between technology developers and users/manufacturers along the supply chain
- Deliver biobased innovation to industrial markets
- Galvanize recruits for the biobased economy from feedstock producers to consumer product conglomerates

Our Track Record

- Plants to Products is a program of a ten-year old nonprofit, Environmental Health Strategy Center
- Organized a business-led regional trade association to promote biobased products
- Pursuing biobased product development as a sustainable rural economic development strategy
- Raised more than $3 million for cluster development, and biobased technology research
- Promoting forest products and agricultural waste as more sustainable feedstocks

Invitation to Join the Dialogue

Focus Areas

- Cellulosic Sugars
- Value Added Applications
- Economic Development

Questions?
Challenges?
Solutions?
Involvement?

Cellulosic Sugars
**Challenge**

**Current and Future Feedstocks**

- Fermentable Sugars
- Conversion
- Biomaterials

**Drivers:**
1. Local Supply
2. Improve Life Cycle Impact
3. Avoid competition with food
4. More efficient use of land
5. Additional revenues for farmers, foresters, others
6. Biofuels Industry

**Solution: Wood & Ag Wastes**

- Bio-based products use just a small amount of available biomass today, but if they expand, feedstock will become a local and global constraint.

**Our Role**

- Bring Technology Developers and Potential Users Together
- Get the Right People in the Room to Identify and Solve Problems
- Leverage Public and Private Resources for Mutual Benefit

**Success**

- Developed capacity at the Forest Bioproducts Research Institute at the University of Maine to support biopolymers research and development
- Helped promote first-to-market cellulosic sugars from woody biomass by Old Town Fuel & Fiber to potential customers among biobased technology companies

**Challenge**

**The Evolving Biobased Plastics Landscape**

- Feedstocks:
  - Agricultural: bio-based
  - Direct Fermentation
  - Bio-technological
  - Petroleum/Natural-based

- Polymers:
  - PLA
  - Nylon 11
  - Polyethylene
  - Polypropylene
  - Polylactic Acid

**Value Added Applications**
Solution: Collaboration

The Plants to Products project works to advance the development of new value-added applications for PLA and other biobased blends, such as those with nanocellulose and other biopolymers.

Our Role

- Creating a conversation between manufacturers and PLA providers to help the user understand the benefits of the bio-based alternative
- Inform the further technology development by giving voice to manufacturer needs

Success

Economic Development

Challenge

Solution: Supply Chain Development

- Feedstock Producers
- Technology Researchers
- Biobased Material Developers
- Consumer Goods Manufacturers

- Depressed Rural Economies
- Unemployment
- Commodity Price Volatility
Plants to Products Role

- Refine rural economic development approach
- Demonstrate and validate model
- Disseminate results to other regional candidates

What we’re asking for… partners, resources, ideas!

Success

Contact Us

Mike Belliveau, Plants to Products
mbelliveau@mainebioplastics.org
Phone: (207) 561-9846
ITECS: admin@itecs-innovative.com