SUMMARY REPORT

December 5, 2022, Bioeconomy Policy Workshop: Measurement and Language

Over the past year, there have been significant policy advances related to the US bioeconomy—the part of the economy driven by the life sciences and biotech, and enabled by engineering, computing, and information science. In addition to several reports and recommendations from outside experts and committees, action within federal government agencies has been spurred by the September 2022 Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy (EO 14081) and by the CHIPS and Science Act signed into law in August 2022. Many agencies are now looking for ways that they can most effectively organize and how their authorities can best be applied to support the burgeoning bioeconomy.

To generate ideas and support discussion related to bioeconomy policy, FAS hosted two half-day, multi-stakeholder, discussion-based workshops on December 5 (with a focus on Measurement and Language, summarized here) and December 7, 2022 (with a focus on Financial and Economic Tools, summarized separately). The December 5 workshop was held in-person in Washington, DC, with an option to attend remotely, and included ~40 people representing academia, industry, non-governmental organizations, and the U.S. government. The workshop featured keynote speakers and short “flash talks” followed by group discussions as well as two break-out sessions in which participants were divided into smaller groups to engage in exercises to generate ideas for policy solutions. The workshop was held under the Chatham House Rule to enable participants to share ideas openly without attribution.

WORKSHOP OUTCOMES

The first part of the workshop focused on progress, needs and recommendations to date for measuring the bioeconomy. Opening remarks sparked discussion about the importance of metrics and language. Measuring the bioeconomy not only helps to inform the public and others

4 87 FR 56849: https://www.federalregister.gov/executive-order/14081
about its importance, but is also critical to strategic planning for investments that the US government and others should pursue in supporting the bioeconomy. This discussion also raised questions and cautions about how to best measure the bioeconomy. In describing hopes for the future of the bioeconomy, nearly all participants included aspirational ideas such as sustainability, resilience, solutions for climate change, equity, and security, which are difficult to measure. Participants noted that we need to be careful about what we measure and track because we are likely to optimize for those metrics, which may not be well aligned with the outcomes we care about. Attention to economic measures alone can lead to unintended outcomes.

A series of flash talks provided information and context about current approaches and challenges to measuring the bioeconomy. Topics included:

- **The North American Industry Classification System (NAICS), the North American Product Classification System (NAPCS), and the federal Bioeconomy Interagency Technical Working Group (ITWG).** NAICS is a system that classifies all businesses and public sector enterprises in the U.S. based on their production processes. NAPCS is a system to track goods and services produced and transacted by the economic reporting units within each NAICS industry. NAPCS and NAICS are revised every five years, with the next revision due in 2027. The ITWG was established in September 2022 by EO 14081 to develop recommendations on bioeconomy-related revisions to NAICS and NAPCS. The committee, led by OMB and USDA, will solicit public input in 2023 on how these systems should be revised.

- **The National Institute of Standards and Technology (NIST)’s Bioeconomy Lexicon.** NIST was tasked by EO 14081 to develop a list of terms and definitions related to the bioeconomy. With input from across the federal government, this lexicon was released on December 9, 2022 (after the workshop). NIST will continue to update it and will work to develop more sector-specific terms and definitions.

- **An estimate of the scale of the bioeconomy.** By one method and definition, the U.S. bioeconomy in 2017 was estimated to be ~$400 billion, which is similar to worldwide revenues for semiconductors, and represents ~2% of the US gross domestic product. Significant sectors within the bioeconomy are crops (e.g. corn, soy, cotton), biologics (i.e. drugs composed of proteins, nucleic acids, and lipids), and industrial biotechnology (biochemicals, plus ingredients for food, drugs, and agriculture), which is the biggest sector, with revenues estimated at ~$147 billion in 2017.

After general discussion, participants were divided into smaller groups to generate ideas to address key challenges related to measuring and describing the bioeconomy. The discussion and break-out session raised several key points and ideas:

- In updating NAICS and NAPCS, we should study how other types of technologies with cross-sectoral economic contributions are tracked, such as semiconductors and communications technologies.
- The US government should develop a shared resource (e.g. a website or “dashboard”) that provides up to date economic data on the bioeconomy.

---

6 NIST Bioeconomy Lexicon: https://www.nist.gov/bioscience/nist-bioeconomy-lexicon
• The US government and/or outside groups should track and analyze opportunities or unmet needs in the bioeconomy in addition to tracking economic indicators. Such analysis would better enable sound policy development and investment toward complex goals such as sustainability, a circular economy, and local or regional development.
• Success of US government actions on the bioeconomy can be determined by how well they establish the US as a leader in this sector, not only by economic indicators, but also by the extent to which non-US companies and governments adopt US metrics, terminology, investment approaches, standards, and practices.

The second part of the workshop began with a flash talk that asked the question, “How do we make sure that progress and values are advanced via our measuring?” It included a warning that what we measure is what we will get, so we need to be careful about what our metrics capture. After a short discussion, attendees participated in a second break-out session to generate ideas on how to drive the bioeconomy to achieve societal goals. Priority Ideas and action items included:

• Develop metrics that better capture meaningful endpoints such as sustainability, equity, or security. For example, metrics that include externalities related to sustainability; workforce metrics for geographic mobility, income mobility, and diversity; and bioeconomy pipeline metrics that measure education, including community colleges.
• Improve incentives for supporting the bioeconomy by: pursuing government subsidies; using federal procurement to support bio-based products and processes; and streamlining and harmonizing processes throughout the bioeconomy (including risk assessment and regulation).
• Secure supply chains for the bioeconomy by improving incentives to keep companies in the U.S. and by working to define the critical infrastructure of the bioeconomy (key components, products, and capabilities) and develop plans for strategic reserves.

CONCLUSION

As US government agencies work to organize and support activities to support biomanufacturing and the broader bioeconomy, it will be critical to develop meaningful metrics and a common language for describing progress in these domains. This workshop highlighted many of the challenges that the US government and others will face, including a central tension between measuring simple economic indicators and capturing the broader societal benefits and promise of the bioeconomy. Several potential solutions and priority actions were identified, including ideas for US government resources that could be developed (e.g. a bioeconomy “dashboard”); what types of metrics could be tracked beyond economic production; and incentives that could be developed to support the bioeconomy.