

Biomass Research and Development Board

National Biofuels Action Plan Update

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2008 National Biofuels Action Plan



- The October 2008 National Biofuels Action Plan (NBAP) outlined a plan for a coordinated federal interagency effort to advance domestic biofuel production and deployment
 - Identified challenges to meeting the increased volumes required by the Renewable Fuel Standard (RFS2)¹
 - Proposed specific actions needed to address challenges
 - Focused on cellulosic ethanol
- The NBAP identified 5 areas for interagency collaboration:
 1. *Feedstock Production*
 - cultivation of biomass resources
 2. *Feedstock Logistics*
 - harvesting/collecting, storing, delivery to plants
 3. *Conversion*
 - transformation of the processed feedstock to liquid fuels
 4. *Distribution*
 - transfer of the fuel from the biorefinery to the point of retail sale
 5. *End Use*
 - the purchase of biofuels by the consumer for use in vehicles

¹ Enacted by Energy Independence and Security Act (EISA) 2007

2008 NBAP Action Items



- Select Action Items included in the 2008 NBAP:
 - ***Sustainability working group***: Define science-based national criteria indicators to assess the sustainability of biofuels production
 - ***Feedstock Production working group***: Conduct feedstock availability and cost study using EISA production targets.
 - ***Feedstock Logistics working group***: Facilitate collaboration on logistics systems that can supply cellulosic feedstocks to demonstration facilities.
 - ***Conversion Science and Technology working group***: Develop a 10-year federal science and technology research plan for developing cost-effective means of biomass conversion and production of cellulosic biofuels.
 - ***Distribution Infrastructure working group***: Study feasibility of transporting ethanol in pipelines and assess the availability of geographic information system (GIS) capabilities across agencies.
 - ***Environment, Health and Safety working group***: Inventory federal activities and areas of jurisdiction with respect to public health, safety, and environmental protection.
 - ***Blending***: Complete testing of gasoline/ethanol blends greater than 10 percent (E10)

Goals of the 2012 NBAP Update

- Reflect changes in overall strategic direction and landscape since the NBAP 2008 was issued
 - Document technology advancements and accomplishments
 - Provide updates on status and progress in RD&D across the supply chain, and delineate additional needs and challenges
 - Highlight accomplishments of federal investments in increasing the production and use of biofuels since the release of the NBAP
- Identify actions needed to accelerate the biofuels industry in order to advance the biofuels industry and meet the RFS2

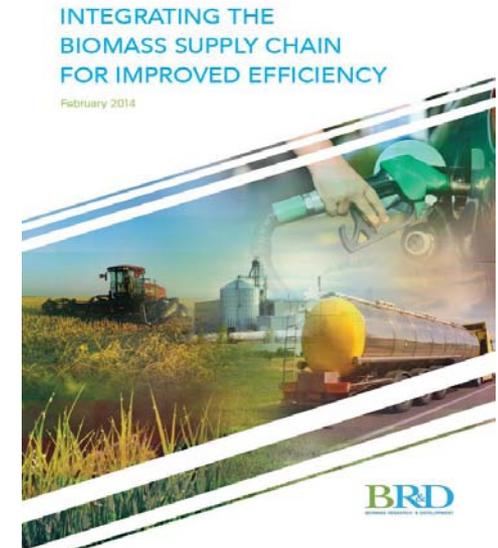
Major Changes included in the 2012 NBAP Update



- Expansion of focus to include advanced hydrocarbon fuels in addition to ethanol
- Inclusion of algae as a potential biomass feedstock
- New feedstock logistics approach
- Assessment of impacts of advanced hydrocarbon fuel on Conversion approach and Distribution Infrastructure needs
- Coordinated federal role in the area of Transport & Distribution Infrastructure
- Issues of Sustainability and Environment, Health, & Safety integrated into all sections rather than included as separate sections

Feedstock Development Recommendations

- Develop a [white paper](#) on the integration of feedstock into the entire supply/use chain. A key focus should be characterizing how existing high efficiency material handling infrastructures can be leveraged through advanced preprocessing/pretreatment and densification technologies and the potential impact on downstream conversion processes.
- Develop sustainable biomass feedstock production and management systems and practices for integration into conventional agriculture, forest, and rangeland management systems and for energy crops.
- Develop an information resource to support evaluations of the utility, safety and sustainability of specific algae proposed for commercialization.



Conversion Technology Recommendations

- Complete the updated roadmap/barriers documents for conversion technologies, identify any technology recommendations, and use the roadmap as one input to defining multi-agency R&D. Additional agency specific roadmaps will be produced as required.
- Develop and employ an evaluation process tool which gauges techno-economic performance, energy effectiveness and efficiency, environmental impact and sustainability in a consistent manner for all conversion technologies. Use the tool to re-focus research and development efforts in conversion science.
- Develop inter-agency mechanisms to focus research and development efforts on gap identification and filling to speed delivery of multiple selected conversion processes to the pilot and commercialization scales.

Transportation and End-Use Recommendations

- Develop consensus on a national roadmap that will provide direction for developing modeling tools and capabilities for national policy and regional and local transport & infrastructure development.
- Define future transport & infrastructure needs based on regional supply and demand, feedstock & fuel production geography.
- Develop strategies to address constraints facing existing fuel distribution infrastructure, including local and regional petroleum distribution and blending facilities.
- Coordinate with industry to accelerate development and implementation of new standards adoption and testing to ensure compatibility of all equipment in the fuel path. Research, evaluate and implement findings for transport, storage and dispensing infrastructure to ensure material compatibility.
- Identify opportunities to reduce time to introduce a new fuel to commerce once it is available on commercial scale.

Cross-Cutting Recommendations

- Conduct analysis of lifecycle air and GHG emissions, water quality and quantity, nutrients, and pesticide use across the entire biofuels supply chain and identify steps to protect water quality and reduce emissions and negative impacts.
- Establish an interagency analysis working group that will focus on coordinating federal efforts to identify and address analysis needs as they relate to biofuels RD&D.
- ~~• Designate an interagency workgroup to review biofuels laws and regulations to identify barriers, duplicative requirements, information & regulatory gaps, and address jurisdictional authority across the entire biofuels supply chain.~~

Feedstock Development Accomplishments

- Completed a comprehensive assessment of national biomass resources
- Made substantial R&D investment in biomass feedstock production and logistics
- Supported production of biomass feedstock through financial assistance to owners and operators of agricultural and non-industrial private forest land
- Developed new basic and applied R&D programs focusing on algal systems

Conversion Technology Accomplishments

- Established multiple consortia research centers for basic and applied sciences
- Demonstration of a small scale commercial deployment of cellulosic ethanol facilities
- Technology improvements led to
 - Improvement in pretreatment processes
 - Two enzyme packages commercialized
 - Catalyst and process improvements to methane and benzene conversion in biomass-to-syngas conversion
- Update of a federal database tool and roadmap to evaluate conversion barriers and existing gaps in R&D

Transportation and End-Use Accomplishments

- Infrastructure handled significant increases biofuels volumes since 2008 and E10 has been deployed in all 50 states
- Intermediate Blends Test program was completed and EPA approved a partial waiver for the use of E15 waiver in light duty vehicles 2001 and newer
- Pipeline industry has advanced materials compatibility and fuel quality R&D, and has deployed short-distance ethanol pipelines
- Successful commercial & military trials of biomass-based jet fuel
- Coordinated, proactive federal engagement of biofuel transport & distribution infrastructure issues

Feedstock Development

Key Message

- U.S. has abundant and renewable agricultural and forestry resources that could be available for bioenergy
- With research, land resources can be effectively used for feedstock production and still meet demand for production of other goods and services
- Significant advances in feedstock supply and logistics technologies have been made, but more advances needed to meet potential
 - Improvements in production, harvest, and transport systems for bioenergy feedstocks are needed
 - Significant efforts from industry, academia and government sector in feedstock development needed for feedstock supply systems

Conversion Technology

Key Message

- The diversity and complexity of biomass feedstocks require multiple conversion technologies – no single process
- Multiple, cost-effective conversion processes are required
 - Leverage cellulosic ethanol process developments
 - Provide processes for advanced biofuels from non-food biomass sources
- Process intensification strategies are essential
- Economics for gasoline-only replacement are not compelling
 - Whole barrel replacement
 - Bio-products for added value realization

Transportation & End-Use

Key Message

- Reliable and efficient multimodal transport and distribution infrastructure is essential across the supply chain
- Transport geography & rising biofuel production volumes pose major challenges
- Economics, policy and market uncertainty also significantly affect infrastructure development
- Increased end-use and biofuel demand pull are critical

Developing the 2012 NBAP Update



- Agencies participating in the 2012 NBAP Update:

- USDA (ARS, RD, REE, FS, OSEC, OCE, FSA)
- DOE (EERE, Science)
- EPA
- DOT (RITA, Volpe)
- NSF
- OSTP
- DOD
- DOI (BLM)

- Section Authors:

- Background
 - DOE, USDA, EPA
- Biomass Feedstocks
 - DOE, USDA
- Conversion Technologies
 - DOE, NSF, USDA
- Transport & Distribution Infrastructure and End Use
 - DOT, DOE, EPA, USDA
- BRD Recommendations
 - All
- Appendix
 - All

Structure of the 2012 NBAP Update

- The 2012 NBAP Update is intended to inform and coordinate Federal Agencies' research and development of biofuels
- Major Sections:
 - Biomass Feedstocks
 - Conversion Technologies
 - Transport & Distribution Infrastructure and End Use
 - Recommendations
 - BRD Working Groups will help to implement these
 - APPENDIX – Index of Selected Agency R&D Accomplishments and Activities