American Society of Agronomy | Crop Science Society of America | Soil Science Society of America
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December 8, 2011-by e-mail to bioeconomy@ostp.gov

RE: Comments to OSTP on National Bioeconomy Blueprint

TO: Office of Science and Technology Policy (OSTP)

In response to your Request for Information (RFI), the American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA) recognize the importance of developing sustainable bioenergy and bioproducts sectors. Our more than 18,000 member scientists, graduate and undergraduate students from academia, federal government, industry and consulting sectors are involved in public and private partnerships, aimed at developing the next generation of cellulosic biomass, which span the continuum from basic (discovery) research through laboratory and field phases whereby our more than 14,000 crop consultants transfer the newly developed technologies, seeds, and vegetative materials to our nation's farmers. Combined, these efforts will aid America to reach the Renewable Fuel Standard challenge of increasing the volume of renewable fuel required to be blended into transportation fuel to 36 billion gallons by 2022.

With that goal in mind, Agronomists conduct research and develop technical approaches for increasing the efficiency of biofuel feedstock production systems. Crop Scientists contribute to advances in ethanol-based and cellulosic feedstocks and develop sustainable cropping systems. Soil Scientists perform research identifying methods to develop sustainable production systems that sequester greenhouse gases and identify soil-borne microorganisms optimal for use in conversion processes for biofuel production. Together, ASA, CSSA, and SSSA and its member scientists, educators, extension agents and consultants present a holistic perspective on best management approaches for biomass feedstock production and generate data and models needed for life-cycle analysis.

1) Identify one or more grand challenges for the bioeconomy in agriculture, and suggest concrete steps that would need to be taken by the Federal government, companies, non-profit organizations, foundations, and other stakeholders to achieve this goal.

Grand Challenge 1: Workforce and STEM Education Training
There are two main grand challenges to the success of the bioenergy sector. The first pressing challenge is the training and deployment of a qualified workforce for the bioenergy and bio-products industries. These industries require personnel with a diverse and transformative set of skills ranging from crop physiology and plant breeding to economics. Professionals and scientists are needed, who can offer consulting services, develop new feedstocks appropriate to conversion technologies, and continually refine the approaches for producing bioenergy crops and cropping systems.

Research, education, and extension programs within the United States Department of Agriculture Research Education and Economics Mission Area are currently in place that help to develop

educational and training materials appropriate to the needs of the bioenergy sector. ASA, CSSA, and SSSA urge the federal government to acknowledge and build upon the essential research conducted in such programs to build better Science, Technology, Engineering, and Mathematics education approaches that support the training of the next generation of experts who will be essential for developing and shaping the bioenergy sector.

We suggest that more university-industry partnerships at the bachelor, master, and Ph. D. levels occur via scholarships, fellowships, or internships. These could be federal or joint federal-privately funded programs. More emphasis on recruitment needs to occur by interacting with guidance counselors and high-school level educators so that students enter the pipeline early, at the high-school level. Community colleges will play a significant role in training students for the industry because not all jobs will require technical training at or above the bachelor level. Further development of the science-business interface is needed to educate faculty, students, and post-docs about commercialization strategies, including the marketing of innovative ideas for the purpose of acquiring capital, venture or otherwise. Federal support for better use of university-based, industry-supported innovation incubators would help to advance the development of the science-business interface.

Grand Challenge 2: Market Feasibility

The second challenging issue is the need to shape the development of the marketplace so that the consumers' demand is obvious to farmers. This means making the economic benefits of feedstock production clear and easy to understand. The cellulosic sector, for example, is significantly hampered by limited supplies of biofuel feedstock resulting from low product demand. Market barriers include: feedstock availability, competitive uses, and cost; large capital investment required for conversion facilities; and an inadequate supply-chain infrastructure. The ASA, CSSA, and SSSA recommend that private-public partnerships be identified and supported which take concrete steps to overcome these challenges.

Possible solutions to this challenge include the development of local supply-chain processing centers that increase the efficiency of local production, harvesting, preprocessing, and storage of uniform biomass commodity feedstocks. These centers would be modeled after the existing grain handling systems, which include local grain elevators, and would remove cellulosic biomass pretreatment from the bio refinery, keeping it at a local level in the biomass processing center. By fully integrating supply chain logistics on a local level, a series of several smaller, geographically dispersed local processing centers would preprocess, pretreat, and densify available biomass locally before transport to a central biorefinery.

This approach maximizes the biofuel value chain at the local level while improving rural development. It also offers substantial benefits to cellulosic biofuel production including:

- alignment of biomass production with the scale of cellulosic biorefineries;
- efficient use of existing locally owned conventional equipment to store and handle densified biomass;
- reduced transportation costs;
- reduced biorefinery conversion costs; and
- development of biorefinery cooperatives that contract with local processing centers instead of individual farmers.

Our members see numerous opportunities for collaboration between public and private sectors to accelerate the development of the bioeconomy without compromising the long-term sustainability of economic, environmental, or social factors of the sector. The challenges before us are surmountable at the local level, and the economic and environmental opportunities associated with bioenergy production, especially those in rural areas, appear to far outweigh the uncertainties. We urge the Administration to support programs that are currently underway in the research portfolio which support research in biofuels production and development.

Grand Challenge 3: Challenges for Research
ASA, CSSA, and SSSA each developed grand challenges for research related to bioenergy production. The challenges are as follows:

- ***American Society of Agronomy Grand Challenge:*** Double global food, feed, fiber, and fuel production on existing farmland within the 21st century with production systems that: enable food security; use resources more efficiently; enhance soil, water, and air quality, biodiversity, and ecosystem health; and are economically viable and socially responsible. For more information about ASA's Grand Challenge, please view: https://www.agronomy.org/files/science-policy/asa-grand-challenge-2010.pdf

- ***Crop Science Society of America Biofuel Grand Challenge:*** Develop sustainable biofuel feedstock cropping systems that require minimal land area, optimize production, and improve the environment. As a result, there is a need:
    - to modify crop compositions according to processing requirements;
    - to increase yield in low-input production systems;
    - to understand plant response to changes in the environment, in tandem with changes to composition for accurate modification;
    - to understand the ecosystem services (carbon sequestration, water quality, wildlife habitat, etc.) from perennial bioenergy crop production on arable and marginal lands; and
    - to develop new production systems that thrive in low-input situations.

  For more information on the CSSA Grand Challenge related to biofuel production, please view: https://www.crops.org/files/cssa-grand-challenge-layout-7-2011-updated.pdf

- ***Soil Science Society of America Grand Challenge:*** Optimizing soil ecosystem services for greater food and energy security, water quality, and adaptation to and mitigation of climate change. For more information, please view: https://www.soils.org/files/science-policy/sssa-grand-challenge-2011.pdf

We recommend that research and extension priorities be fashioned in line with these grand challenges for research. In closing, we are pleased that the Administration is taking on this important task and appreciate the opportunity to provide comment.

Sincerely,

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*The **American Society of Agronomy** (ASA) is a scientific society helping its 8,000+ members advance the disciplines and practices of agronomy by supporting professional growth and science policy initiatives, and by providing quality, research-based publications and a variety of member services.*

*The **Crop Science Society of America** (CSSA), founded in 1955, is an international scientific society comprised of 6,000+ members with its headquarters in Madison, WI. Members advance the discipline of crop science by acquiring and disseminating information about crop breeding and genetics; crop physiology; crop ecology, management, and quality; seed physiology, production, and technology; turfgrass science; forage and grazinglands; genomics, molecular genetics, and biotechnology; and biomedical and enhanced plants.*

*The **Soil Science Society of America** (SSSA) is a progressive, international scientific society that fosters the transfer of knowledge and practices to sustain global soils. Based in Madison, WI, and founded in 1936, SSSA is the professional home for 6,000+ members dedicated to advancing the field of soil science. It provides information about soils in relation to crop production, environmental quality, ecosystem sustainability, bioremediation, waste management, recycling, and wise land use.*