

January 25, 2023

Chairs Sollman and Bynum and Members of the Joint Committee on Semiconductors,

The Oregon Bioscience Association (Oregon Bio) is Oregon's voice for the growth of our bioscience sector. Our members are involved in cutting-edge research and development of innovative healthcare, agricultural, and environmental, biological, and medical technologies. They range from entrepreneurial startups developing a first product to large multinational therapeutic and device companies. We also represent the state's biotech research institutions, service providers to the industry, and academic centers of learning. Oregon Bio promotes the growth of and continually seeks ways to support sustainability and growth in the life science, bioscience, biotechnology and device manufacturing sectors here in Oregon. As measured by our 2022 economic impact study, our growing bioscience industry has created nearly 66,000 jobs and \$16 billion of total economic activity in Oregon, as well as \$1.7 billion in tax and fee revenues for the State and local governments.

We applaud the work of the Semiconductor Competitiveness Task Force. While semiconductors are an important component of many emerging and existing biotech firms, the recommendations in the entire package can also be critical in retaining and growing our existing bioscience ecosystem here in Oregon. Our members use, or could use, many of the tools supported as part of the package, from property tax incentives like Enterprise Zones, to funding for workforce development to higher-education, to better availability of industrial sites.

Today, we are supporting the Committee's review and analysis of the Research and Development (R&D) Tax Credits. States that enact R&D tax credit legislation are helping to mitigate the significant risks associated with R&D in biotechnology. These efforts are a component in building and growing a thriving biotechnology industry hub in a state and in maintaining the dominant US position as the center of biotechnology innovation.

State R&D tax credits decrease the risks associated with investing in research-intensive biotechnology companies because the credits provide immediate tax benefits to qualifying companies, freeing up additional capital that can be invested in this high-tech business sector. For example, due to the drawn-out nature of the biopharmaceutical development process, small biotechnology companies often have difficulty obtaining early-stage financing for their research. Given that these smaller biotech companies are not yet profitable, they are unable to immediately use their tax assets to offset income.

It is our position that the recommended state R&D tax credit categories should be comprised of the following:

- Wages paid to employees for qualified services (including amounts considered to be wages for federal income tax withholding purposes);
- Supplies (defined as any tangible property other than land or improvements to land, and property subject to depreciation) used and consumed in the R&D process;

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- Contract research expenses paid to a third party for performing QRAs on behalf of the taxpayer, regardless of the success of the research; and
- Basic research payments made to qualified educational institutions and various scientific research organizations.

In addition, the R&D recipient should show that the activities:

- Are intended to resolve technological uncertainty that exists at the outset of the project or initiative, related to the capability or methodology for developing or improving the business component or the appropriate design of the business component;
- Rely on a hard science, such as biological science;
- Relate to the development of a new or improved business component, defined as new or improved products, processes, techniques, formulas, or inventions to be sold or used in the taxpayer's trade or business; and substantially all constitute a process of experimentation involving testing and evaluation of alternatives to eliminate technological uncertainty.

We look forward to continuing to work with the Joint Committee on Semiconductors

Sincerely,

Liisa Bozinovic
Oregon Bioscience Association
Executive Director

Brian Warren
Biotechnology Innovation Organization
Director of Government Affairs

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Making
the
impossible
possible.

**Driving the Bioscience Economy Forward
During the COVID-19 Pandemic:**

Best practices in State and Regional Economic
Development Initiatives



Where
breakthroughs
begin





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State and Regional Focus on the **BIOSCIENCES ECOSYSTEM**

With a seemingly ever-changing viral pandemic, the growing threat of extreme weather and greenhouse gas emissions, and the impact both challenges have on future human, animal, plant, and economic health, the world is counting on the U.S. bioscience industry for solutions.

And it's meeting the moment.

Indeed, in 2021, the U.S. bioscience industry represents a unique confluence of characteristics essential for addressing these challenges and realizing societal and economic progress: extraordinary innovation that's saving and improving lives through advancements in biomedical, energy, and advanced food and industrial technologies, along with an expanding mix of employment opportunities with incomes that support a quality standard of living.

The industry is at the forefront of a host of major global challenges related to diagnosing, treating, and curing disease—especially COVID-19 and other infections with pandemic potential. The industry is also ensuring that the world can rely on a safe, affordable, and more sustainable food supply to feed a growing population, as well as developing biobased fuels, chemicals, and other industrial products to help us address climate change.

The U.S. bioscience industry has continued its impressive growth trend, generating high-paying, quality jobs and significant economic impacts for the nation.

Because of a growing national sense of the social and economic value of the biosciences in our daily lives, the industry continues to be a preferred technology sector for company creation and growth by states and regions for several reasons:

- First, in an environment of increasing and sustained international competition, the industry is a vital component of the durable goods manufacturing sector of the U.S. economy. Many states have a strong bioscience-manufacturing presence that produces some of the highest quality products in the global marketplace.
- Second, the biosciences create highly skilled jobs that diversify the economy and support the creation of improved living standards and state and local taxes to support K-12 education, public safety, and other budget priorities. This is especially important as states focus on efforts to rebound from the COVID pandemic.
- Third, the industry is intertwined with technology transfer efforts of universities, workforce training at community colleges, and inflow of federal and private research grants for both invention and workforce training funds to match employer needs and employee skills.



And as with other advanced industries, there is a growing understanding of the pivotal role that partnerships play in successfully moving bioscience research and development efforts forward. Examples of partnerships that are helping the bioscience ecosystem capitalize on resources and workforce include:

- **Public and Private Research Centers:** Fostering collaborative partnerships between academic research centers and companies has been critical to sustaining U.S. invention and innovation, especially during a pandemic. The increasing volume and accelerated pace of knowledge creation has transformed the research process to the point where no one scientist or institution can sufficiently conduct wholly independent research programs.
- **State and Regional Policymakers:** The need for a stable and supportive public policy structure is pivotal to bioscience companies, large and small. It is almost impossible for any state to ignore the need for selective infrastructure and development incentives to either hold existing companies or attract new enterprises.

- **Industry Participants:** Industry collaboration with universities and policymakers continues to be the hallmark of the vibrant U.S. technology industry growth over the past three decades. During that time period, industry became an active participant in public policy creation by providing insights into its needs for sustained growth.

In the following report, the Biotechnology Innovation Organization (BIO), in partnership with the Council of State Bioscience Associations (CSBA), highlight noteworthy public policy strategies and programs to assist policy leaders, academic research and training organizations, and their bioscience industry partners in identifying new and innovative measures that enhance the future of our industry in their states and regions—and in turn, enhance the future of our world.

Bioscience industry wages now reach nearly two times the overall U.S. average—the average bioscience worker earns more than \$107,000, or \$50,000 more than the nation's private sector average.

2021 National Trends for STATE BIOSCIENCE GROWTH

Every state in 2021 is still feeling the effects of the economic downturn from COVID-19, and driving new funding mechanisms for biosciences industry growth will continue to be challenging in the 2022 state legislative sessions.

As with past economic slowdowns, the bioscience industry has been resilient. Experience has shown that the following seven principal strategies are helping states large and small to create, grow, and retain their bioscience industry clusters.

1. States are building career pathways for future biosciences talent. Attracting and retaining a continuous flow of educated (Ph.D., MS, BS, AA) and technically-proficient workers is essential for a state that aspires to strengthen its bioscience industry. In this global economy, nearly every competitor has access to breakthrough technologies and to the equipment and capital to produce standardized products. States and regions have come to understand that human capital—with its wealth of insights and competencies—provides an enormous competitive advantage when it comes to creating and retaining companies.

2. States and regions are implementing an overall supportive regulatory climate to ensure predictable and stable regulatory treatment of biosciences firms. A supportive public policy framework is vital to industry firms, large and small. It's impracticable, and ill-advised, for any state, city, or municipality to ignore the importance of selective incentives to either hold existing bioscience companies or attract new enterprises.

Lawmakers have become increasingly aware of the unique challenges facing bioscience companies, such as high costs of research and the long development timeline to bring a new bioscience product to market. State partners are increasingly allowing companies to monetize earned R&D and net operating loss credits, sales

tax exemptions for the purchase of R&D and manufacturing equipment, and investment tax credits to drive angel capital investment in the bioscience industry.

3. States and regions are focusing on developing their agricultural, industrial, and environmental bioscience sectors in addition to their biomedical and health sectors. After two decades of approvals of biotechnology medicines, the first biotechnology-enhanced crop finally entered the marketplace. Now, scientists are using bioscience technologies to improve manufacturing processes, chemical synthesis, and production, while a number of states and regions are focusing on the opportunities this presents for their economies. These sectors are taking advantage of new research to provide both jobs to rural America and more sustainable and environmentally friendly practices to farms.

4. Physical infrastructure and facilities remain a priority. Investing in basic and applied research facilities at universities and life sciences-related institutes is an essential step in the innovation process. Because the industrial applications of the industry have dramatically changed in the past 10 years, state-of-the-art research demands modern facilities.

State governments, academic research centers, and private developers are increasingly integrating these physical facilities into the long-term vision and strategy for economic development by providing physical space to leverage public-private partnerships, in particular for early-stage commercialization efforts.



5. Universities and other research centers' technology transfer efforts are better understood by public agencies. Thanks to a coalition of industry and university technology transfer groups across the nation that have provided strong support for enhanced federal legislation—including the Bayh-Dole Act of 1980 and the 2011 Patents Act—U.S. colleges and universities continue to lead the world in funding for cutting-edge basic research.

States are making company formation a high priority in partnerships with universities, and include entrepreneurship as part of the technology transfer effort. In particular, policies that encourage full funding of basic research, predictability of patents, and flexible technology transfer, and that provide early-stage funding opportunities and incentives, will stimulate biotechnology innovation.

6. Proximity to academic innovation is a driving influence. Academic research anchors offer distinct features including the scale of their operation, extensive collaborations with other research institutions, and a multi-disciplinary approach that integrates complementary technologies to create a focus in a broad-based area of the biosciences. New partnerships that integrate entrepreneurship and industry involvement into the university research experience facilitate the path from research to commercialization and help innovative ideas reach the marketplace.

7. Increased focus on biomanufacturing is the future. Biomanufacturing is a type of advanced manufacturing that utilizes biological systems to produce commercially important biomaterials and biomolecules for use in medicines, food and beverage processing, and industrial applications. Because of current international supply chain challenges, there is a renewed emphasis on reshoring these important components of the innovation ecosystem, adding to the growing manufacturing presence of this segment of the industry in every U.S. state and territory.



Phases of Development

REGIONAL POLICY

SUPPORT MECHANISMS

Because of the lengthy commercialization timeline to

success, the biosciences sector has three distinct phases of company creation, expansion, and manufacturing of products and services in health, agriculture, and the environment. The following stages of development and essential legislative support mechanisms are needed to succeed in a very competitive bioscience marketplace of ideas and products.

Early-Stage Development Companies: It is at this stage that company researchers identify the action protocols to begin verifying the viability of the discovery with early testing. Typically, these companies have no products on the market and have less than 100 employees, and are funded by a variety of private or venture funding.

Legislative Enablers:

- SBIR/STTR Small Business Technology Match Funding
- Angel Investor Tax Credit
- Seed Capital Tax Credit
- Incubator/Accelerator Funding

Mid-Stage Testing Companies: Once the technical viability of a discovery has been established, the target product must be developed. This stage of company development typically requires significant investment in personnel, equipment, and facilities. These companies generally have less than 200 employees.

Legislative Enablers:

- Net Operating Losses (Carry-Over, Transferability)
- Research and Development Tax Credits
- Capital Investment Tax Incentives
- Innovation Investment Tax Incentives

Manufacturing Companies: In this stage, the company manufactures commercial quantities of its approved product, creates a sales force, or licenses product to another company. Sale of manufactured products produces revenues and, hopefully, profits. Traditional sources of financing, such as commercial loans and public stock offerings, may become viable.

Foundational Legislative Enablers:

- Site and Infrastructure Grant Funds
- Renewable Energy Tax Credits and Utility Rebates
- Sales and Use Tax Discounts, Exemptions and Refunds

Since 2018, the industry has grown its employment base by 7.2 percent, which is more than twice the growth rate for the overall private sector.

Charts by States

Select State Incentive	SBIR State Matching	Manufacturing Sales Tax	R&D Tax Credit	Angel Funding
Legislation Categories	Grants	Exemption on Equipment	For Product Development	For Emerging Companies
STATE				
Alabama	■			
Alaska			■	
Arizona	■	■	■	■
Arkansas				
California		■	■	
Colorado	■	■	■	■
Connecticut		■	■	■
Delaware	■	■	■	
Florida	■		■	
Georgia	■		■	■
Hawaii		■		■
Idaho			■	
Illinois	■	■	■	
Indiana	■	■	■	■
Iowa	■	■	■	■
Kansas			■	■
Kentucky	■		■	■
Louisiana	■		■	■
Maine		■	■	■
Maryland		■	■	■
Massachusetts	■	■	■	■
Michigan	■	■		
Minnesota	■	■	■	■
Mississippi		■		
Missouri		■		
Montana	■			■
Nebraska	■	■	■	■
Nevada				
New Hampshire				
New Jersey	■	■	■	■
New Mexico	■	■	■	■
New York		■	■	■
North Carolina	■	■		
North Dakota			■	■
Ohio		■	■	

Select State Incentive	SBIR State Matching	Manufacturing Sales Tax	R&D Tax Credit	Angel Funding
Legislation Categories	Grants	Exemption on Equipment	For Product Development	For Emerging Companies
STATE				
Oklahoma	■	■		■
Oregon	■	■		■
Pennsylvania		■	■	■
Rhode Island		■	■	■
South Carolina	■	■		
South Dakota		■		
Tennessee	■			■
Texas		■		
Utah	■	■	■	
Vermont				
Virginia	■	■	■	■
Washington	■	■		
West Virginia	■			■
Wisconsin	■	■	■	■
Wyoming				
Puerto Rico	■	■	■	■

■ Yes

The bioscience industry's total economic impact on the U.S. economy totaled \$2.6 trillion dollars in 2018, as measured by overall output.



Dynamic Bioscience Workforce DEVELOPMENT MEASURES

Like any knowledge-based industry, bioscience companies need a strong supply of qualified, trained workers.

To meet the demands of newly emerging fields, new curricula and programs are being developed by educational institutions working in close partnership with the bioscience industry. In addition to having world-class researchers, successful bioscience regions have an adequate supply of management, sales, marketing, and regulatory personnel experienced in the biosciences. Funding bioscience workforce initiatives across the educational spectrum is essential.

- In **Oregon**, lawmakers passed a bill establishing the Eastern Oregon Border Economic Development Board to contract with third-party organizations on workforce development projects. The legislation instructs the board to focus on economic and workforce development projects in the region to attract and keep workers, including authorizing them to suggest restrictive laws be waived. The legislation also allows for third-party organizations to provide grants to local industry for workforce development purposes.¹
- **Indiana's** Governor's Workforce Cabinet created through legislation a comprehensive strategic plan to ensure alignment of the state's education systems with workforce training programs and employer needs, and identifies the workforce needs in Indiana to recommend goals to meet the investment needs, including goals for the talent development system in the state.²
- To encourage added growth in the life sciences sector, the State of **Georgia** has a new Life Science Manufacturing Tax Credit Bonus. In addition to the Job Tax Credit that companies may earn for creating new jobs in Georgia, companies with jobs dedicated to manufacturing pharmaceuticals, medicine, medical devices and equipment earn a bonus of \$1,250 per job. These credits are applied to a company's state corporate tax liability, and in certain areas may also reduce the company's payroll withholding obligations.³
- The **Illinois** Biotechnology/Bioscience Training Investment Program (BioTIP) assists in encouraging graduate students to work part-time in biotech/bioscience positions. BioTIP provides grants to companies to help cover training costs for students who find part-time employment as lab technicians/engineers in the biotech arena and provides essential training to students to enhance their practical skills.⁴

1 <https://legiscan.com/OR/bill/HB4209/2020/X1>

2 <https://www.google.com/search?client=safari&rls=en&q=indiana+governor%27s+health+workforce+council&ie=UTF-8&oe=UTF-8>

3 <https://www.taxnotes.com/tax-notes-today-state/code-and-regulations/georgia-dor-adopts-life-sciences-manufacturing-job-tax-credit-rule/2021/11/30/7cn0j>

4 <https://www2.illinois.gov/dceo/Pages/default.aspx>

- The “More Jobs for **Marylanders**” Act includes numerous work force training incentives, including a business tax credit linked to job training, a tax credit for apprenticeships, and a student financial aid program for non-credit training. The legislation provides tax incentives for manufacturers to create jobs in economically distressed areas of the state.⁵
- The **Florida** *Job Growth Grant* Fund promotes economic opportunity by improving public infrastructure and enhancing workforce training. The program awards money to regional projects rather than to individual companies. The workforce training grants support programs offered at state colleges and technical centers. Also, the *Get There Florida* Initiative is in partnership with the state’s 28 Florida College System institutions and the state’s 48 technical colleges or centers. It accelerates students’ time to completion of an in-demand but high-value industry certification or postsecondary workforce credential. Programs include biotechnology advanced manufacturing including biotechnology, transportation and logistics, healthcare, and information technology.⁶
- The **Massachusetts** *Biomanufacturing Education and Training Center* is an innovative partnership between academia and industry that creates customized workforce development solutions for forward-thinking biotechnology companies across the region and around the world.⁷
- The **Iowa** Biosciences Development Center, in cooperation with the University of Iowa and Iowa State University, collaborates with businesses to fast track technologies at an incubator for research technology startups and training for the highly skilled workforce needed for Iowa’s bioscience industry.⁸
- A High-Wage Jobs Tax Credit in **New Mexico** refunds corporate income tax credit equal to 8.5% of wages and benefits paid for each job created and retained for a 44-week period. The credit can be taken for up to four years with a maximum of \$12,750 per job. Minimum salary requirements for eligible positions are \$40,000 in communities with fewer than 60,000 residents and \$60,000 in communities with greater than 60,000 residents.⁹
- **Wisconsin** Fast Forward is a \$30 million investment in the worker grant training program for innovative talent development solutions driven by Wisconsin businesses to train and retain highly skilled workers. Over \$24 million in contracts has been issued to date, supporting nearly 260 worker training projects that are benefiting hundreds of employers and thousands of workers across Wisconsin.¹⁰
- **South Dakota’s** *Dakota Seeds* is designed to help employers establish a pipeline for future skilled employees through internships for college students linked to science, technology, engineering, and mathematics.¹¹

5 https://rmiofmaryland.com/wp-content/uploads/2017/05/jobsForMarylanders_MEDA2017.pdf

6 <https://floridajobs.org/news-center/DEO-Press/2021/05/20/florida-department-of-economic-opportunity>

7 https://www.mass.edu/strategic/work_manufacturing.asp

8 <https://www.iowaeda.com/bioscience/>

9 <https://www.tax.newmexico.gov/tax-professionals/tax-credits-overview-forms/general-industry-incentive-tax-credits/>

10 <http://wisconsinfastforward.com>

11 <https://sdgoed.com/financing-incentives/dakota-seeds/>

Advancing Biomanufacturing with **SUPPORTIVE MEASURES**

The COVID-19 crisis has created a national discussion on ways

to increase US domestic biomanufacturing and a desire to identify policies to encourage growth in the sector. A 2021 analysis of Burning Glass (burning-glass.com) jobs data finds the pipeline for job openings in biomanufacturing is robust with more than 14% of manufacturing job openings through the first half of 2021 being pharmaceutical and medicine manufacturing jobs. In fact, biopharmaceutical manufacturers posted more jobs than any other industrial sector through the first half of 2021, according to Burning Glass.

Whether securing and assembling raw chemical and biologic materials, working with clients, or training workers, biomanufacturing is a complex and expensive venture. A full spectrum of state and regional support systems to both manufacture products and the creation of those high-quality jobs continue to be vital for our communities.

- **New Mexico** provides an investment tax credit for manufacturers based on non-refundable corporate income, gross receipts, or personal income tax credit equal to 5.125% of the value of qualified equipment. For every \$500,000 of equipment, one employee must be added up to \$30 million. For amounts exceeding \$30 million, one employee must be added for each \$1 million of equipment.¹²

- The *Excelsior Jobs Program* of **New York** State encourages manufacturing and life sciences companies that create at least five net new jobs to expand and relocate to New York. These companies are eligible for a number of credits including a 6.85% credit on wages per net new job, a 2% credit for qualified investments, and a 50% credit on R&D expenditures up to 6%. That state also provides a manufacturer's real property tax credit to qualified manufacturers located in New York State. They are eligible to receive a credit equal to 20% of the real property taxes paid during the taxyear.¹³
- **Ohio's** *Advanced Manufacturing Initiative* is a competitive grant program to encourage new advanced manufacturing project and service activity in support of this important sector of Ohio's economy. The funding being provided is to support proposals from existing Edison Technology Centers and other qualified Ohio organizations with demonstrated capabilities to deliver value-added advanced manufacturing assistance.¹⁴

A recent USDA report showed that the biobased products industry in the US contributed \$393 billion and 4.2 million jobs to America's economy in a single year.

¹² <https://nmpartnership.com/incentives-data/new-mexico-business-incentives/>

¹³ <https://www.google.com/search?client=safari&rls=en&q=excelsior+jobs+program+new+york+state&ie=UTF-8&oe=UTF-8>

¹⁴ <https://www.jobsohio.com/industries/advanced-manufacturing/>

- **North Carolina's** *Golden LEAF Biomanufacturing Training and Education Center (BTEC)* is a multidisciplinary instructional center at [North Carolina State University](https://www.ncsu.edu) that provides education and training to develop skilled professionals for the biomanufacturing industry. BTEC provides hands-on education and training in bioprocessing concepts and biomanufacturing methods that comply with [cGMP](https://www.fda.gov/cgmp) (current Good Manufacturing Practice), a set of regulations published by the U.S. Food and Drug Administration (FDA).¹⁵
- In **Georgia**, the *National Science Foundation Engineering Research Center for Cell Manufacturing Technologies (CMArT)* operates as a translational research arm, and provides space for collaboration among engineers, clinicians, and industry to develop and validate manufacturing processes for cell therapies, and is funded by the NSF, Georgia Tech, the Georgia Research Alliance and The Marcus Foundation.¹⁶
- **Tennessee's** Oak Ridge National Laboratory innovative manufacturing efforts include R&D programs in advanced materials, innovative processing, transportation technologies, and automation and controls, as well as forefront modeling and simulation capabilities and the US Department of Energy's first Manufacturing Demonstration Facility.¹⁷

The nation's bioscience industry employs 1.87 million across more than 101,000 U.S. business establishments.

- **Puerto Rico's** *Bioprocess Development and Training Complex (BDTC)* is a collaboration among industry, government and academia to strategically enhance Puerto Rico's capabilities in biotechnology manufacturing, research, bioprocess improvement, and training. The BDTC is housed in a 29,000 square foot building located at the Guanajibo Research and Innovation Park (GRIP) in Mayaguez, Puerto Rico.¹⁸
- **Connecticut** has a *Manufacturing Innovation Fund* that offers loans, grants, vouchers, incumbent worker training and apprenticeship programs and the \$100 million over five years Innovation Corridor Program. It is designed to facilitate the creation of at least 15,000 new jobs in data science, advanced manufacturing, insurance technology, or other high-growth industries.¹⁹
- **Nebraska** provides a business and occupancy tax credit based on wages for new employees in manufacturing and R&D labs and commercial testing facilities in rural counties or within a Community Empowerment Zone (CEZ).²⁰

¹⁵ <https://www.btec.ncsu.edu>

¹⁶ <https://cellmanufacturingusa.org>

¹⁷ <https://www.ornl.gov/advancedmanufacturing>

¹⁸ <https://www.cybo.com/PR-biz/bioprocess-development-and-training>

¹⁹ https://portal.ct.gov/DECD/Content/BusinessDevelopment/05_Funding_Opportunities/Manufacturing-Innovation-Fund

²⁰ <https://revenue.nebraska.gov/government/occupation-taxes>

Public Private Partnerships in **BIOSCIENCE DEVELOPMENT**

A strong partnership among industry, academia, and state government is essential for the development of successful bioscience clusters. As states evaluate how to continue encouraging

bioscience companies to locate within their borders, they need to review their tax and investment structure incentives in the area of capital acquisition, workforce preparedness/training, and physical infrastructure to help companies through all phases of product development and manufacturing.

Through support for industry-university collaborations, provision of R&D tax credits, business incubator development, risk-capital supports, and other innovative support mechanisms, states and metro regions are able to enhance their attractiveness for bioscience projects and increase the creation and growth of new bioscience companies.

ALABAMA

In 2020, the Alabama Public School and College Authority announced a \$15 million grant in funding for an expansion to the HudsonAlpha Institute for Biotechnology campus, located in Huntsville. The funding will go towards two new facilities, one of which will house a 90,000 sq. ft. global headquarters for Discovery Life Sciences, a company which provides biospecimen analysis and procurement needed to advance modern drug and biomarker discoveries. The second, 13,000 sq. ft. facility will include laboratory and greenhouse space for a new Center for Plant Science and Sustainable Agriculture.²¹

COLORADO

Innosphere Ventures, a Colorado-based incubator and commercialization program, announced plans for a 7,500 sq. ft. laboratory facility adjacent to its current facility in Fort Collins, which began construction in March 2021. Innosphere secured \$500,000 from the Colorado Department of Economic Development towards the construction of ten private wet laboratory

spaces that will be the future home to startup companies operating at biosafety levels 1 and 2.²²

Innosphere's facilities are located in close proximity to Colorado State University's Powerhouse Campus, which contains incubator space for CSU-aligned start-ups. In October 2021, Innosphere acquired \$3.3 million of land to support the expansion of the Powerhouse Campus, with 150,000 sq. ft. of facility space to support biotech and cleantech startups and research.²³

FLORIDA

In October 2021, a gene therapy company focused on rare genetic diseases, announced a partnership with the University of Florida to research and develop next generation gene therapy capsids with the goal of creating safer, more effective, and tissue specific gene therapies. The expansion of this partnership will enable AavantiBio to further build out its platform focused on advancing innovative gene therapies in areas of significant unmet medical need.²⁴

21 HudsonAlpha launches expansion project at its biotech campus" Made in Alabama May 11, 2021 <https://www.madeinalabama.com/2021/05/hudsonalpha-launches-expansion-project-at-its-biotech-campus/>

22 "Innosphere Ventures Breaks Ground on Laboratory Facility" North Forty News September 20, 2021 <https://northfortynews.com/category/business-education/innosphere-ventures-breaks-ground-on-laboratory-facility/>

23 "Innosphere buys third parcel to help with possible Powerhouse expansion" Loveland Reporter-Herald October 8, 2021 <https://www.reporterherald.com/2021/10/08/innosphere-buys-third-parcel-to-help-with-possible-powerhouse-expansion/>

24 "Pandemic a boon for area's biotech industry" The Gainesville Sun January 11, 2021 <https://www.gainesville.com/story/business/2021/01/11/alachuas-biotech-industry-raises-1-b-2020/6620537002/>

MASSACHUSETTS

Harvard University began construction in July 2021 of a 40,000 sq. ft. facility in Watertown, MA, as part of a public-private partnership led by Harvard and MIT. The center seeks to foster partnerships among academics, biopharma, and medical leaders to accelerate the production and delivery of new treatment technologies to patients. The center will also collaborate with the state government through the Massachusetts Life Science Center.²⁵

NEW YORK

In June 2021, Mayor DeBlasio and the NYC Economic Development Corporation announced a \$1 billion 10-year investment in infrastructure to support life science economic investment. The program includes: \$200 million in city investment to support the construction of commercial lab space and incubators, \$300 million in city capital to support nonprofit facilities to spur new research that translates into companies, jobs, medicines, and advanced technologies, \$5 million to enhance the Life Sciences Expansion Fund to support early-stage companies and \$5 million to expand the LifeSci NYC Internship program to develop the city's life sciences talent pipeline.²⁶

Since 2016, the industry has grown its employment base by 7.2 percent, which is more than twice the growth rate for the overall private sector.

Bioscience industry establishments and average wages grew as well; and the industry continues to stand out as a major job generator among knowledge and technology-driven sectors for the U.S. economy.

TENNESSEE

The State of Tennessee, as part of its fiscal year 2021-2022 budget, has directed \$2.5 million in funding to a public-private partnership to develop animal health drug products through partnerships with state universities that have agriculture and veterinary medicine programs that study animal cancers and dermatological disorders.²⁷

WASHINGTON STATE

Cancer Research Endowment (CARE) Fund: The Andy Hill CARE Fund is a public-private partnership model designed to prioritize cancer research, leverage Washington's existing cancer facilities and talent, incentivize additional investment, create jobs, and advance the biotech, medical device, and health care IT industries in Washington. The fund has a budget from the State of \$7.5 million.²⁸

²⁵ "Press Release: Introducing Landmark Bio and Appointment of Ran Zheng as CEO" July 29, 2021 <https://www.life-sciences-usa.com/news/landmark-bio-appoints-ran-pbllic-mit-massachusetts-institute-2001-118632.html>

²⁶ "A Recovery for All of Us: New York City Invests \$1 Billion in Life Sciences" June 9, 2021 <https://www1.nyc.gov/office-of-the-mayor/news/414-21/recovery-all-us-new-york-city-invests-1-billion-life-sciences>

²⁷ <https://www.tn.gov/agriculture/businesses/animals/animal-health.html>

²⁸ <https://www.wacarefund.org>

Early-Stage Bioscience Company FUNDING MEASURES

While it is critical to have financing available for each stage of development

including early-stage, proof-of-concept, and prototype development, a state or region must also be able to access national and regional venture capital pools as bioscience firms mature and move closer to the market. In short, leading states and regions address a continuum of capital needs from prototype through seed to later stage formal venture financing.

ARIZONA

The Arizona Innovation Challenge is hosted by the Arizona Commerce Authority and competitively awards \$3 million in grants annually. One of the largest business plan competitions in the country, the Arizona Innovation Challenge is designed to advance innovation and technology commercialization opportunities in Arizona by assisting early-stage ventures to scale. In 2021, there were 110 applications with 26 semifinalists chosen in October, of that eight are in the biotech and life sciences sectors. Approximately 30% of awards have gone to life science/healthcare companies since 2011.²⁹

INDIANA

Indianapolis-based Elevate Ventures launched its announced Innovation Voucher Program in cooperation with the Indiana Economic Development Corp. to provide access to up to \$50,000 in funding for "innovation-driven research and product development capabilities" among Hoosier startups. The program is managed through Elevate Ventures, which matches \$.50 toward every federal dollar awarded, up to \$50,000 per Phase I federal award. Any given company, including subsidiaries, can receive a lifetime maximum of \$150,000.³⁰

NEW JERSEY

The New Jersey \$500 million Innovation Evergreen Fund invests the bond auction proceeds, alongside at least \$250 million in funds from venture capital firms, into promising startups with the potential to scale up and create jobs. Companies that purchase tax credits through the auction will also be required to make additional commitments, for example, providing mentoring and networking support for startups that receive investments through the Fund. In addition, the noteworthy New Jersey Net Operating Loss (NOL) provision continues to be of assistance to all phases of industry development in that state.³¹

OREGON

Oregon InC is a public-private partnership that helps create new jobs and new companies through three funding mechanisms focused on high impact opportunity projects in product development and testing, or expedited technology commercialization, and SBIR support to assist small businesses with access to federal non-dilutive funding. In addition, the University Innovation Research Fund (UIRF) enables Oregon's public universities to better compete at the national level for federal research funds aimed at economic innovation that require a local match.³²

²⁹ <https://www.azbio.org/2021-arizona-innovation-challenge>

³⁰ <https://elevateventures.com/>

³¹ "New Jersey Innovation Evergreen Fund" NJ Economic Development Authority <https://www.njeda.com/evergreen/>

³² <https://research.uoregon.edu/apply/apply-internal-funding/university-innovation-research-fund-business-oregon>

OHIO

Ohio Innovation Districts - JobsOhio, together with the state of Ohio and partners, is investing over \$3 billion to fuel the creation of three world-class Innovation Districts. The overall effort includes the JobsOhio R&D Centers providing funding up to \$100 million to facilitate the creation of new R&D centers across Ohio in nine targeted industries including the life sciences. In addition, the Innovation Ohio Loan Fund provides loans for acquisition, construction, and related capital costs of technology, facilities, and equipment purchases. The fund was created to help Ohio companies develop next-generation products and services within the state's key industry sectors. Loans range from \$500,000 to \$1.5 million and can cover up to 75% of the project cost.³³

OTHER RECENT INNOVATIVE BIOSCIENCE-RELATED INITIATIVES:

MIDWEST

Iowa legislators created an agricultural industry finance corporation to support agricultural biotechnology advancements in the state. **Kansas** provides state-backed bonds for the development of both biotechnology facilities and affiliated research. **Michigan's** Economic Growth Authority Board was given authorization to provide tax credits for new or retained jobs in technology fields, including biotechnology research and product development. **Illinois** passed its first-ever SBIR matching-grant legislation and funding. **Minnesota** authorized sales tax abatements for various businesses including biotechnology. **Ohio's** Innovation Ohio Loan Fund (IOF Loan) promotes assistance to existing Ohio companies in developing next generation products and services within certain targeted industry sectors including the biosciences. **Nebraska** now has manufacturing sales and use tax deferral/waivers for facilities in high unemployment counties within a community empowerment zone.

EAST

The **Delaware** Bioscience Center for Advanced Technology continues to award applied research collaboration grants among the academic and industrial bioscience research communities to address the technology innovation gap and promote economic development in Delaware. **Maine** authorized funding for the International Northeast Biotechnology Corridor and a seed capital tax credit to encourage investments through private investment capital funds with up to 60% cash credit for fixed assets, research, and working capital. **Maryland's** *Invest Maryland* provides \$100 million in insurance premium tax credits to raise venture capital for the State's entrepreneurs. Two-thirds of the funds will be invested on behalf of the State by private venture capital firms, while the Maryland Venture Fund and the Maryland Small Business Development Financing Authority will administer the remaining one-third. **Massachusetts'** Cooperative Research Grant supports industry-sponsored research at universities and facilitates scientific discoveries that lead to medical applications with grants of \$250,000 per year for up to three years, in a 1:1 match with its industry partner. **New Jersey** enacted a \$25 million Investor Tax Credit program to spur investment and growth in that State's innovative and emerging technology sectors including the bioscience industry and *Research New Jersey* provides an on-line portal to identify experts, facilities, and intellectual property in cooperation with the state's universities. **Pennsylvania** enacted legislation to include "biotechnology" within the scope of its Industrial Development Act to support biotech enterprises as a tool of industrial development. **West Virginia** policymakers created a new SBIR matching-grant program.

³³ <https://www.jobsohio.com/blog/posts/innovation-districts-transforming-healthcare-and-technology-thrive-in-ohio/>

The strength and success of America's economy increasingly depends on our ability to innovate and provide solutions for American farmers, manufacturers, energy producers, retailers, and consumers. Biotechnology plays a leading role in strengthening food and energy security, reducing waste, and improving animal health for sustainability of our world.

WEST

California's *California Competes* tax credit is available to businesses that want to either relocate to or stay in California. \$180 million is available each fiscal year through 2023, with a maximum of 20% of the budget allowed to go to any one applicant per fiscal year. **Oregon's** *Oregon Nanoscience and Microtechnologies Institute* (ONAMI) is a state-funded non-profit innovation center that advances bioscience commercialization, drug, diagnostics, and other bioscience product development and startup business incubation in Oregon through strategic partnerships with businesses and universities. **Colorado** created advanced technology funds to finance research of biotechnology and technology transfer activities. The State's public employee retirement fund has also launched an investment vehicle that can fund Colorado-based capital formation opportunities. **Hawaii** has an exemption from excise taxes for biotechnology research, development, and production. **Washington** State enacted legislation to create biotechnology product and medical device manufacturing tax incentives. **Utah** offers an Economic Development Tax Increment benefit when companies reach certain employment milestones. **Montana's** *4th "F" Fund* provides direct assistance to that state's bioscience entrepreneurs, startups, and small businesses in need of money for travel to key conferences, small equipment purchases, or temporary staff assistance in relation to proposal development.

SOUTH

Arkansas legislation was enacted to provide income tax credits for biotechnology facilities, and associated business expenditures. **Kentucky's** *Unbridled Future* provides direction to the Kentucky Cabinet for Economic Development and its partners have identified 10 strategic business/industry sectors to focus its economic development efforts and six priority areas with actionable strategies related to each. Targeted industries include bioscience and healthcare technologies. Amendments to the **Louisiana** *Jobs Quality Act* now provide tax rebates to businesses that create jobs in the biotechnology field, and funding enhancements. **Oklahoma's** *EDGE Fund (Economic Development Generating Excellence)*, transfers the remaining funds to the Oklahoma State Regents Endowment Trust Fund to match privately funded endowed chairs, mostly in the areas of science, technology and math. **Texas** voters again approved the continuation of funding for the *Cancer Prevention and Research Institute of Texas* for innovation and technology transfer activities and is funded by bonds issued by the state.

GLOSSARY OF TERMS

Angel Investor: An investor who provides financial backing for small startups or entrepreneurs. Angel investors typically invest their own funds, as opposed to venture capitalists who manage pooled money in a professionally managed fund. The capital provided by an angel investor can be a one-time injection of seed money or ongoing support.

Biomanufacturing: A type of manufacturing that utilizes biological systems to produce commercially important biomaterials and biomolecules for use in medicines, food and beverage processing, and industrial applications.

Bioscience Research: The basic, applied, or translational research that leads to the development of therapeutics, diagnostics, or devices to improve human health or agriculture.

Business Incubation: A business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services.

Business Retention: The activity that an economic or workforce development agency undertakes in order to reduce the loss of private sector businesses.

Drug Development Costs: The total cost of developing a new drug, including studies conducted after regulatory approval. According to a 2020 analysis by the Tufts Center for the Study of Drug Development, the average cost is \$2.2 billion and up to ten years of research and testing.

Economic Development: A process that influences the growth and restructuring of an economy to enhance the economic well-being of a community. Economic development encompasses job creation, increases in community wealth, and the improvement of quality of life.

Fund of Funds: A "fund of funds" is an investment strategy of holding a portfolio of other investment funds rather than investing directly in stocks, bonds or other securities.

FDA Review: The regulatory process by which the U.S. Food and Drug Administration reviews a sponsor company's data from clinical studies to determine if the new product is safe and effective for its intended use.

Human Capital: A measure of the economic value of an employee's skill set, including education, experience, abilities, and productivity.



Incentives: Benefits or rewards offered to motivate action. Incentives are often a part of an economic development strategy, including tax abatements and credits, low interest loans, infrastructure improvements, job training, and land grants.

Net Operating Losses: Net operating loss is when a company's allowable deductions exceed its taxable income within a tax period. The NOL can generally be used to offset a company's tax payments in other tax periods through an IRS tax provision called a loss carryforward.

Initial Public Offering (IPO): The first sale of stock by a company to the public.

Public-Private Partnership: A venture which is funded and operated through a partnership between a government entity and one or more private sector companies, usually to finance, build or manage a project for the public good.

Seed Capital: The funding required to get a new business started. The capital is almost always supplied by an entrepreneur and his/her family, friends and relatives, and it is used to help attract other investments.

Tax Credit: The amount of money that can be offset against a tax liability. Tax credits are often used as an incentive to attract new companies and retain existing companies in the state.

Tax Exemption: The amount of money that can be subtracted from the assessed market rate. Tax exemptions are often granted to individuals, institutions and types of property.

All five of the industry's major subsectors have grown their employment base since 2018.



Economic Development Guide

CONCLUSION

As COVID-19 took the world by storm and businesses across many sectors scrambled to adapt, the U.S. bioscience industry quickly rose to the occasion by tapping into its varied resources to address the challenge.

As can be seen in this report, state and regional partnerships are working together to support the industry's health, agriculture, and environment R&D and manufacturing efforts. Whether the need is capital, workforce, facilities, innovative ideas to transfer, or supportive business climate legislation, the bioscience industry has worked with public and private entities to move cutting-edge research into products for citizens here in the U.S. and around the world.

But just as bioscience research & development have faced new challenges, there also must be increased levels of communication and thoughtful measures to keep the industry vibrant in the face of continuing international competition. The future of science and its application in the goods and services provided by the bioscience industry will exist only if public-private partnership strategies continue to seek answers to address future global challenges.

Bioscience industry wages now reach nearly two times the overall U.S. average—the average bioscience worker earns more than \$107,000, or \$50,000 more than the nation's private sector average.

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