



Council on Competitiveness Bioeconomy Initiative

Working Session 5 Prep Brief

Virtual Working Session | Thursday, October 15, 2026 | 2:00–3:00 p.m. ET

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PROJECT BACKGROUND

The Council has been building a body of work around the U.S. bioeconomy and its implications for competitiveness, innovation, and national economic security. This effort builds on discussions at the [2025 National Competitiveness Forum](#), the leadership gathering hosted by Jim Stutelberg at [Primient in Lafayette](#), the Council's April 2026 bioeconomy [working session](#), and the Nebraska Competitiveness Conversation hosted by University of Nebraska System President Jeff Gold.

Building on these discussions and the growing national focus on biotechnology and biomanufacturing, the Council is convening six virtual working sessions starting on Thursday, September 17 and concluding on Thursday, October 22, each scheduled for one hour from 2-3 PM Eastern. The virtual working sessions will identify a focused set of high-impact, strategic recommendations to strengthen U.S. competitiveness and leadership in the global bioeconomy.

THE SIX-SESSION PROCESS

The six one-hour sessions will examine three complementary dimensions of the U.S. bioeconomy, with two sessions devoted to each:

- 1. Build Fast, Scale Big.** *Investment, Commercialization, and Biomanufacturing Leadership*
- 2. Win the Market.** *Demand and Global Competitive Advantage*
- 3. Build National Capacity.** *Talent, Infrastructure, and Ecosystem Leadership*

The first session in each focus area will surface emerging trends, critical challenges and chokepoints, opportunities for U.S. leadership, and potential solutions. Following each session, the Council team will circulate a summary of the discussion, highlighting emerging recommendations and areas for further exploration, and invite participants to provide feedback. The second session will build on this input by challenging and refining the recommendations, assessing feasibility and impact, identifying gaps and unintended consequences, and prioritizing the ideas with the potential for transformational impact.

Council staff will synthesize the work across all six sessions into a concise strategic recommendations report for release at the [2026 National Competitiveness Forum](#). For additional background on the initiative, see the [Bioeconomy Initiative Project Plan](#).

SESSION 5 OVERVIEW | Prioritizing and Operationalizing Recommendations for U.S. Competitiveness in the industrial Bioeconomy

Session 5 will focus on refining and prioritizing the recommendations emerging from our bioeconomy working sessions and related inputs. The consolidated recommendations are organized into three areas:

1. Accelerate the Path from Research to Commercialization
2. Grow Demand and Build Markets
3. Build National Capacity and Enabling Conditions

As you review the recommendations, consider which actions are most consequential, where we may have missed critical issues, and whether any recommendations need to be reframed, strengthened, or repositioned.

Important: We want to move beyond broad aspirations to define what it will take to put these recommendations into action. Please come prepared with bold, specific ideas about:

- Interventions. What specific action, policy, program, or mechanism is needed?
- Resources. What level of investment or other resources is required, and who should provide them?
- Leadership. Who needs to lead and act, and how should responsibilities be coordinated?
- Outcomes. What measurable results should these interventions achieve?

Our objective is to identify the highest-priority recommendations and sharpen them into actionable proposals with clear interventions, resource requirements, responsible actors, and intended outcomes.

CANDIDATE RECOMMENDATIONS FROM WORKING SESSIONS 1-4, PLUS SURVEY FEEDBACK

The recommendations below synthesize input from Working Sessions 1–4 and participant survey feedback. They are organized under the three categories above. Each recommendation identifies the problem and proposes an integrated response, including specific mechanisms, potential actors, and intended outcomes where appropriate. These are working recommendations for discussion, prioritization, and further development, not a finalized set.

CATEGORY 1. ACCELERATE THE PATH FROM RESEARCH TO COMMERCIALIZATION

The United States has world-class scientific capabilities, but scientific leadership alone does not guarantee domestic manufacturing or commercial success. The priority is to connect discovery, engineering, customer validation, scale-up, financing, and first commercial production into a more integrated and predictable pathway.

Candidate 1. Establish commercially disciplined, customer-centered pathways from scientific discovery to industrial production.

Problem: Scientific advances and public research investments do not consistently translate into commercially competitive products and domestic manufacturing. Technologies can progress without sufficient attention to customer needs, process engineering, feedstock economics, downstream processing, manufacturing readiness, or the cost and performance of incumbent products. These gaps can lead to expensive redesigns, failed scale-up efforts, and technologies that attract research funding but never reach commercial production.

Recommendation: Establish integrated commercialization pathways that evaluate technical feasibility, customer demand, manufacturing performance, and economic competitiveness from the outset. Incorporate prospective customers, feedstock suppliers, process engineers, manufacturers, and investors into technology development and scale-up planning. Assess the full production system, from feedstock preparation and biological production through fermentation, separation, downstream processing, and finished-product requirements. Apply rigorous techno-economic analysis and common readiness assessments to determine whether technologies can achieve competitive performance, cost, quality, reliability, and functionality at commercial scale. Use clear stage gates to guide investment decisions, identify unresolved risks, and prioritize technologies with a credible path to differentiated market value.

Candidate 2. Expand shared pilot, demonstration, and scale-up infrastructure to accelerate commercialization and reduce risk.

Problem: The United States lacks sufficient accessible infrastructure to move industrial biotechnology processes from laboratory research through pilot-scale validation, demonstration, and first commercial production. Specialized facilities and equipment can be prohibitively expensive for individual companies, particularly startups and small businesses. Gaps in fermentation, feedstock preparation, pretreatment, downstream processing, measurement, and process development increase technical and financial risks, duplicate costs, and can push promising technologies and manufacturing investment overseas.

Recommendation: Expand and coordinate shared biomanufacturing infrastructure, including pilot and demonstration facilities, technology foundries, process-development centers, and specialized equipment. Build on existing capabilities across industry, universities, DOE

National Laboratories, BioMADE, and other relevant initiatives, including BioMADE's 10,000-liter capabilities. Prioritize persistent scale-up bottlenecks, particularly downstream processing and other difficult stages of production, and connect companies with machinery manufacturers, engineering firms, and adjacent industries that can contribute relevant capabilities. Design shared facilities to serve multiple companies and technologies, generate reusable technical knowledge, and provide the evidence needed to attract commercial partners and financing. Where appropriate, integrate modular, flexible, digitally enabled systems, and existing infrastructure to reduce capital requirements and accelerate deployment.

Candidate 3. Develop integrated regional biomanufacturing ecosystems connected through a national network.

Problem: Agricultural feedstocks, industrial facilities, transportation and energy infrastructure, research institutions, workforce capabilities, and specialized scale-up resources are distributed across the country but often remain disconnected. Regions may lack the partnerships and coordination needed to translate existing assets into commercially viable opportunities. Requiring every region to develop a complete biomanufacturing ecosystem risks duplicating infrastructure and spreading investment too thinly, while companies may lack access to specialized capabilities located elsewhere.

Recommendation: Develop regional biomanufacturing ecosystems around existing feedstocks, industrial strengths, research capabilities, infrastructure, workforce institutions, and credible market opportunities. Connect agricultural producers, universities, DOE National Laboratories, startups, established manufacturers, investors, and manufacturing-extension networks to support technology validation, production, and market development. Network regional capabilities nationally so companies can access specialized facilities and expertise based on comparative advantage rather than geographic proximity alone. Build investment on existing regional models, including the NSF RuralSTAMINA Biomanufacturing Engine in Iowa and Nebraska. Evaluate regional initiatives against their ability to attract investment, strengthen domestic supply chains, support commercially viable production, and generate higher-value economic opportunities from U.S. agricultural resources.

Candidate 4. Develop coordinated public-private financing pathways for first commercial facilities and domestic manufacturing expansion.

Problem: Industrial biotechnology companies face a persistent financing gap as technologies advance from research and pilot-scale validation to first commercial production. Capital requirements can rise from tens of millions to hundreds of millions of dollars, exceeding the practical limits of venture financing while remaining too risky for conventional project finance. Public grants can reduce early technical risk but may not bridge the gap to investment in operating assets. High construction costs, engineering complexity, and uncertain customer demand can make U.S. facilities less attractive than overseas alternatives, threatening the

retention of domestic intellectual property, process expertise, supplier networks, and future manufacturing capacity.

Recommendation: Develop coordinated public-private financing pathways that connect research and development support, demonstration funding, loan guarantees, private investment, and commercial deployment. Adapt Small Business Administration financing tools, including appropriate loan guarantees and other mechanisms, to address the capital requirements and risks of eligible first-of-a-kind industrial biotechnology facilities. Assess opportunities for a dedicated biotechnology commercialization track that helps small businesses transition from validated technologies to asset ownership and commercial production. Compare U.S. financing conditions and facility costs with those in Europe and China, and identify where targeted public support can address demonstrated competitive disadvantages. Distinguish shared infrastructure and early-stage risks that may warrant public participation from company-specific commercial operations that should attract private capital. Evaluate financing structures that address capital expenditures and, where justified, early operating costs, while requiring credible customer demand, private-sector participation, and a path to commercially sustainable operations.

Candidate 5. Reduce biomanufacturing capital costs and construction timelines through standardized engineering and shared expertise.

Problem: First-of-a-kind biomanufacturing facilities face substantial construction costs, engineering complexity, and project-delivery risks. Conventional approaches to engineering, procurement, and construction can produce avoidable cost overruns and delays. Smaller biotechnology companies often lack the purchasing power, specialized expertise, and project-management capabilities available to established industrial sectors. As a result, even technically promising projects may struggle to achieve competitive production economics or secure financing.

Recommendation: Develop and disseminate improved approaches to engineering, procurement, construction, and facility operations for industrial biotechnology. Encourage modular and standardized facility designs where appropriate, early integration of process engineering and facility design, disciplined cost management, and project-delivery practices adapted from advanced manufacturing and other capital-intensive industries. Establish mechanisms for companies to share trusted engineering partners, equipment knowledge, cost-reduction practices, and lessons from demonstration and first-of-a-kind projects. Expand access to technical advisory services through the SBA and relevant federal and industry programs.

Candidate 6. Strengthen industry-research partnerships and streamline technology transfer to move discoveries into commercial applications.

Problem: Universities, DOE National Laboratories, and other research institutions possess substantial scientific, computational, and engineering capabilities, but their discoveries do not always translate efficiently into industrial applications. Companies can struggle to identify relevant expertise, access specialized facilities, negotiate intellectual-property arrangements, and establish partnerships. Conversely, research may proceed without sufficient engagement from manufacturers and prospective customers, limiting its relevance to actual industrial needs.

Recommendation: Establish sustained partnerships among industry, universities, DOE National Laboratories, startups, and other research institutions around defined industrial challenges and commercial priorities. Engage manufacturers, process engineers, feedstock suppliers, and prospective customers earlier in research planning. Establish shared projects that connect discovery to process development, pilot-scale validation, demonstration, and commercial deployment. Develop standardized partnership agreements, licensing templates, and collaboration processes to reduce administrative and contractual delays. Improve access to national laboratory facilities, computational capabilities, and technical expertise through clear engagement pathways, while preserving intellectual-property protections, appropriate research incentives, and the public missions of research institutions. Align partnerships with measurable commercialization milestones and practical industrial needs.

Candidate 7. Establish shared data, measurement, and AI capabilities that accelerate scale-up and improve manufacturing productivity.

Problem: Biotechnology and biomanufacturing data are fragmented across companies, universities, national laboratories, and government agencies. Inconsistent measurements, proprietary information, intellectual-property concerns, security restrictions, and limited mechanisms for sharing lessons can prevent companies from learning from previous scale-up efforts. Companies may repeat costly experiments and rely on trial and error because knowledge from successful, stalled, and failed projects is not captured in reusable forms. These limitations also constrain the application of AI, predictive modeling, automation, and digital tools to industrial biotechnology.

Recommendation: Develop a coordinated national approach to collecting, governing, analyzing, and appropriately sharing biotechnology and biomanufacturing data. Establish interoperable data standards, improved measurement methods, trusted precompetitive collaboration mechanisms, and AI-enabled tools for research, process development, predictive scale-up, manufacturing optimization, and performance monitoring. Integrate biological research with process engineering, measurement science, modeling, and automation to improve reproducibility and transfer knowledge across facilities and production scales. Prioritize data and AI investments around specific industrial biotechnology applications and measurable commercialization challenges. Develop case studies of successful and unsuccessful scale-up efforts, protect intellectual property and national security, minimize

unnecessary reporting burdens, and explore mechanisms to recognize the value of data in corporate financial statements.

CATEGORY 2. GROW DEMAND AND BUILD MARKETS

Commercialization depends on customers willing to purchase products that deliver measurable value. Public policy can help establish initial markets and reduce adoption risks, but the objective must be sustainable demand for competitive U.S.-produced products rather than permanent reliance on government purchasing or subsidies.

Candidate 8. Establish national priorities for strategically important bio-based products and develop market-specific commercialization strategies.

Problem: Industrial biotechnology spans chemicals, materials, fuels, agriculture, food, and other markets, each with distinct customer requirements, production economics, regulatory pathways, and competitive dynamics. Limited public and private resources can be spread across too many technologies and applications without concentrating on the opportunities most likely to deliver economic, industrial, and national-security value. A uniform policy approach can overlook market-specific barriers or support products without a credible path to commercial adoption.

Recommendation: Identify a focused set of priority bio-based products, product classes, applications, and supply-chain inputs where domestic production can deliver significant economic, industrial, or national-security value. Evaluate opportunities based on demonstrated or credible customer demand, differentiated product performance, U.S. advantages in feedstocks or technology, production economics, supply-chain resilience, and prospects for competitive domestic manufacturing. Develop tailored commercialization strategies for each priority market, identifying the relevant technical, financial, regulatory, infrastructure, and customer-adoption barriers. Use these priorities to align research, financing, scale-up infrastructure, procurement, and market-development efforts around specific commercial outcomes. Track progress through measurable indicators, including commercial production, domestic manufacturing capacity, market share, and investment.

Candidate 9. Modernize government procurement specifications and use targeted purchasing commitments to establish early markets for strategically important bio-based products.

Problem: First-of-a-kind biomanufacturing facilities face substantial commercial risk because customers may hesitate to purchase products before production capacity, reliable supply, and competitive performance are demonstrated. Legacy procurement specifications can exclude bio-based alternatives even when they meet or exceed required performance. Without credible

early demand, companies may struggle to attract financing, establish commercial operations, or demonstrate the viability of new domestic supply chains.

Recommendation: Use government procurement, targeted purchasing commitments, and appropriate offtake agreements to establish credible early markets for strategically important bio-based products. Review federal procurement specifications and transition from prescriptive formulations and feedstock requirements toward performance-based specifications where technically and operationally appropriate. Establish testing, qualification, and validation pathways that allow bio-based alternatives to demonstrate compliance with safety, quality, reliability, performance, and cost requirements. Prioritize product categories where procurement reform can open markets for domestic production without mandating a particular technology. Design government purchasing to help companies demonstrate commercial viability and attract private investment, with a clear objective of transitioning toward sustainable private-sector demand rather than perpetual public purchasing.

Candidate 10. Develop a coordinated portfolio of demand-creation and market-development tools.

Problem: Government procurement alone cannot overcome all the barriers facing emerging bio-based products. Cost disadvantages relative to incumbent products, uncertain customer demand, switching costs, limited awareness, and fragmented incentives can prevent commercially promising technologies from attracting investment and reaching scale. Different markets may require different combinations of policy support, and poorly designed interventions can stimulate initial purchases without establishing durable competitiveness.

Recommendation: Develop a coordinated portfolio of demand-side mechanisms tailored to specific products and market conditions. Evaluate government and commercial purchasing agreements, targeted mandates where appropriate, incentives that address cost-of-goods gaps, investments in cost-reducing science and technology, and mechanisms to benchmark and monetize the benefits of bio-based products. Incorporate customer education and tools that reduce a manufacturer's technical, financial, and operational risks of switching from incumbent products. Distinguish safety regulation from voluntary incentives and market-shaping policies. Develop interventions that establish durable markets, reduce commercialization risk, attract private investment, and help domestic products compete on their merits in the United States and globally.

Candidate 11. Mobilize established manufacturers and anchor customers to develop domestic bio-based supply chains.

Problem: Biotechnology startups may possess promising technologies but lack the customer relationships, market knowledge, manufacturing expertise, and purchasing commitments needed to establish new supply chains. Established manufacturers may have clear needs for

materials and ingredients but lack the time or specialized capabilities to develop biological production pathways independently. Without stronger connections between technology developers and industrial customers, promising innovations can remain disconnected from viable markets or move overseas to secure manufacturing partners.

Recommendation: Encourage established manufacturers to become active partners in industrial biotechnology commercialization by identifying priority material and ingredient needs, co-investing in technology development and scale-up, participating in demonstrations, and providing credible pathways to adoption. Strengthen partnerships among biotechnology startups, chemical companies, agricultural producers, and downstream manufacturers to connect biological production pathways with existing industrial capabilities and customer requirements. Use anchor customers, strategic supply-chain partnerships, and private-sector purchasing commitments to validate demand, help de-risk initial investments, and establish a foundation for broader domestic market development. Pair public support with explicit expectations for private-sector investment, infrastructure use, workforce development, and commercialization of U.S.-produced bioproducts.

Candidate 12. Capture more downstream value from U.S. agricultural resources and strengthen participation across the bioeconomy value chain.

Problem: U.S. agriculture provides feedstocks for much of the industrial bioeconomy, yet agricultural productivity and downstream value creation can be overlooked when biotechnology is framed primarily around pharmaceuticals and life sciences. Economic opportunities may be lost when agricultural commodities are not converted into higher-value domestic products or when farmers do not participate in the resulting value creation. Fragmented connections among feedstock suppliers, manufacturers, and customers can also constrain reliable supply and market development.

Recommendation: Make agricultural productivity, feedstock development, and downstream value creation central to U.S. bioeconomy competitiveness. Develop and test models such as farmer-owned data, cooperatives, and distributed biomanufacturing that connect agricultural producers more directly to higher-value markets and enable them to participate in economic returns. Integrate agricultural and other biological feedstocks with regional processing capabilities, transportation and energy infrastructure, and domestic manufacturing opportunities. Engage agricultural producers and feedstock suppliers early in commercialization planning to validate supply availability, quality, cost, and long-term market requirements. Streamline the regulatory environment to accelerate the development of next-generation feedstock crops. Prioritize approaches that strengthen domestic value chains and create durable economic opportunities for producers, manufacturers, and regional communities.

Candidate 13. Strengthen the public narrative around biotechnology, engineering, and domestic biomanufacturing.

Problem: The bioeconomy and broader science-and-technology agenda can be difficult for the public to understand, limiting awareness of their relevance to jobs, economic growth, health, manufacturing, and national security. Limited public understanding can constrain support for investment, participation in emerging industries, and customer adoption of new products.

Recommendation: Develop a coordinated public communications approach that makes the benefits of biotechnology, engineering, and domestic biomanufacturing understandable and relevant to consumers, workers, and communities. Highlight tangible applications, scientific achievements, manufacturing capabilities, and economic contributions. Connect the bioeconomy to everyday products, quality jobs, agricultural value creation, supply-chain resilience, and national priorities to strengthen public understanding and support for U.S. innovation and industrial competitiveness.

CATEGORY 3. BUILD NATIONAL CAPACITY AND ENABLING CONDITIONS

A competitive industrial bioeconomy requires more than individual technology successes or isolated market interventions. The United States needs durable coordination, predictable regulatory pathways, modern standards, specialized talent, shared infrastructure, and sustained public-private commitment.

Candidate 14. Establish a durable national coordination and accountability mechanism for industrial biotechnology.

Problem: The United States has developed multiple biotechnology strategies, initiatives, agencies, and programs without consistently sustaining the coordination and execution needed to achieve national objectives. Unclear responsibilities, jurisdictional conflicts, fragmented funding, inconsistent incentives, and short investment horizons can prevent promising technologies from advancing and leave shared infrastructure and workforce gaps unresolved. Industrial and agricultural biotechnology can also fall between established agency structures designed around other sectors, particularly pharmaceuticals and medical devices.

Recommendation: Establish a durable federal coordinating function with sufficient authority and reach to align agencies, resolve jurisdictional issues, clarify regulatory pathways, and integrate existing strategies and initiatives. Define a focused national strategy for industrial biotechnology that identifies priority technology areas, end markets, and competitive objectives. Establish clear roles, responsibilities, measurable milestones, and mechanisms for accountability across federal agencies, industry, universities, DOE National Laboratories, and regional partners. Set a small number of key performance indicators, including the size of the global industrial bioeconomy, the U.S. share of that market, and the U.S. competitive position

within priority market segments. Use credible, regularly updated benchmarks to guide public and private investment and sustain progress over time.

Candidate 15. Establish clear, science-based regulatory pathways and modernize standards, testing, and classification systems.

Problem: Regulatory oversight across agriculture, chemicals, fuels, and other bioeconomy sectors is fragmented, and pathways for novel biological products and processes can be difficult to navigate. Uncertainty about agency jurisdiction, evidence requirements, safety standards, and approval timelines increases commercialization costs and discourages investment. Separately, existing technical standards, testing protocols, product specifications, certification mechanisms, and economic classification systems have not kept pace with biology as an engineered manufacturing discipline. These gaps can delay market entry, exclude viable products, and undermine public confidence.

Recommendation: Modernize and clarify regulatory pathways for industrial biotechnology through coordinated, science-based, risk-proportionate approaches that protect human health, animal health, and the environment without unnecessarily delaying innovation. Clarify agency responsibilities, improve coordination across jurisdictions, establish predictable processes and timelines, and update regulatory frameworks to reflect advances in biotechnology and differences among industrial, agricultural, pharmaceutical, and medical applications. In parallel, strengthen the technical and economic infrastructure of the U.S. bioeconomy by developing relevant industry classification codes, common standards, testing and measurement protocols, product specifications, and certification approaches. Expand interagency collaboration, industry participation, and shared testing and validation capabilities. Distinguish safety regulation from market-shaping policies and voluntary incentives, and prioritize performance-based requirements where technically and operationally appropriate.

Candidate 16. Develop an industry-aligned technical workforce and strengthen domestic scientific and engineering capabilities.

Problem: Domestic biomanufacturing depends on workers with specialized capabilities in fermentation, process operations, downstream processing, process engineering, pipefitting, HVAC, automation, maintenance, and quality assurance. Employers often struggle to find workers with the required skills, while educational institutions may lack detailed information about industry needs. At the same time, international competition for scientific talent and research investment can weaken the pipeline of expertise needed for future commercialization. Workforce programs can fail when training is disconnected from actual employment opportunities and regional industrial expansion.

Recommendation: Establish stronger employer-led partnerships among industry, community colleges, universities, secondary schools, workforce organizations, and government to develop

training aligned with specific biomanufacturing occupations and commercial opportunities. Expand apprenticeships, internships, work-based learning, industry-designed curricula, and pathways for workers transitioning from adjacent industries and military service. Introduce students to biotechnology, engineering, and manufacturing careers earlier, and share effective training models across regions. Align basic and applied research investments with economic growth, manufacturing capacity, and national security while reducing unnecessary administrative barriers to research and innovation. Use anticipated facility investments, employer demand, and regional commercialization opportunities to guide workforce priorities, and measure outcomes through job placement, retention, and employer satisfaction.

Candidate 17. Sustain a coordinated public-private commitment to domestic bioeconomy competitiveness and strategic supply chains.

Problem: Individual agencies and companies may lack the authority or resources to address shared infrastructure gaps, workforce shortages, data needs, and other challenges affecting the broader ecosystem. Public investment can be fragmented across programs without clear expectations for private-sector participation or measurable commercial outcomes. Meanwhile, dependence on foreign biotechnology capabilities and manufacturing capacity can create economic and national-security vulnerabilities, particularly when advanced technologies developed in the United States are commercialized and manufactured overseas.

Recommendation: Establish a sustained public-private commitment to a focused set of industrial biotechnology priorities, with clear responsibilities, measurable milestones, and mechanisms for accountability. Coordinate federal agencies, industry, universities, DOE National Laboratories, and regional partners around shared objectives for innovation, domestic manufacturing, supply-chain resilience, and economic competitiveness. Identify where public investment can address shared infrastructure, early-stage technology, workforce, and other strategic costs that individual companies cannot reasonably bear alone, while securing credible private-sector participation and a path toward commercial viability. Where appropriate, connect domestic biomanufacturing priorities to national-security requirements, defense-sector needs, and strategic supply chains. Strengthen international partnerships where they provide complementary scientific capabilities, capital, or market access, while ensuring that the domestic conditions needed to retain U.S. research, intellectual property, manufacturing, and long-term economic value remain competitive.

CROSS-CUTTING IMPLEMENTATION PRINCIPLES

The working sessions also identified several principles that should guide implementation across all three categories. These are not substitutes for the recommendations above; they are criteria for evaluating, prioritizing, and executing them.

1. Make commercialization and speed to market the organizing principles.

Scientific advances, public investment, and infrastructure development should be evaluated by their contribution to commercially competitive U.S. production. The goal is not simply to advance technologies or build facilities, but to move viable products into markets with competitive economics and a credible path to sustained demand.

2. Concentrate resources on defined priorities and measurable outcomes.

Identify the products, technology platforms, and supply chains where the United States has the strongest opportunity to establish differentiated value and strategic advantage. Establish measurable objectives and use them to guide research, financing, infrastructure, workforce, and market-development decisions.

3. Pair public investment with private-sector commitments.

Public support should address early-stage risks, shared infrastructure gaps, and strategic costs that individual companies cannot reasonably bear alone. It should also be linked to credible private-sector commitments to invest, use shared facilities, develop workforce capabilities, and purchase or commercialize U.S.-produced products.

4. Treat the full biomanufacturing value chain as the unit of analysis.

Recommendations should be tested against the realities of feedstock preparation, biological production, fermentation, downstream processing, product qualification, customer requirements, and commercial operations. Optimizing one stage in isolation may not produce a competitive end-to-end system.

5. Build on existing capabilities and coordinate investments nationally.

Use existing research institutions, DOE National Laboratories, industrial facilities, regional ecosystems, and initiatives such as BioMADE, RuralSTAMINA, and AIM Zones wherever they can meet identified needs. Develop connections among specialized capabilities rather than requiring every region or institution to build the same assets.

6. Ensure the full industrial value chain informs implementation.

The original discussions identified a need for stronger participation from manufacturers, process engineers, commercial operators, investors, agricultural producers, and companies at different stages of scale-up. Their participation will be critical to validating recommendations against actual production economics, infrastructure requirements, market demand, and commercialization constraints.

7. Measure success by durable economic and industrial outcomes.

Evaluate progress through commercial production, time to market, production costs, private investment, domestic manufacturing capacity, market share, workforce outcomes, supply-chain resilience, and the ability of U.S. products to compete in domestic and global markets.