Biomass Research and Development Board

Status of Operations Committee and Working Group Activities, National Biofuels Action Plan Update

Technical Advisory Committee Meeting
Washington, DC
November 8, 2011
Sarah Lynch, Liaison

Recent Biomass R&D Board Chronology

- March 2010 – Reconvenes with USDA, DOE, EPA, NSF, OSTP, DOI (mandated members), and invited DOD and DOT
- June 2010 – Establishes Operations Committee
- September 2010 – Establishes Feedstocks Supply, Logistics and Distribution, and Conversion Working Groups with Subgroups, and associated work plans through at least mid-2011
  - Genetic/Genomic Improvement, Best Management Practices
  - Feedstock Logistics, Fuels Distribution Infrastructure
- June 2011 – Establishes Algae Working Group
- Also in June 2011 – Requests that Operations Committee and Working Group Co-Chairs determine how to update the *National Biofuels Action Plan* (NBAP) by early 2012, with a focus on biofuels for this phase
- September 2011 – Agrees on scope and outline of the proposed NBAP update; Operations Committee and Working Group co-chairs/members begin drafting content

Summary of Activities

- **Working Groups** – Conducting a range of interagency information sharing and assessment activities, including the following highlights:
  - Creating and/or updating interagency R&D project and outcomes inventories to determine further needs and gaps across the supply chain
  - Developing case study on research requirements for switchgrass genomic sequencing and genetic resources, and other case studies
  - Holding workshops on Infrastructure, Pre-Conversion Processing/Logistics, Conversion (upcoming)
  - Completing Working Paper on Feedstock Best Management Practices

- **Operations Committee**
  - Interfacing with Board members and Senior Advisors
  - Managing overall work plan, preparing for quarterly meetings, coordinating topical and annual briefs, ensuring prior working group reports' issuance
  - Providing direction, developing outline, and drafting content for NBAP update

National Biofuels Action Plan Update

Goals of the Update

- Reflect overall strategic direction and landscape since 2008 NBAP was issued
- Provide integrated updates on status and progress in RD&D across the supply chain, and delineate additional needs and challenges
- Clearly map out federal responsibilities and activities
- Provide forum for consensus-building and collaboration among broad range of federal stakeholders

Scope and Inputs

- Focusing scope of *this* effort primarily on advanced biofuels, given the short time frame for completion
- Leveraging results of ongoing Working Groups' activities as well as individual agencies' analyses
- Discuss update with key expert/advisory stakeholders and members of the public – through this Technical Advisory Committee meeting

National Biofuels Action Plan Update

Input Sought on "Current Status of Biofuels" Sections

- **Feedstocks** – Including genomics/genetic improvement, best management practices, and logistics/pre-conversion
  - Current and projected feedstock availability
  - Challenges, R&D advances/progress
  - Actions needed and technical recommendations
- **Conversion**
  - Current status of technologies
  - Challenges, R&D advances/progress
  - Actions needed and technical recommendations
- **Infrastructure**
  - Current status
  - Challenges, R&D advances/progress
  - Actions needed and recommendations
- **Fuel Applications/End Use**
  - Current status of fuel deployment, vehicle/engine compatibility and readiness, flex-fuel vehicle/AFV deployment, refueling infrastructure, retail-end storage, non-highway fuel applications
  - Challenges, actions needed, and technical recommendations

Break Out Groups

- Feedstocks Supply
- Feedstocks Logistics/Practices
- Conversion
- Distribution/Infrastructure
- Fuel Applications/End Use

Framing Questions

- Given the 2008 action plan and the outline of the forthcoming update, what are the handful of issues most important to address for completeness?
- What top 3-4 TAC recommendations are most important for the NBAP authors to consider as we delineate RDD&D accomplishments, gaps, and challenges? Why?
- What top 3-4 RDD&D activities/areas should federal agencies, in particular, support and why?
- In general, what are the greatest 2-3 challenges/barriers to significantly increasing advanced biofuels production over the next few years?

For Reference: Working Group Plans

Feedstock Sources/Supply Working Group

Assess R&D needs to promote next generation biofuels and bioproducts with minimum impacts on natural resources. Consider issues and R&D needs at the scale of feedstock development and production or supply.

Action Areas

Genetic Improvement

- Intensify and expand plant breeding for feedstock crops
- Accelerate development of genomic tools and resources to enhance feedstock improvement and deployment

Feedstock Best Management Practices

- Improving productivity and cost- and resource-use efficiency for purpose-grown and integrated biofuel feedstock production systems
- Development and testing of sustainable feedstock production and management systems for agriculture and forestry
- Evaluate opportunities for optimizing benefits associated with feedstock production
- Develop indicators on BMPs for evaluating long-term effectiveness
- Improve information accessibility of site-specific efficacy of BMPs for land managers, land owners and policymakers

Resources and Inputs

Genetic Improvement

- Board IWG report – Federal Research and Development Planning for Sustainable and Adequate US Biofuel Feedstock Production
- Agency strategic plans and multi-year program plans
- National Academy reports
  - *Achievements of the National Plant Genome Initiative and New Horizons in Plant Biology* (2008)
  - *A New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution* (2009)

Feedstock Best Management Practices

- Long-term research on sustainable productivity for crop and forest management
- State forestry best management practice guidelines and syntheses
- EPA's triennial Biofuels Report to Congress (June 2011)
- Ongoing DOE, USDA , EPA, DOI and partners' research on feedstock production systems, practices and effects on ecosystem services and productivity

Feedstock Sources/Supply Working Group – Genetic Improvement

Review and assess gaps in R&D needs on performance traits that make biomass production more cost- and environmentally effective.

Issue/Focus Area	Deliverable/Date	Participants
Genetic Improvement	Support preparation of updated NBAP section on Feedstocks, 12/11 Case study on further developing switchgrass lines for bioenergy, 7/11 Workshop discussion with Bioenergy Research Center researchers on next steps, 4/11 Update on work across agencies to address research gaps, 3/11 meeting Workshop held in January 2011 to discuss coordination of switchgrass genome sequencing and broaden participation with research community Plan to address research needs and gaps, 12/10 meeting	**Sharlene Weatherwax, DOE/SC** **Kay Simmons, USDA/ARS** Cathy Ronning, DOE/SC Ed Kaleikau, USDA/NIFA Randy Johnson, USDA/FS John Englert, USDA/NRCS Jack Okamuro, USDA/ARS Lidia Watrud, EPA Chad Haynes, DOE/ARPA-E Neil Hoffman, USDA/APHIS Monthly Working Group meetings

Feedstock Sources/Supply Working Group - Best Management Practices

Evaluate best practices and define federal, state and research and business actions needed to reduce inputs and stress for crop and forest energy feedstock production, management, and supply systems while maintaining or enhancing ecosystem services; develop and help deploy sustainable feedstock production and management systems for agriculture and forest systems.

Issue/Focus Area	Deliverable/Date	Participants
Best Management Practices	Support preparation of updated NBAP section on Feedstocks, 12/11 Inventory of BP assessments and field trials/demonstrations, begin 12/11 White Paper on regionally relevant best practice indicators, delivered to Board at 9/26/11 meeting Work with stakeholders and federal and state agencies to educate and implement new best practices, begin 9/11 Outline of White Paper, *Biomass Feedstock Supply: Regional Best Management Practice Indicators*, 12/10	**Marilyn Buford, USDA/FS** **Andy Dupont, EPA/ORD** **Norm Widman, USDA/NRCS** Jeff Steiner, USDA/ARS Bruce Wight, USDA/NRCS John Ferrell, DOE/OBP McKinley-Ben Miller, DOI/BLM Henry Bastian, DOI/OWFC Periodic Meetings/Conference Calls

Feedstock Logistics and Fuels Distribution Infrastructure Working Group

Define means to overcoming technical challenges on an integrated, scaled, and deployable system.

Action Areas, Feedstock Logistics

- Increase bulk/energy density
- Moisture management/stability
- Improve feedstock uniformity/quality
- Systems approach needed at demonstration/industrial scale: harvest and collection; storage; preprocessing; and transport

Action Areas, Distribution Infrastructure

- Identify and address key issues in production, transportation, storage and distribution
- Better understand federal roles in transportation and storage and distribution to meet RFS2 goals

Resources and Inputs

- *Billion-Ton Update* (August 2011)
- Board *Feedstock Logistics* Report (January 2011)
- Uniform – Format Feedstock Supply System Design, INL (April 2009)
- *Roadmap for Agricultural Biomass Feedstock Supply in the United States* – DOE (November 2003)
- Interagency Workshop – Joint Collaboration with DOT, USDA, and EPA (June 2011)
- Report to Congress*, Dedicated Ethanol Pipeline Feasibility Study*, U.S. Department of Energy (July 2010)
- *Study of Rural Transportation Issues*, U.S. Department of Agriculture (April 2010)
- Task Force Report on Biofuels Infrastructure, National Commission on Energy Policy, 2008
- Alternative Fuels & Advanced Vehicles Data Center

Feedstock Logistics

Issue/Focus Area	Deliverable/Date	Participants
Feedstock Logistics Feedstock logistics systems approach to lower costs, improve delivered properties and extend potential collection range. Explore linkages between the supply and conversion scale of supply and conversion technologies.	Support preparation of updated NBAP section on Feedstocks, 12/11 Prepare Special Topic presentation at the 12/11 Board meeting Completed inventory of federal bioenergy logistics RD&D programs; report development in progress for 2012 deliverable Held Biomass Preconversion, Formulation, and Densification workshop and demonstration of the INL Process Demonstration Unit (PDU) with research and industry partners, 8/11 Participated in DOE Feedstock Platform and Program Peer Reviews Conducted panel discussion at Agricultural Equipment Technology Conference (AETC) with logistics industrial partners, Atlanta, GA, 1/11	**John Ferrell, DOE** **Richard Hegg, USDA/NIFA** Bob Fireovid, USDA/ARS Richard Hess, DOE/INL Robert Rummer, USDA/FS Shawn Johnson, DOT Steve Thomas, DOE/GO Sam Tagore, DOE/EERE Bryce Stokes, DOE Cont. Chris Wright, INL Matthew Digman, USDA/ARS Ron Hatfield, USDA/ARS Biweekly to monthly Working Group meetings

Fuels Distribution Infrastructure

Issue/Focus Area	Deliverable/Date	Participants
Feedstock/Fuels Distribution Infrastructure Evaluate storage and transportation options and trade-offs for both upstream feedstock and downstream fuel distribution, as well as end use requirements.	Report on Interagency Multi-Modal Analysis to be submitted for Board review/approval by January 2012 Lead preparation of updated NBAP sections on Infrastructure and on Fuel Applications/End Use, 12/11 Summary of proceedings and research recommendations from Interagency Biofuels Infrastructure Workshop, 12/11 Board presentation Report on Interagency Multi-Modal Analysis to be submitted for Board review/approval by December 2011 Interagency workshop , June 2011	**Shawn Johnson, DOT/RITA** Stephen Costa, DOT/RITA Marina Denicoff, USDA/AMS Shab Fardanesh, DOE/OBP Alicia Lindauer-Thompson, DOE/OBP McKinley-Ben Miller, DOI Bob Czincila, DOT/RITA M.J. Fiocco, DOT/RITA Andrea Barberry, EPA Jeff Herzog, EPA Pete Riley, USDA/ FSA Donna Perla, USDA/OCS Jeffrey Bryan, DOT/RITA Joanna Smith, DOT/RITA Rachel Winkeller, DOT/RITA Cassandra Allwell, DOT/RITA Dennis Smith, DOT/VTP Paul Argyropoulos, EPA

Conversion Working Group

Assist the Board in coordinating research and development policies and programs across the Federal government by providing information about the status of technologies and state of the art technologies to convert biomass into biofuels, biopower and non-food biobased products.

Action Areas

- **R&D Coordination**
  - Assess R&D needs to improve and/or optimize the technical, economic, social, human health and environmental performance of biomass conversion technologies and stimulate movement to commercialization.
  - Provide a valuable forum for Federal agencies to stay apprised of activities and identify meaningful collaborations across the Federal government in support of biorefining, co-products and non-food biobased products research.

Resources and Inputs

- Prior Conversion Working Group report to R&D Board
- Prior and new inventories of funded RD&D projects
- Prior Roadmaps and Action Plans
- Federal and select stakeholder inputs
- Industrial contacts and input

Conversion Working Group

Assess R&D needs to improve and/or optimize the technical, economic, social, health and environmental performance of biomass conversion technologies.

Tactics	Deliverable/Date	Participants
Coordinate with relevant working groups, especially those related to feedstock infrastructure. Leverage existing interactions and conduct additional work across agency R&D portfolios to continually assess commercial practicality, state of technology, et cetera. Evaluate existing conversion technologies, identify potential new areas for development. Assess any environmental and/or genetic and health impacts.	Recommend methods for better leveraging of existing, or creating additional interagency funding mechanisms to initiate flagship project(s) that fill key gaps, moving toward joint FOA on area(s) of mutual high priority, 3/12 Lead preparation of Conversion Technology section for updated NBAP, 1/12 Conduct conversion experts workshop and publish proceedings as Roadmap, 12/11 Prepare an appropriate vehicle and deliver to the Board the first semi-annual report on commercial readiness of conversion technologies, 12/11 Recommend how to harmonize Federal agency efforts to monitor progress, results, impacts, 12/11 Update RD&D project listing through FY2011, 12/11 Evaluate project status with defined interagency metrics and share with Operations Committee, 12/11	**George Antos, NSF/ENG** **Valerie Sarisky-Reed, DOE/OBP** Bob Fireovid, USDA/ARS Carmela Bailey, USDA/NIFA Donna Perla, USDA/OCS Rich Greene, DOE/SC Rebecca Dodder, EPA World Nieh, USDA/FS TBD: USDA/RD, DOD, ARPA-E Monthly Working Group meetings

Algae Working Group

Advise, communicate, and coordinate federal RDD&D activities relating to the production and use of algae and their products/co-products in a sustainable manner within an appropriate regulatory framework.

Action Areas

- *Sustainability*: Resources and siting, agricultural and environmental impacts, human and animal health impacts, and scalability
- *Feedstock Production*: Characterization, biological improvements, cultivation, and invasives
- *Feedstock Logistics*: Infrastructure for scale-up, harvesting, extraction, separation, conditioning, and transport
- *Conversion*: Thermochemical and biochemical methods for biomass hydrolysis and transformations into fuels and co-products
- *Distribution Infrastructure:* Fuel and feed infrastructure, standards/specification for fuels and co-products, and market
- *Analyses:* Techno-economics, life-cycle assessments, and analytical methods
- *Systems Integration*: Test beds and demonstration projects that bridge technology scaling and integration challenges
- *Other topics as considered timely and relevant*

Resources and Inputs

- Inventory of Funded RD&D Projects
- Federal and Select Stakeholder Inputs
- Industrial Contacts and Input
- National Algal Biofuels Technology Roadmap (May 2010)
- A Look Back at the U.S. Department of Energy's Aquatic Species Program: Biodiesel from Algae (July 1998)

Algae Working Group

Tactics	Deliverable/Date	Participants	
Facilitate in-depth discussions of several topics as they relate to research and development challenges, federal investments, and associated statutes and regulations governing technology demonstration through commercialization.	Topical white papers resulting from meeting discussions, findings of knowledge gaps, and descriptions of other collaborative activities, Q3/FY 2012 Summarize scope of agency activities in agency mission areas and objectives related to algae, Q1/FY 2012 Support preparation of updated NBAP section on Feedstocks, 12/11 Develop "Most Wanted" Algae list -- genera of algae that are of particular interest as research models, production strains, and those that have obtained prior approval for commercial use by regulatory agencies, Q4/FY 2011	**Joyce Yang, DOE/OBP** **Mark Segal, EPA/OPPT** *George Antos, NSF/CBET* *Linda Benjamin, FDA/CVM* *Nick Clesceri, NSF/CBET* *Anthony Crooks, USDA/RD* *Roxanne Dempsey, DOE/GFO* *Quay Dortch, NOAA/COP* *TJ Evens, USDA/ARS* *Andy DuPont, EPA/ORD* *Richard Greene, DOE/BES* *Bruce Hamilton, NSF/CBET* *Neil Hoffman, USDA/APHIS* *John Houghton, DOE/BER* *Gary Jensen, USDA/NIFA* *Kristin Kerwin, DOE/GFO*	*Walter Kozumbo, DOD/AFOSR* *David Lee, DOE /ARPA-E* *Rob Mantz, DOD/DARPA* *Max Mayeaux, USDA/NIFA* *Gwen McClung, EPA/OPPT* *Gail Mclean, DOE/BES* *Joanne Morello, DOE/OBP* *Roberta Parry, EPA/OW* *Ron Pate, DOE/OBP* *Mark Poth, USDA/NIFA* *Muquarrab Qureshi, USDA/NIFA* *Greg Rorrer, NSF/CBET* *Peter Schmeissner, OSTP* *Steve Smith, USDA/NIFA* *Bob Stack, DOE/BES* Monthly working group meetings.