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the
impossible
possible.



The U.S. Biosciences Industry in the States:

Best Practices in Innovation, Partnerships,
and Job Creation



Where
breakthroughs
begin





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INTRODUCTION

As the nation emerges from the global COVID-19 pandemic, the U.S. Biosciences industry continues to illustrate its value 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.

Even during the economic downturn of 2020-2022, the Biosciences industry actually grew and its advancements continue into 2023, providing ample awareness to state and local stakeholders that Biosciences companies are an important component of gathering people, developing ideas, and bringing prosperity to states, cities, and municipalities with the industry in their location.

In its seventh edition, this report reviews the latest state and regional economic development measures that support the Biosciences, or life science, industries. The analysis is developed by the Biotechnology Innovation Organization (BIO), in partnership with the Council of State Bioscience Associations (CSBA), to highlight noteworthy public policy strategies and programs to assist policy leaders and their industry partners in identifying new measures that enhance the future prospects of Biosciences in their states and regions.

From an analysis of current state public policy efforts to support the Biosciences, the authors have identified four consensus strategies that states have created to retain the industry and grow the size and diversity of all of the Biosciences industry sectors across the states:

1. Building career pathways for future Biosciences talent is crucial.

Attracting and retaining a continuing flow of educated (Ph.D., MS, BS, AA) and technically -proficient workers is essential to a state aspiring to enhance a Biosciences industry presence. In this global economy, nearly every competitor has access to breakthroughs in technology and to the equipment and capital to produce standardized products. It is the regions that possess the human capital, with its insights and competencies, that experience an enormous competitive advantage.

2. States and regions are addressing their regulatory climate to ensure predictable and stable regulatory treatment of Biosciences firms.

A stable and supportive public policy framework is vital to industry firms, large and small. It is impracticable, and ill-advised, for any state, city or municipality to miss the value of selective incentives to either hold existing Biosciences companies or attract new enterprises.

Lawmakers and economic development professionals have become increasingly aware of the unique challenges facing Biosciences companies, such as the high research costs and the long development timeline involved in bringing a new Biosciences product to market. They understand the importance of a stable and supportive business industry climate, especially for small and emerging companies.



States are increasingly allowing companies to monetize earned R&D and net operating loss tax credits, sales tax exemptions for the purchase of R&D equipment, and investment tax credits to drive angel capital investment in the Biosciences industry, among a diverse of supportive public policy efforts.

3. Utilization of innovative technology-based economic development tax support strategies is on the rise.

Public and private stakeholders are creating entrepreneur resource programs that help connect biotech startups with early-stage capital.

Supportive measures include investor tax credits to spur more early-stage investment in Biosciences companies, and seed funds to bridge the funding gap for companies as they develop and advance their technologies, conduct initial research, and establish proof of concept before attracting larger investments.

“We will continue to grow Michigan’s economy by creating good-paying jobs for Michiganders while expanding on our leadership in the life sciences and agribusiness sectors.”

Michigan Governor Gretchen Whitmer

4. Universities and research centers continue to be strong partners in pre-commercialization research and technology transfer.

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, U.S. colleges and universities continue to be the international leaders in generating cutting-edge basic research and creating companies from that research effort.

States have made company formation a high priority, especially policies that encourage full funding of basic research, predictability of patents, and flexible technology transfer, and that provide early-stage funding opportunities and incentives that will serve to stimulate biotechnology innovation.

As the contents of this report illustrate, state and regional governments are taking measures to increase the number of new and innovative economic development initiatives to support Biosciences company creation, expansion, and attraction for the betterment of their communities.

U.S. Biosciences Industry Economic Impacts **AND INDUSTRY SECTOR OPPORTUNITIES**

Despite the challenges of a global pandemic and the resulting economic slowdown,

the U.S. Biosciences industry has continued to hire and grow its employment base. In 2021, the Biosciences industry grew its employment base by 1.4% while the overall private sector saw a 5.1% decline.

- In 2021 the national Biosciences industry employment reached 2.1 million jobs in more than 127,000 business establishments spread across every state and Puerto Rico.
- Since 2018, Biosciences employers grew their payrolls by 11 percent while the private sector overall experienced a net job decline of 1.5 percent, due to the steep job losses experienced during the initial pandemic wave and economic shutdowns of 2020. Bioscience industry establishments and average wages also have risen at double-digit rates over the latest three-year period..
- The Biosciences industry has not only outperformed the overall economy in recent years, but also other knowledge-and technology-intensive industry sectors such as tech and aerospace manufacturing, in its employment growth.
- All five of the industry's major subsectors – Pharmaceuticals, Agriculture and Environment, Medical Devices, Research Laboratories, Specialized Distribution – have contributed to the employment growth seen since 2020, led by impressive, double-digit jobs gains in research, testing, medical labs and pharmaceutical manufacturing, especially during the pandemic.
- The Biosciences continue to generate high-wage jobs reflecting the industry's outsized demand for STEM talent and a highly skilled workforce. In 2021, U.S. Biosciences workers earned nearly \$126,000 per year, on average, which is \$58,000 or 85 percent greater than that earned by their counterparts in the overall private sector.
- The total economic impact of the Biosciences industry on the U.S. economy, as measured by overall output, totaled \$2.9 trillion dollars in 2021.

"Life sciences have become a strategic pillar of Utah's economy. The industry embodies entrepreneurship and innovation in its work to improve and save lives through advanced testing, novel technologies, and groundbreaking cures."

Utah Governor Spencer J. Cox



Commercial Applications for Job Creation and Development:

Beyond the economic numbers the Biosciences industry provides a variety of job opportunities across a number of commercial applications that illustrate the many ways a person can successfully participate in this growing technology sector.

1). Medical Care: Biotechnology tools and techniques open new research avenues for discovering how healthy bodies work and what goes wrong when problems arise. In human health care, biotechnology products include quicker and more accurate diagnostics tests and therapies with fewer side effects because they are based on the body's self-healing capabilities.

- **Medicines** – Biotechnology medicines assist the body in fighting infections or carrying out specific functions. Biotechnology also uses other living organisms – plant and animal cells, viruses and yeasts – to assist in the large-scale production of medicines for human use. Some new biotechnology medicines approved by the FDA include treatments for anemia, cystic fibrosis, growth efficiency, hemophilia, leukemia, hepatitis, transplant rejection and many forms of cancer.
- **Vaccines** – A biotechnology vaccine consists of the antigen, not the actual microbe. By isolating antigens and producing them in the laboratory, it is possible to make new vaccines that cannot transmit the virus itself.

- **Diagnostics** – Biotechnology has revolutionized the medical diagnostics field by providing accurate and relatively inexpensive tests for a wide spectrum of diseases (e.g., blood screening test for cholesterol, HIV, etc.) as well as for consumer products, such as home pregnancy tests.
- **Gene Therapy** – Gene therapy uses the genes themselves as drugs to treat hereditary genetic disorders.

2.) Agricultural Production: Humanity has always relied on living things for food, shelter, clothing, and fuel. Our demand for these resources will increase as the world's population grows. In 1900, the global population was approximately 1.6 billion. This number has surged to over 6 billion today, and the United Nations expects the global population will reach 10 billion by 2030. Agricultural biotechnology can help humanity meet ever-increasing need by increasing yields, decreasing water and fertilizer usage, and provide for pest control methods that are more compatible with the environment.

- **Crop plant production** – Farmers and breeders have relied for centuries on crossbreeding and other genetic modification techniques to improve the yield and quality of crops. The tools of biotechnology allow plant breeders to select single genes that product desired traits and move them from one plant to another, thus opening a world of traits to benefit food production.

- **Environmental benefits of crop production** – New biotechnology diagnostics tools detect plant diseases earlier and more accurately, decreasing the amount of chemicals needed to control the disease.
- **Plant-Made Pharmaceuticals** – With biotechnology scientists now use transgenic plants as manufacturing plants for pharmaceutical compounds, making plant-produced antibodies 25 to 100 times less expensive than cell fermentation methods.
- **Livestock Production** – Improvements in biotechnology research has fostered enhanced abilities to detect, treat and prevent diseases from better feed derived from transgenic crops designed to meet the dietary needs of different farm animals.

3.) Industrial and Environmental Applications:

The biotechnology industry employs the techniques of modern molecular biology to reduce the environmental impact of manufacturing and can best be characterized by the reduction or elimination of waste and low consumption of energy. Industrial and environmental biotechnology also works to make manufacturing processes more efficient for industries such as textiles, paper and pulp, and specialty chemicals.

- **Industrial Manufacturing Processes** – Biotechnology offers many options for minimizing the environmental impact of manufacturing processes by decreasing energy use and replacing harsh chemicals with biodegradable molecules produced by living plants and organisms.
- **Green Plastics** – Replacement of petroleum-derived polymers with biological polymers derived from grain or agricultural biomass is another environmentally-friendly aspect of biotechnology applications.

- **Environmental Monitoring and Remediation** – The techniques of biotechnology science are providing novel methods for diagnosing environmental problems and assessing normal environmental remediation. The remarkable ability of microbes to break down chemicals is proving useful not only in pollution remediation but also in pollutant detection.

4.) Other Applications:

- **DNA Fingerprinting** – In its simplest form, DNA fingerprinting is the process of cross-matching two strands of DNA to establish paternity. Comparing the different-sized DNA fragments of two samples provides very strong evidence about whether or not the two samples come from a single source or individual.
- **Space** – Biotechnology has aided NASA solve some of the toughest problems holding back space exploration, such as putting heavy objects into outer space, controlling spacecraft and explorer modules from the Earth, and developing energy-efficient ways to feed astronauts and keep them safe and healthy while they are far from home.
- **Domestic Animal Health** – The Center for Veterinary Biologics at the USDA has licensed more than 90 veterinary biotech products, including therapeutics for horses, a vaccine for feline leukemia, and gene-based drugs and vaccines to treat arthritis, infectious diseases and cancer in companion animals.

“Technology, aerospace, biotechnology, advanced manufacturing and many more industries are building for growth in North Carolina.”

North Carolina Governor Roy Cooper

Biosciences **HIGH-SKILLED JOBS, COMPANIES, AND WAGES**

The U.S. Biosciences industry stands out for being a steady generator and source of high-wage jobs. Industry wages are consistently significantly higher, on average, than those for the overall economy, reflecting the mix of skilled, high-quality jobs in demand within an industry advancing a wide range of value-adding products and services, and it further reflects the importance of the industry as a national economic engine.

In addition, industry employees who earn high average wages generate the demand for goods and services through their own personal spending. As a result, the Biosciences have a national economic impact that extends and multiplies well beyond the industry's direct employment and earnings. The chart below illustrates that every state, and Puerto Rico have the Biosciences industry in their industrial mix of private sector employment and the average salaries that accompany this innovative technology industry.

STATE	Bioscience Industry Establishments, 2021	Bioscience Industry Employment, 2021	Bioscience Industry Avg. Wages, 2021
United States	127,389	2,135,704	\$125,750
Alabama	1,264	14,372	\$77,658
Alaska	171	1,147	\$72,574
Arizona	2,912	36,410	\$99,585
Arkansas	1,316	10,177	\$79,472
California	14,268	334,690	\$163,181
Colorado	3,359	38,102	\$117,225
Connecticut	2,021	24,251	\$136,103
Delaware	686	7,190	\$131,612
District of Columbia	484	3,387	\$161,710
Florida	8,599	106,688	\$106,360
Georgia	3,349	38,449	\$97,413
Hawaii	424	3,393	\$79,396
Idaho	1,065	8,031	\$89,521
Illinois	4,297	90,941	\$141,681
Indiana	2,713	65,290	\$109,138
Iowa	1,805	26,469	\$87,885
Kansas	1,603	19,405	\$90,745
Kentucky	1,860	16,354	\$92,798

STATE	Bioscience Industry Establishments, 2021	Bioscience Industry Employment, 2021	Bioscience Industry Avg. Wages, 2021
Louisiana	1,609	12,353	\$99,681
Maine	575	10,374	\$89,095
Maryland	3,104	49,945	\$140,498
Massachusetts	4,612	131,800	\$202,857
Michigan	2,429	44,340	\$101,374
Minnesota	2,670	63,338	\$116,110
Mississippi	1,032	7,720	\$80,053
Missouri	2,662	35,739	\$97,496
Montana	645	3,745	\$84,944
Nebraska	1,424	18,147	\$82,718
Nevada	1,069	9,413	\$97,766
New Hampshire	875	8,293	\$119,883
New Jersey	4,340	104,989	\$165,670
New Mexico	770	6,821	\$72,248
New York	5,314	110,259	\$128,308
North Carolina	5,863	92,223	\$111,993
North Dakota	602	4,299	\$84,600
Ohio	4,290	59,052	\$98,478
Oklahoma	1,277	10,490	\$90,236
Oregon	1,664	17,392	\$89,192
Pennsylvania	3,123	93,105	\$126,292
Puerto Rico	999	38,673	\$57,207
Rhode Island	666	5,773	\$95,450
South Carolina	1,918	19,418	\$83,546
South Dakota	718	7,427	\$79,945
Tennessee	2,899	44,375	\$104,420
Texas	7,462	116,473	\$111,025
Utah	1,845	40,419	\$80,984
Vermont	342	2,747	\$91,235
Virginia	2,696	28,135	\$99,016
Washington	2,638	43,546	\$123,108
West Virginia	673	6,581	\$94,391
Wisconsin	2,152	42,483	\$95,151
Wyoming	238	1,073	\$81,889

Source: Peter M. Pellerito/Teconomy/BIO, *The U.S. Biosciences Industry Fostering Innovation and Driving America's Economy Forward*, 2022

State and Regional ECONOMIC DEVELOPMENT LEGISLATION GUIDE

The Biosciences sector has three distinct phases of company growth, including early-stage creation, successful testing and expansion, and the manufacturing of products and services in health, agriculture, and the environment. The following stages of development and priority legislative support mechanisms are needed for companies to succeed in a very competitive Biosciences 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.

Priority Legislative Enablers:

- SBIR/STTR Small Business Technology Match Funding
- Refundable/Transferable R&D Credits
- Angel Investor Tax Credit
- Seed Capital Tax Credit
- Incubator/Accelerator Funding
- Net Operating Loss (Carry-Over)

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 and funding sources may include venture funding, and early sales of products or services. These companies generally have less than 200 employees.

Priority Legislative Enablers

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

Manufacturing Companies: At 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 with traditional sources of financing placed in commercial loans and public stock offerings.

Priority Legislative Enablers:

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

SUPPORTIVE 2023 STATE TAX INCENTIVES FOR INDUSTRY DEVELOPMENT

State governments continue to enact tax credit legislation

to mitigate the significant financial risks associated with research and development and manufacturing in the Biosciences. Tax credits are an important component to building and growing a thriving Biosciences industry hub in a state and in maintaining the dominant U.S. position as the center of innovation.

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	Note: * indicates Refundable or salable tax credits.			
Alabama	■	■	■	
Alaska			■	■
Arizona		■	■*	■
Arkansas	■		■	
California		■	■	
Colorado	■	■	■	■
Connecticut		■	■*	■
Delaware	■	■	■*	
Florida	■	■	■	
Georgia		■	■	■
Hawaii	■	■	■*	■
Idaho		■	■	
Illinois	■	■	■	■
Indiana	■	■	■	■
Iowa	■	■	■*	■
Kansas		■	■	■
Kentucky	■	■	■	■
Louisiana	■	■	■	■
Maine		■	■	■
Maryland	■	■	■*	■
Massachusetts	■	■	■*	■

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				
Minnesota	■	■	■	■
Mississippi		■	■	
Missouri		■	■	
Montana	■			■
Nebraska	■	■	■*	■
Nevada			■	
New Jersey	■	■	■*	■
New Mexico	■	■	■*	■
New York		■	■*	■
North Carolina	■	■		
North Dakota		■	■	■
Ohio		■	■	
Oklahoma		■		■
Oregon	■	■		■
Pennsylvania		■	■*	■
Rhode Island	■	■	■	■
South Carolina	■	■	■	
South Dakota	■	■		
Tennessee	■	■	■	
Texas		■		
Utah	■	■	■	■
Vermont				
Virginia	■	■	■*	■
Washington	■	■		
West Virginia	■	■		■
Wisconsin	■	■	■*	■
Wyoming	■	■		
Puerto Rico	■	■	■	■

■ Yes



Dynamic Bioscience Supportive **TAX CREDIT MEASURES**

State governments currently enact tax credit legislation to mitigate the significant financial risks associated with research and development in the Biosciences.

Tax credits are an important component to building and growing a thriving Biosciences industry hub in a state and in maintaining the dominant U.S. position as the center of innovation.

Due to the extensive length of time inherent to the drug development process, small biotechnology companies, for example, often have difficulty obtaining early-stage financing for their research and development. Given that these smaller biotech companies are not yet profitable, they are unable to immediately use their tax assets to offset income.

- In 2022, the **Colorado** legislature expanded the Advanced Industries Investment Tax Credit, increasing the funds available for qualifying investments in life sciences and other designated advanced Industries from \$750,000 to \$4 million. Also included is an increase in the qualified investments in rural counties or enterprised zones.
- The **Connecticut** General Assembly has increased the research and development tax credit from 50% to 70% level, in Fiscal year 2023.
- The newly-approved **Illinois Angel Investment Tax Credit Program** encourages investment in innovative, early-stage companies to help obtain the working capital needed to further the growth of their company in Illinois. Investors in companies that are certified as Qualified New Business Ventures (QNBVs) can receive a state tax credit equal to 25% of their investment (up to \$2 million). A total of \$10 million in Angel Investment tax credits a year are allocated with set-asides for minority-owned, women-owned person with a disability-owned, and rural businesses. Credits will be released by quarter, on a first-come first-served basis.
- **Maryland's Biotechnology Investment Incentive Tax Credit (BIITC)** provides an investor with a refundable State income tax credit for an eligible investment in a Qualified Maryland Biotechnology Company (QMBC). BIITC provides an income tax credit equal to 33% of an eligible investment in a QMBC up to \$250,000 in tax credits, or 50% of an eligible investment in a QMBC up to \$500,000 in tax credits if the QMBC is located in certain Maryland counties. Enhanced tax credits are also available for eligible investments made in certain QMBCs located in Opportunity Zones. Total credits issued during the fiscal year cannot exceed the budget amount and are, therefore, issued on a first come basis. The credit is refundable if the investor has no Maryland income tax liability.

"As governor, I am working to build an Arizona for everyone. Innovation is at the heart of this mission to find breakthroughs in biosciences technology and sustainability."

Arizona Governor Katie Hobbs



- The **New Jersey Technology Business Tax Certificate Transfer Program** allows new or expanding emerging tech/biotech companies in New Jersey with unused amounts of R&D tax credits which cannot be applied for the tax year, to surrender or transfer those tax benefits for use by other corporation business taxpayers in New Jersey, provided that the taxpayer receiving the surrendered tax benefits is not affiliated with the corporation that is surrendering its tax benefits under the program. The maximum lifetime value of surrendered tax benefits that a corporation shall be permitted to surrender pursuant to the program is \$20,000,000.
- The **New York State** Life Science Credit now offers up to a 15% refundable credit on qualified R&D expenses (20% for companies that employ fewer than 10 people) in New York state and is a refundable credit that can be used to offset a tax liability, or it can be received as a cash refund. Combined with the benefit of the federal R&D credit for life science startups in New York, there is a potential \$2,750,000 in cash rebates over a five-year period per eligible company and these credits can be directly applied to quarterly payroll and income taxes.
- In 2022 **Pennsylvania** passed legislation providing \$115 million in new tax credits annually in the renamed Pennsylvania Economic Development for Growing Economy (PA EDGE) program for a variety of technology sectors including semiconductor manufacturing and biomedical research, and biomedical research. A provision in the legislation requires a company to make a capital investment and create a formula for the hiring of a specified number of permanent jobs.
- **Wisconsin's** Refundable Research Tax Credit was increased in 2022 from 10% to 20% with any unused research credit that is not refundable and may be able to be carried forward.

"In 2023 We will put our focus on the high-wage and high-growth innovation sectors that have the potential to bring the greatest investment and most jobs into our state – clean energy, life sciences, advanced manufacturing."

New Jersey Governor Phil Murphy

Bioscience Incubators and Accelerators **FOR EARLY-STAGE COMPANY GROWTH**

An investment in the physical structure needs of both basic and applied research

at universities and life sciences-related institutes is an essential step in the Biosciences invention and innovation ecosystem. As the science of biotechnology has steadily advanced, the industrial applications of the industry have dramatically changed in the past ten years, state-of-the-art research demands modern research facilities.

Growing a company is a complex, multi-faceted effort. Founders of early-stage Biosciences and technology companies need qualified laboratory space, equipment, advice, mentoring, and investment for entrepreneurs reach their goals of getting to market.

State governments, academic research centers and private developers are very aware of this competitive advantage and have increasingly integrated the physical facilities into the long-term vision and strategy for economic development by setting aside physical assets to leverage public-private partnerships in early-stage commercialization efforts.

- QB3 is the **University of California's** center for innovation and entrepreneurship in life science and is a research organization combined with the fundamentals of a startup accelerator. QB3 benefits bio-entrepreneurs by creating high-value jobs and brings more than \$750 million each year with five of its incubators, an affiliated venture capital firm, and a special initiative in health technology. QB3 only focuses on life sciences, specifically quantitative Biosciences.
- **Connecticut's** CURE Innovation Commons opened in a renovated laboratory building in Groton that was donated by Pfizer. The 22,000-square-foot biotech incubation facility, which features laboratories, office suites, conference rooms, event space and office hours with mentor and industry experts, was renovated with a \$4.2 million grant from their state Department of Economic and Community Development.
- **Delaware's** Graduated Lab Space Grants incentive program creates "ready-to-go" lab space for companies growing out of space that hampers their ability to continue thriving in Delaware. Target companies include early-stage and small to medium sized companies that are growing out of their existing space in Delaware, as well as similar companies from outside of the state which are considering relocating or expanding to Delaware. The Agreement is structured so that both the company receiving the grant and the space owner/lessor are parties to ensure that: 1) the company remains operating in the state for a period of five years; and 2) the owner maintains the improved space as a community asset for the same length of time, regardless of whether the Company Grantee leaves before the end of the five-year term. Eligible applicants may apply for a grant of up to 33% of the fit-out or building costs for the lab space portion of the space.

- The Sid Martin Biotechnology incubator has approximately 40,000 square feet of area and is funded by the **University of Florida** and the United States Department of Agriculture and the Florida Legislature with its mission of nurturing the growth of startup companies that work in the field of Biosciences and related to the University of Florida. The incubator deals in all areas of Biosciences such as life sciences, biomedical research, medicine and chemical science.

“Over a decade ago, (Former) Governor Patrick and the legislature made a bet on life sciences in this state — offering funding and support and leadership to make Massachusetts a leader in biotech. Now, the results are nothing short of remarkable.”

Massachusetts Governor Maura Healey

- LabCentral is a **Massachusetts** based non-profit company which was founded in 2013 as a launchpad for highly prospective life sciences and biotech start-ups. It has over 100,000 sq. feet of operational area in Cambridge University and on the Harvard University campus. LabCentral has a set-up of fully permitted and fully equipped laboratory and office spaces for as many as 100 start-ups including around 500 scientists and entrepreneurs. Moreover, LabCentral is building a more supportable and comprehensive biotech system that supports development, workforce training and next-generation entrepreneurship through its LabCentral Ignite initiative. LabCentral offers world-class facility and organizational support, a skilled and qualified laboratory operations team, and domain-specific events and programming as well as the other crucial facilities and support that early-stage startups need to push-start laboratory operations.
- Located in the heart of **New Jersey's** research corridor between Rutgers and Princeton universities, the Commercialization Center for Innovative Technologies (CCIT) incubator offers wet labs and access to a wide array of resource and networking opportunities essential to the startup community. The incubator's leasable space includes offices, as well as both small and large labs. The 46,000-square-foot CCIT also offers discounted first-year rent for university spinouts, educational programs and business development resources, including helping to identify funding sources.
- The **North Carolina** Biotechnology Center's Landing Pad program helps Biosciences companies establish a presence in the state. The effort offers short-term flexible lease office space in Research Triangle Park as well as easy access to NC's life science community facilitated by NCBiotech staff. Tenants have immediate access to a conference center, accounting and information services, university and investor connectivity, and a personal liaison to support a soft landing in North Carolina.
- The Portland State University Business Accelerator in **Oregon** is an organization of innovative entrepreneurs in Oregon. The institute has 36,000 square feet of total area, including a 2,600-square-foot Biosciences lab. PSU is the abode to future-ready technologies and Biosciences startups which come from all main Oregon research universities. The Accelerator provides office space and fully-loaded lab facilities are a plus for fast-growing startup needs. The dedicated and skilled staff of the accelerator appeals to the region's top science and technology startups. The startups are also leveraging the affordable co-working space, access to the conference room, monthly Business tycoons meetings and topic-related Lunch & Learns, fundraising and business management.

Workforce Development Measures for **BIOSCIENCE EMPLOYMENT**

Because workforce and economic development efforts naturally align, there is a growing recognition by state policy and education leaders that to continue job growth there needs to be public funding mechanisms to ensure a supply of skilled workers to meet Bioscience employer demand and economic prosperity for businesses and residents of the state.

State tax incentives continue to be important funding sources states can implement

in an innovative way to accomplish workforce and economic development collaboration to attract new businesses in a target growth industry and create jobs. BIO believes that there is a growing need for enhanced support through new legislation and public-private partnerships focused on the future of the Biosciences workplace at all levels of academic preparation for the Biosciences careers through educational opportunities.

- **Arizona** has established the Arizona Health Innovation Trust Fund as a vehicle to drive the creation of health innovations that can improve quality of life for the people of Arizona and increase opportunities for the high quality jobs Arizona health innovators create. The appropriation allows the initial set up of the fund and monies invested must mature for five (5) years from the date of deposit prior to the prescribed 4% distributions being made to a contracted Arizona non-profit that will focus on workforce development, entrepreneurial support, and mission related investments.
- In **Connecticut**, a new training program has been launched for New Haven residents interested in jobs in the city's rapidly growing biotechnology industry. BioLaunch's goal is to shape the biotech industry to better benefit the broader New Haven community, as well as to provide an avenue for historically underrepresented communities in biotech to build rewarding careers. The program is designed for non-college-bound 18 to 26-year-olds and includes both a classroom curriculum and internship opportunities.
- The **Georgia** Bioscience Training Center offers customized workforce training programs with high tech labs for pre-employment assessments, gowning simulations, production system and manufacturing training, testing of raw materials and microorganisms, aseptic practices, technology maintenance and metrology training, and computer labs. The center is operated by Quick Start and is designed to be altered to teach a variety of processes, pending a client's needs.
- BioNexus KC of Kansas City, **Kansas** is co-leading the development of a statewide workforce training initiative to help area life sciences employers fill in-demand jobs. The initiative also plays into a national challenge to rely less on overseas pharmaceutical manufacturing and bring more manufacturing capabilities stateside. The \$2 million workforce training effort award has established the "Bioscience Industry Occupational Training and Equity Collaborative Hub for Missouri" or BIOTECH for MO.

- **New York City's** BioBAT, Inc. is a partnership created by the Research Foundation for SUNY that works to support the advancement of the life science industry by providing facilities and resources for scientific research and advanced manufacturing at the Brooklyn Army Terminal. A focus of BioBAT's mission is to attract and retain promising research firms and develop a skilled 21st Century workforce.
- **The University of Minnesota's** BioTechnology Institute (BTI) received a grant awarded by the State of Minnesota Job Skills Partnership (MJSP) Board to kick start their training efforts. Over the next three years, BTI will provide advanced biopharmaceutical training for up to 125 Takeda employees working at its biologics manufacturing facility in Brooklyn Park, Minnesota. The training program will consist of six courses focused on a range of topics based on current Good Manufacturing Practices (cGMP), technical writing, facility operations and the product life cycle of biologics.
- **BioSTL** has been awarded a \$2 million grant from the **Missouri Department of Economic Development** to create the Bioscience Industry Occupational Training and Equity Collaborative Hub for Missouri, which will help train underrepresented communities for quality employment in the Biosciences industry.
- The Nebraska Legislature approved the creation of the **Nebraska Innovation Hub Act** to serve as a resource for stimulating and supporting entrepreneurship and technology based small businesses in Nebraska. The Nebraska Department of Economic Development designates innovation hubs within iHub areas to stimulate partnerships economic development and job creation by leveraging iHub partner assets to provide an innovation platform for startup businesses, economic development organizations, business groups, and venture capitalists.

"New York is at the forefront of the rapidly growing life sciences industry, which has become a powerful growth engine for the state growth and is turning regions of the state into dynamic life science ."

New York Governor Kathy Hochul

- The **Oklahoma City** Innovation District's biomanufacturing workforce training center (BWTC) program. One of the only programs of its kind within the United States, the BWTC program presents inclusive, non-degreed careers within the city's emerging Biosciences industry that directly benefit from the BWTC program's output of skilled technicians that are able to step directly into the roles needed at local research labs and generate data more quickly.
- **Puerto Rico** and LIFT, the Detroit-based national manufacturing innovation institute, to open a local branch of its operation to offer advanced applied research and development, as well as advanced manufacturing on the island. In the agreement, LIFT will engage to support the local workforce development in the Biosciences and CHIP's sectors by providing next-generation manufacturing training opportunities.

- **Oregon's** BioCatalyst Advanced Training Program offers Biosciences-specific professional training to under/unemployed Oregonians hoping to launch their careers in the Biosciences industry. The objective is to prepare qualified, mid-career candidates to earn sector-specific Biosciences industry certificates to facilitate this employment transition. Business Oregon, in partnership with Oregon BIO, received funding from the legislature to start the BioCatalyst program in 2014.
- The **South Carolina** Biotechnology Industry Organization (SCBIO) launched its life sciences workforce development mobile app 'Rad Lab' and is designed for middle- and high schoolers across South Carolina. It is part of a workforce and career development initiative spearheaded by SCBIO and select industry partners that seek to connect over 400,000 middle and high schoolers in the state, including underserved youth, to life-science careers via mobile gaming technology.
- The Employee Training Incentive Program provides refundable tax credits to **New York State** employers for skills training that upgrades or improves the productivity of their employees. Businesses can also receive tax credits for approved internship programs that provide training in advanced technology, life sciences, software development or clean energy. Tax credits may be awarded for costs associated with an eligible training program for current or new employees. The internship program is available for current students, recent graduates and recent members of the armed forces. Tax credits may be issued only after approved training is completed.
- The **University of Washington** Bothell School of STEM has been awarded additional funding from the FY 2022 Omnibus Appropriations Bill to support the growing Biomedical Innovation Partnership Zone (IPZ) in the Bothell-Woodinville corridor, as well as the broad array of biotech opportunities in the region and across the state. Its aim is to expand curriculum, increase student-faculty research and create a pipeline of talent for the growing biotech sector.

"In order to make Virginia a leader in biotechnology, life sciences and pharmaceutical manufacturing, we have to accelerate our growth and create a best-in-class business environment for this industry."

Virginia Governor Glenn Youngkin



GLOSSARY OF TERMS

As the science of biotechnology has advanced over the decades, the need to better define key components of the various facets of company creation and expansion and description of the foundational building blocks for individuals or groups interested in various phases and tools needed to successfully navigate the growing economic development community of interest in the Biosciences. Here are some examples.

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.

Bioeconomy: Economic activity involving the use of biotechnology and biomass in the production of goods, services, or energy. This includes the application of scientific and technological developments to agriculture, health, chemical, and energy industries.

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 \$2.7 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 as 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 the result 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.

Small Business Innovation Research Grants (SBIR): Federal and state grant agreements entered into with companies focused on the performance of experimental, developmental or research work leading to potential creation of goods and services.

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.



"Illinois continues to grow as a thriving innovation hub with world-class research institutions and top-tier talent for a biomedical research hub that will take medical research to a new level."

Illinois Governor J.B. Pritzger

Economic Development Guide

CONCLUSION

As illustrated in this 2023 biennial economic development report, every U.S. state continues to actively engage in building Biosciences industry infrastructure through state-based policy measures that encourage investment in capital and human resources to support companies in a challenging economic innovation cycle.

We have growing life science clusters, both large and small, and a diverse community of stakeholder groups that provide the strategic research initiatives, financing, enabling legislation, state-of-the-art laboratories within both industry and university research parks, and workforce training efforts needed to successfully compete in today's marketplace of ideas.

Since the beginning of the Biosciences industry forty-plus years ago, public-private partnerships that provide cutting-edge research turned products for the marketplace are crucial at all levels of company creation and expansion, and the future of our industry is predicated on leadership and commitment to maintain and grow the Biosciences industry into the future.

"We've always talked about Rhode Island being a hub of bioscience activity and over the past few years we've laid the foundation for this growing sector. It's time to double down and make a major investment in Rhode Island's life science industry."

Rhode Island Governor Dan McKee

Beyond the economic efforts noted in the report, we believe that while we are living through one of the most challenging times in our nation's history, this has also been a clarifying time. Clarifying in the sense that we are seeing the best of the scientific community and unprecedented public collaboration and cooperation within our industry to identify ways to improve the human condition through science.

Principal Author, Editor

Peter M. Pellerito

BIO Senior Policy Adviser

*Federal/State Economic Development
& Technology Transfer Lead*

BIO Editor

Michael Linehan

BIO Manager, State Government Affairs

Designed and Formatted by:

Meagan Samuel, 29M Designs, LLC

Editorial Review Contributors:

Vicky Stinson, *BIO Director of State Policy
& Strategic Communications*

Patrick Plues, *BIO Vice President, State
Government Affairs*

Michele Oshman, *BIO Vice President of
External Affairs*

John Guy, *BIO Manager of Emerging
Companies Policy*



1201 New York Avenue, NW Ste. 1300
Washington, D.C. 20005
bio.org