2019 Bioenergy Sustainability Conference

AIChE Institute for Sustainability -- October 21-22, Nashville, TN

Summary of final panel and conclusions

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October 23, 2019

Final Panel Objectives

- What do future users of improved technology see as *priority research needs*?
- How do researchers interact with existing *bioenergy industries & sustainability (compliance) programs*?
- How do current research initiatives compare to perceived needs?
- Strategic opportunities & most effective path forward?

BRC Common Research Goals include research to IMPROVE:

- **Yields** (biomass/ha)
- **Resilience** (droughts, temp…)
  - **Water-use** efficiency (WUE)
  - **Nitrogen-use** efficiency (NUE)
  - **Resistance to pests, pathogens**
- **Microbial roles & associations**
- **Genetics** – for all of the above plus deconstruction (crops and microbes)
- **Feedstock uniformity** (composition over time, environments)
- Plus corresponding modeling, TEA, LCAs… integrated systems analysis

BRC common focus areas (constraints addressed) – examples include:

- **Early-stage research**
- **"Marginal lands"**
- **New bio-based co-products & processing technologies**
- **Selected crops** (genetic improvement, experiments) poplar
  - sorghum
  - Switchgrass
  - Miscanthus
  - energy cane
  - prairie grasses…
- Selected **field trial sites**, labs
- **More modeling**

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[1] Conference Co-chair/Panel moderator. Oak Ridge National Laboratory, Environmental Science Division, Oak Ridge, TN 37831. Research supported by y the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE), Bioenergy Technologies Office, award number EE0007088. The authors' opinions expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof. Oak Ridge National Laboratory is managed by the UT-Battelle, LLC, for DOE under contract DE-AC05-00OR22725.

Final panel Summary

Priority research areas identified for increasing bioenergy sustainability

1. Document the value propositions of improving land management associated with existing industries (productive landscapes should be high priority)
2. Improve understanding & communication of the role bio-based industries already play and the many opportunities to increase benefits to society
3. Develop, apply & share new tools and technologies to monitor what is actually happening on our landscapes. Need more emphasis on collecting the right data (above and below ground stocks and flows of carbon and nutrients, for example) rather than arguing over what happened in past or about land cover classes (grassland vs cropland)
4. LCA & TEA to quantify value of bioenergy as a complement to intermittent renewables
5. Invest in more social science research
6. LCA & TEA to illustrate importance of MARKETS as incentives to keep land under productive management (forests and agriculture)
7. More investment in "concise, clear science results via media to reach general public"
8. Utilization of co-products/residues from current US bio-based industries
9. How to establish effective market incentives to reduce emissions, pollution, waste
10. Invest in sampling, analyzing and understanding dynamics in soils under different management and environmental conditions, including microbial community interactions with management, identifying options to increase carbon storage and productivity.

Informal notes from the presentations and discussion in the final panel session (listed by the presenters)

A. Don Scott – NBB (biodiesel) – see slides presentation:

1. Use existing byproducts, lots of potential bio-based feedstocks seeking markets.
2. Put higher value (credits) for reducing wastes, pollution, etc.
3. Optimize benefits – for all parties

B. Jenn Jenkins -ENVIVA (sustainable woody biomass, pellets) – no slides:

1. Time is money.
2. Pellets exported to nations that value renewable alternatives to coal
3. Forest industry generates unmarketable byproducts (unloved biomass – about 30% of total harvest)
4. In the sourcing areas, about 10% of total wood withdrawals go to pellets. About 3-5% in SE overall.
5. Softwood pellets have higher calorific value
6. ENVIVA ensures/certifies sustainability standards are met (see web site) – per customer needs – but it's more like a threshold and paper requirement (acceptable product or not), rather than incentives
7. Transparent sustainable tracking system, accessible to public

8. Cannot use new, or GMO crops for pellets. Cannot use non-native species. Due to EU requirements.
9. Enviva gets a lot of push-back when trying to make the business case: GHG reductions
10. Goal: make a difference in the world.

Research ideas: Its about markets and perceptions

- Importance of human impacts on land; NEED FOR MANAGEMENT of our lands
- People don't understand bioenergy, especially solid fuels, don't understand the potential benefits
- Society needs to understand issues of dispatchable power (complements to wind and solar)
- Batteries have limits (costs and materials)
- All biomass is not the same – we are not causing deforestation; we are promoting healthy forests
- Document how markets increase forest area and biomass
- LCA – keep it up! Consider: is it better to leave forest alone or manage/harvest/use them?
- How to improve quality of pellets while reducing costs and reducing fire hazards

C. Stakeholders perspectives on priorities for sustainability research (Keith Kline--see slide presentation)

D. Group Discussion

- After 30% renewable penetration, issues with intermittent power and costs arise
- Need good research & communications of research that informs public opinion.
- Need to have simple, clear results for public and journalists
- Why no wood pellets use in US? Answers: Policy failure. No carbon price. No target under Paris Agreement. Insufficient incentives for utilities… And natural gas is so cheap. While some incentives exist, more subsidies go to fossil energies. Need to lower renewable fuel costs and put price on all carbon emissions. EU offers incentives to displace coal.
- "Dispatchable base load" – how much flexibility is there in ability to ramp up and down power production using wood pellets as fuel? Issues need to be more clearly documented.
- Estonia is 3rd largest producer of pellets after US and Canada. Concerns increasing there about environmental effects. Poland has coal. German market is interesting.
- Renewable diesel vs biodiesel. Note that 3 NBB members produce renewable diesel, and market is growing, including aviation. Algae often assumes large scale proposals for renewable diesel.
- Role of biodiesel to help meet new IOM rule for low-sulfur substitute (diluent). Walt Disney is using more biodiesel to improve "sustainability" issues on cruise ships - CSR
- Ship engines might not be able to tolerate some new fuels? Some ships use seawater as ballast in fuel tanks. Machinery/pumps in place to move fuel/water in/out. It costs money to document that there are not adverse issues. Requires more investment.

- Sustainability Task Group (2008) at NBB: Adopted Principles - these are already reflected in RFS. There is not an option since 2008 for imports from Indonesia. NBB sponsored dumping case that was successful against Argentina.
- Still debate and contentious arguments persist about current status, is there expansion or not, and what would be a reference scenario. Can we start baseline "now" rather than trying to go back to 2007 with counter-factuals? We could use new tools, better satellite data, and focus on what matters most going forward, rather than fighting over the past. Need to decide what to measure. There is no justification to keep adding LUC factors.
- Keep it simple. Do not try to create giant manuals, detailed procedures, complicated calculations. "You can't model policy, you have to do what is practical."
- Propose more social science research.
- Consider approach to social science in the program for the Aachen conference on this website: https://www.fuelcenter.rwth-aachen.de/cms/Fuelcenter/Austausch/Aktuelle-Veranstaltungen/~soxh/7th-International-Conference/lidx/1/ Their focus is broader than biofuels extending to alternative fuels which includes, for example, those achieved from Carbon capture and utilization. See the social sciences on the agenda.