NSF and The US Bioeconomy

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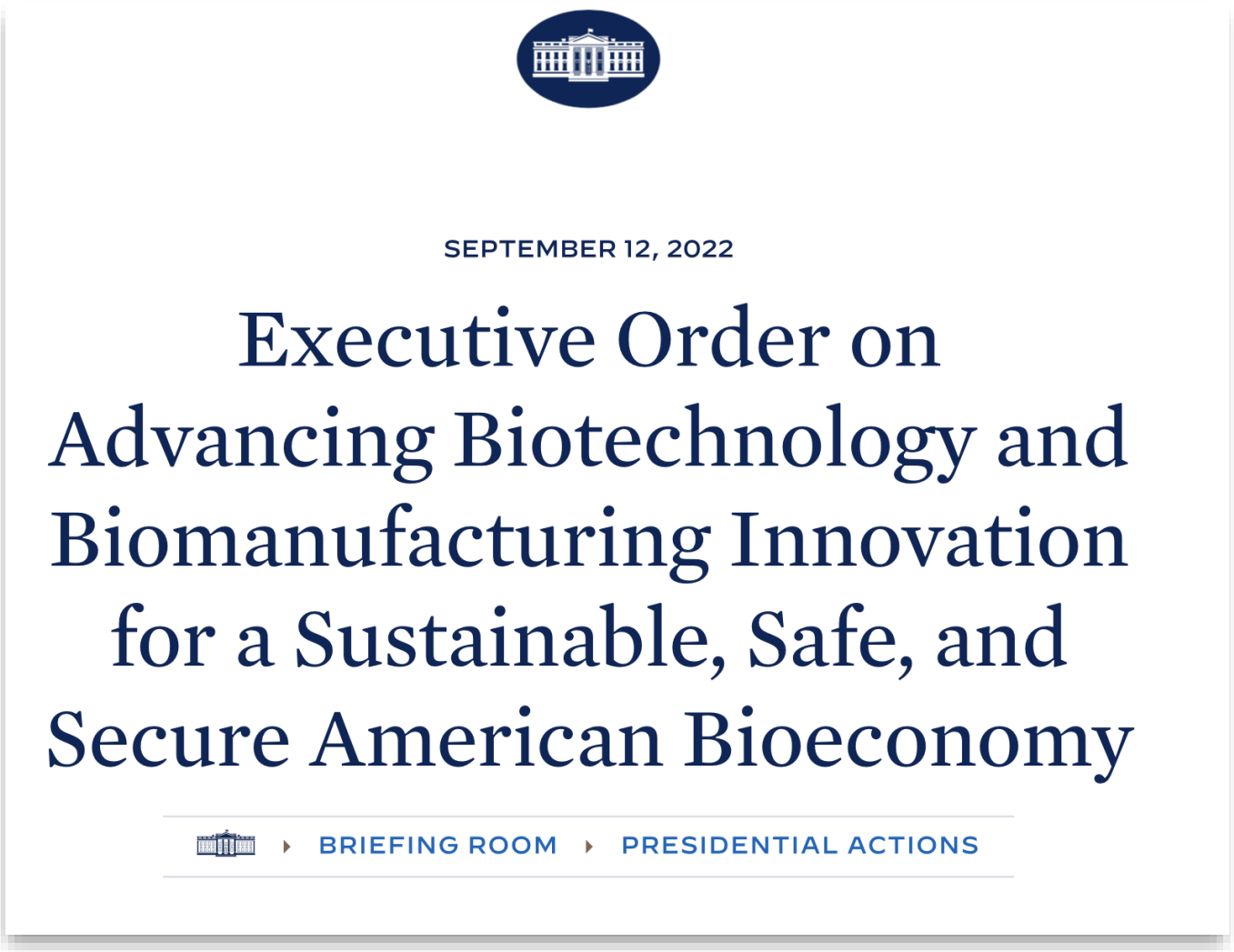
White House Order on the Bioeconomy



SEPTEMBER 12, 2022

Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy

BRIEFING ROOM ▸ PRESIDENTIAL ACTIONS

White House Order on the Bioeconomy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BRIEFING ROOM › PRESIDENTIAL ACTIONS

Section 1. Policy. It is the policy of my Administration to coordinate a whole-of-government approach to advance biotechnology and biomanufacturing towards **innovative solutions in health, climate change, energy, food security, agriculture, supply chain resilience, and national and economic security**.

The US Bioeconomy

- $1 Trillion sector of the economy
- Predicted to expand 30

BOLD GOALS FOR U.S. BIOTECHNOLOGY AND BIOMANUFACTURING

HARNESSING RESEARCH AND DEVELOPMENT TO FURTHER SOCIETAL GOALS

MARCH 2023

Biotechnology and Biomanufacturing R&D to Further Cross-Cutting Advances

In collaboration with other U.S. Federal Government departments and agencies, this report was authored by the U.S. National Science Foundation

Theme 1: Leverage Biodiversity Across the Tree of Life to Power the Bioeconomy

Goal 1.1: In 5 years, sequence the genomes of one million microbial species and understand the function of at least 80% of the newly discovered genes.

Goal 1.2: In 20 years, speed discovery of new gene sequences, metabolisms, and functions by 100-fold over current practice across all types of organisms.

Theme 2: Enhance Predictive Modeling and Engineering Design of Biological Systems

Goal 2.1: In 5 years, increase the ability to predictably design small molecules or enzymes capable of binding selectively to any desired target, and reduce the time needed for this process to 3 weeks.

Goal 2.2: In 20 years, leverage multidisciplinary advances in theory to enable high-confidence (90%) design of purposeful engineered biological systems at all scales, from molecular to ecosystem level.

Theme 3: Expand Capabilities to Build and Measure Performance and Quality of Biological Systems

Goal 3.1: In 5 years, develop the capabilities to read and write any genome, epigenome, transcriptome, and expressed proteome to enable the construction and measurement of any single cell within 30 days.

Goal 3.2: In 20 years, build a synthetic minimal plant that can be used as a chassis for food, feedstock, chemical, or pharmaceutical production.

Theme 4: Advance Scale-Up and Control of Biological Systems

Goal 4.1: In 5 years, advance bioprocess design, optimization, and control tools to enable predictable scale-up to commercial production of any bioprocess within 3 months with a 90% success rate.

Goal 4.2: In 20 years, advance integration of all aspects of feedstock use, organism design, process design, and end-of-use disposal with technoeconomic analysis such that sustainability and commercial goals can be achieved for more than 85% of new bioprocesses within the first year of deployment.

Theme 5: Innovate Biomanufacturing Approaches

Goal 5.1: In 5 years, reproducibly manufacture devices that integrate living and non-living components such as organ-chip or human-robotic interfaces that maintain over 90% viability and connectivity of components, paving the way for innovations in biomanufacturing including the development of human-assistive devices that will enable healthier aging.

Theme 6: Enable Ethical, Safe, and Equitable Co-Generation and Translation of Biotechnology Products

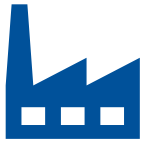
Goal 6.1: In 5 years, include broad public and end-user participation; technology co-generation; rigorous assessment; integration of social, behavioral, economic, and socio-technical sciences; and formal evaluations in all biotechnological and biomanufacturing projects from their beginning.

NSF investments align with bold goals and R&D needs

Leverage biodiversity across tree of life

Enhance predictive modeling and engineering design

Expand capabilities to build and measure



Advance scale up and process control

Innovate in biomanufacturing

Enable equitable, safe & equitable cogeneration of technology


NSF