



BIOSCIENCE ECONOMIC DEVELOPMENT IN THE STATES: LEGISLATION AND JOB CREATION BEST PRACTICES

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Economic Development Trends of 2013–2014



The United States bioscience industry continues to be a significant economic engine creating high-wage, family-sustaining jobs with average wages well above the overall private sector. Despite a tough economic climate, the industry created jobs across the country with many states and regions maintaining or growing their industry presence in specialized industry subsectors.

This biennial report highlights new economic development initiatives created in the 2013 and 2014 legislative sessions that focus on key strategic building blocks for all phases of bioscience industry development. The following economic development measures support the vital growth of the bioscience industry.

- 16 states offer matching grants for Phase I and II Small Business Innovation Research (SBIR) grants to accelerate early stage company development
- 25 states offer tax credits to angel investors who invest in technology companies including the biosciences
- 36 states offer sales tax exemptions on equipment for both research and development (R&D) and manufacturing with several exemptions specifically for biomanufacturing
- 21 states invest state dollars in private venture-capital firms that fund small and emerging bioscience companies
- 39 states offer R&D tax credits for early stage research that is vital in moving research into commercialization

TRENDS FOR CONTINUED GROWTH

Public policy makers and other stakeholders worked to enact legislation over the past two years. An analysis of those efforts reveal the following trends in state economic development.

States Respond to Funding Hurdles

There is a growing recognition among state policy makers that biotechnology innovation can help to solve some of the healthcare, agricultural and industrial problems that are present in America, particularly if early stage funding for emerging bioscience companies is available. Policy makers have increased their support for the biosciences through more targeted legislation to increase available funding, particularly for emerging companies in their state.

Smaller Metropolitan Areas are Gaining Ground

Lower overall costs of occupancy, coupled with academic resources and an educated work force, continue to attract companies to locations outside the nation's largest metro areas. Even with industry consolidation, companies are driving a steadily increasing demand for space in life sciences-oriented facilities, keeping space occupied and rents stable.

Proximity to Academic Innovation is a Driving Influencer

Academic research anchors offer distinct features including the scale of their operation, their extensive collaborations with other research institutions and their multi-disciplinary approach that integrates complementary technologies to create a focus in a broad-based area of the biosciences. This broad foundation promotes both sustainability and flexibility in a rapidly changing bioscience universe.

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.

Public-Private Partnerships Create Commercialization Centers

Technology commercialization, as compared to technology transfer, continues to receive considerable attention. There has been a great deal of activity within the states to encourage and support the commercialization of discoveries coming out of universities, national laboratories and other research institutions. States are providing funding to universities to build capacity for technology transfer and

commercialization, and some states even support free-standing commercialization centers that provide in-depth assistance to create and grow companies.

Predictability Matters in Partnerships

States with a successful bioscience industry provide a predictable, stable source of funding for building the entrepreneurial infrastructure necessary to support the growth of science and innovation companies. This infrastructure includes incubator space, space for post-incubator companies, multi-tenant space, pilot or full-scale manufacturing space, and research park development for clustering young and mature companies.

Emphasis on Broader Bioscience Sector Development

States and regions are focusing activities on developing their agricultural, industrial and environmental bioscience sectors in addition to their biomedical and health sectors. A dozen years after the first approval of a biotechnology medicine, the first biotechnology-enhanced crop entered the marketplace. Now, scientists are using bioscience technologies to improve manufacturing processes, chemical synthesis and production. Several states and regions are focusing on the opportunities these applications present for their economies.

Workforce: An Essential Priority for Industry and State Government

State governments and regional economic development agencies are continuing to respond to bioscience industry needs for a well-trained workforce in all phases of bioscience testing and manufacturing. Those partners, in cooperation with the industry, have established bioscience workforce initiatives across a range of the educational spectrum, including:

- Establishing biomanufacturing technician two-year associate's degree programs;
- Offering new master and doctoral level programs in the bioscience field, and;
- Determining skill training and education needs through regular and continuing outreach to bioscience companies.

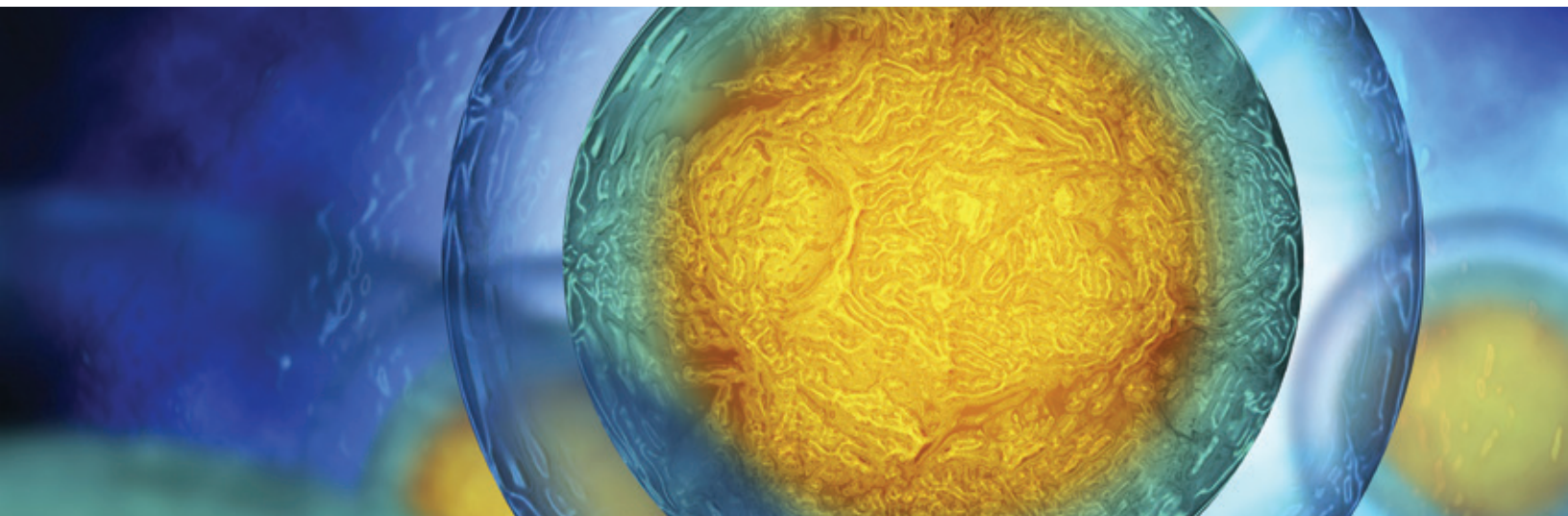
Defining the Biosciences

The Bioscience industry uses the knowledge of living organisms or other biological systems in the manufacturing of innovative products that address health, agricultural and environmental challenges. This diverse industry spans many markets and includes manufacturing, services, and research activities.

Whether the industry is called biotech, biosciences, or the life science industry, its diversity in scientific discovery and commercialization is defined by the application of biological knowledge.

In collaboration with BIO, the Battelle Technology Partnering Practice identified five major sectors of the biosciences that reflect the size and diversity of this growing technology sector.

- **Agricultural Feedstock and Chemicals:** Industries that utilize advances in biochemistry and biotechnology to produce products involved in crop protection, advanced seed, agricultural processing, bio-fuels, biodegradable materials from plant-based feedstock, sustainable industrial oils and lubricants, and enzymes and bio-based catalysts for industrial processes.
- **Drugs and Pharmaceuticals:** Industries that produce vaccines, biopharmaceuticals, tissue and cell culture media.
- **Medical Devices and Equipment:** Industries that produce a variety of biomedical products such as surgical instruments, orthopedic implants, bioimaging equipment, dental instruments and patient care products (such as walkers, wheelchairs and beds).
- **Research, Testing and Medical Laboratories:** Emerging companies working to develop and commercialize new drug discovery/delivery systems and gene and cell therapies, as well as more service-oriented firms involved in pre-clinical drug development, clinical trials, and research/laboratory support services. While primarily focused on human health, many companies also focus on research and testing for agriculture and veterinary uses.
- **Bioscience-related Distribution:** Industries that specialize in approaches such as cold storage and highly regulated product monitoring, and new technologies for distribution such as automated pharmaceutical distribution systems. These dedicated bioscience-related distribution industries include three unique subgroups: one associated with medical equipment and device distribution; another with drug distribution; and a third with agricultural-related chemicals and seed distribution. Each of these bioscience-related industries is becoming integral to the primary production of bioscience goods in an age of advanced logistics and the increasingly specialized nature of bioscience product development.



U.S. Bioscience Industry Jobs: A Signature Performer

The U.S. bioscience industry is a strong and growing component for the U.S. economy. Since Battelle and BIO began reporting on the growth and development of the bioscience industry in 2001, there has been significant growth in employment, business establishments, economic output and wages. In 2012, U.S. bioscience companies employed 1.62 million personnel across more than 73,000 individual business establishments. Looking back over the past decade reveals a national industry that has added nearly 111,000 new, high-paying jobs or 7.4 percent to its employment base.

According to Battelle, the long-term trend of employment from 2001 to 2012 demonstrates the strong performance of the bioscience industry as a job generation engine for the U.S. Over this time period total private sector employment grew by only 1.0 percent, whereas the bioscience industry grew at a rate more than seven times as high (7.4 percent).

As reported in 2014, the industry-wide average annual wage for bioscience workers reached \$88,202, a figure that's nearly \$40,000 more (or 80 percent greater) than that for the average worker in the nation's private sector (\$49,130).

"I ask that you join me in nurturing the cutting edge research that combines Montana innovation with our can-do spirit—both in traditional industries like agriculture and manufacturing, and in emerging fields like photonics and bioscience."

Montana Governor Steve Bullock January 2015

Employment Sector	Average Annual Wage
Drugs & Pharmaceuticals	\$106,576
Research, Testing & Medical Labs	\$91,248
Finance & Insurance	\$91,226
Total Biosciences	\$88,202
Bioscience-related Distribution	\$85,188
Professional & Technical Services	\$83,357
Information	\$82,013
Agricultural Feedstock & Chemicals	\$75,828
Medical Devices & Equipment	\$75,695
Manufacturing	\$60,491
Construction	\$52,294
Total Private Sector	\$49,130
Real Estate & Rental & Leasing	\$48,236
Transportation & Warehousing	\$46,611
Health Care & Social Assistance	\$45,407
Retail Trade	\$27,729

Source: Battelle/BIO State Bioscience Jobs, Investments and Innovation 2014

MATCHING BIOSCIENCE COMPANY PHASES OF DEVELOPMENT AND STATE POLICY SUPPORT MECHANISMS

Because of the lengthy commercialization timeline to success, the biosciences sector has three distinct phases of company creation and expansion. Over the past fifteen years, BIO, with the assistance of its member companies, has identified key enabling types of legislation to support emerging, testing, and manufacturing companies in our technology sector. This chart characterizes those phases of development and essential legislative support mechanisms needed by these companies.

Emerging Companies

Early-Stage Development. It is at this stage that company researchers identify the action mechanisms of the lead compound or diagnostics tool and develop protocols to begin verifying the viability of the discovery with early testing on in vitro media. Many of these companies can focus on developing products for markets that would otherwise not be served by larger organizations. Typically these companies have no products on the market, less than 100 employees, and are funded by Angel and Venture Capital supporters.

Testing Companies

Mid-Stage/Product Development. 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 and have products in Phase I FDA safety trials.

Late-Stage/Regulatory Review and Approval. Clinical trials are required to show that products are both safe and effective. Clinical research contractors are often retained. In the case of biopharmaceuticals, pilot-scale manufacturing facilities must be built or contract manufacturing capacity must be secured, along with the necessary scientific, engineering, operating, and maintenance personnel. Small quantities of the product must be produced for testing.

Manufacturing Companies

Mature/Manufacturing/Marketing and Sales. 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:

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

Foundational Legislative Enablers:

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

Foundational Legislative Enablers:

- Site and Infrastructure Grant Funds
- Renewable Energy Tax Credits
- Road Access and Rail Access Programs
- Sales and Use Tax Discounts, Exemptions and Refunds
- Utilities Rebates

Capital Formation Initiatives

State governments and regional economic development organizations have increasingly begun to target the bioscience industry because it is an economic engine that provides high-wage, high-skilled jobs across a broad range of occupations.

During the last decade, this understanding of the economic potential of the industry has led to policies and programs that provide supportive tax environments in capital formation, technology transfer, and funding for a workforce to facilitate research, development, and manufacturing.

The charts on the following pages demonstrate the extent to which state governments are targeting and supporting the industry for economic growth and development.

State Capital Formation Priorities

- Research and Development Tax Credits
- NOL Carry-forwards
- Tax Credit Transferability
- Sales and Use Tax Exemptions
- Creation of Capital Access Funds
- State Pension Fund Investment
- Capital Gains Tax Reductions
- Investment Tax Credit
- Developing Incubator/Shared Research & Manufacturing Facilities
- Workforce Development Programs

Small Business Innovation Research Matching Grants Specific to Biosciences

Fifteen states match various SBIR phases of development research.

State	SBIR Funding Focus/Bioscience Specific	Legislative Program Title
CT	Targeted toward manufacturers	Small Business Innovation and Diversification Program
DE	For SBIR Phase I	Small Business Innovation Research
FL	Requires a university partnership	Florida High Tech Corridor Phase II SBIR/STTR External Investment Program
FL	For SBIR Phase I and II	Florida Research Commercialization Matching Grant Program (currently closed)
HI	For SBIR Phase I	Hawaii Small Business Center
IA	For SBIR Phase I	
IN	For SBIR Phase I	Indiana 21st Century Research and Technology Fund
KS	Not exclusive to SBIR but still of interest	Kansas Bioscience Matching Fund
KY	For SBIR Phase I and II	Kentucky SBIR-STTR Matching Funds Program
MA	For SBIR Phase II	Small Business Matching Grant Program at Mass Life Sciences Center
MI	Only for commercialization purposes; for Phase I and II	Michigan Emerging Technologies Fund
MT	For SBIR Phase I	
NC	For SBIR Phase I (no funding for current year)	Phase I Matching Funds Program
OK	For SBIR Phase I	SBIR Phase II Matching Funds Program
SC	For SBIR Phase I	SC Launch SBIR/STTR Phase I Matching Grant Program
VA	For SBIR Phase I and II	Also STTR Phase I and II

Source: PMP Public Affairs Consulting

“Just as California has led the way with stem cell research, so too can we pioneer the new field of precision medicine which uses genomics, medical devices, computer sciences and other fields to treat individual patients, instead of broad populations.”

California Governor Jerry Brown January 2014

State Tax Credits to Encourage Early-stage Investment

States also use tax policies to encourage private investment in early-stage companies and/or in funds that make early-stage investments. Twenty-four states offer tax credits to angel investors who invest in technology companies, eight of which are targeted specifically to angel investors who invest in bioscience companies. Eleven states reported providing tax credits to individuals who invest in early-stage venture funds.

State	State Tax Credits Provided to:			
	Angel Investors	Bioscience Angel Investors	Investors in Early-Stage Venture Funds	Investors in Bioscience Early-Stage Venture Funds
AZ	■	■		
CO	■			
GA	■			
HI	■			
IN	■			
IA	■		■	
IL	■			
KS	■	■		
KY	■		■	
LA	■			
ME	■		■	
MD	■	■		
MN	■			
MT	■		■	
NJ	■	■		
NM	■	■	■	■
NY	■			
NC	■	■		
ND	■		■	
OH	■		■	
OK	■		■	
OR			■	
RI	■			
VA	■	■		
WV			■	
WI	■	■	■	■

Source: PMP Public Affairs Consulting

State Sales Tax Exemptions to Support the Growth of Bioscience Companies

Thirty-eight states reported exempting sales tax for equipment used in R&D, and thirty-five states reported exempting equipment purchased for biomanufacturing from sales tax. Eight states—California, Colorado, Missouri, New Jersey, New Mexico, North Carolina, Rhode Island and Wisconsin—have sales tax exemptions specifically targeted to bioscience firms.

State	Sales tax exemption for equipment used in R&D	Specifically targeted to bioscience	Sales tax on equipment purchased for biomanufacturing
AZ	■		■
CA	■	■	■
CO	■	■	■
CT	■		■
DE	■		■
FL	■		■
GA	■		■
HI	■		■
IL	■		■
IN	■		■
IA	■		■
KS	■		■
KY	■		■
LA	■		■
ME	■		■
MD	■		■
MA	■		■
MI	■		■
MN	■		■
MS	■		■
MO	■	■	■
NE	■		■
NV	■		■
NJ	■	■	■
NM	■	■	■
NY	■		■
NC	■	■	■
ND	■		■
OH	■		■
PA	■		■
PR	■		
RI	■	■	■
SC	■		■
SD	■		■
TX	■		
VA	■		■
WA	■		■
WI	■	■	

Source: PMP Public Affairs Consulting

Funds of Funds to Increase the Availability of Venture Capital

States also use tax credits to increase the availability of venture capital. They can create funds that make investments directly in companies, invest in privately managed funds that agree to invest in state companies; or create a fund that in turn invests in private venture-capital funds, which is referred to as a “fund of funds” if it involves more than one fund. As of 2014, Twelve states reported investing in a fund of funds, eleven states reported investing state dollars in private venture capital firms and fourteen states reported making direct investments in bioscience companies.

State	Invested in Fund of Funds	Invested in Private VC Firms	Invested in Bioscience Companies	Other
DE	■	■	■	
HI				Appropriated funds for contract with private nonprofit to provide funding for companies
IL	■	■	■	
KS			■	
KY	■	■	■	
MA			■	Through Massachusetts Technology Development Corporation
MD		■		
MI	■			
MT	■			
NJ	■	■	■	
NM	■	■	■	
NC	■	■		
OH	■	■	■	
OK	■		■	
OR	■			
PA		■	■	
RI			■	
SD			■	Provides financing for feasibility studies in the form of a forgivable loan
TN		■		
VA			■	
WI	■	■	■	

Source: PMP Public Affairs Consulting



State R&D Tax Credits

Thirty-nine states reported offering R&D tax credits, an increasing number of which offer a larger credit if the research is conducted by an in-state university. R&D tax credits are refundable in ten states and transferable in five.

State	R&D Tax Credit	Transferable	Refundable	Comments
AR	■	■	■	
AZ	■			
CA	■			
CO	■			
CT	■		■	
DE	■			
GA	■			
HI	■		■	
ID	■			
IL	■			
IN	■			
IA	■		■	Refundable tax credit is equal to 6.5% of qualified expenditures and it may be increased for bioscience firms participating in the High Quality Jobs Programs
KS	■			
KY	■			
LA	■		■	
ME	■			
MD	■			
MA	■		■	Refundable if company creates more than 10 jobs and applies to Massachusetts Life Sciences Center (MLSC)
MN	■			
MS	■			R&D Jobs Credit
MT	■			
NE	■		■	
NH	■	■		
NJ	■	■		In FY 2012 the R&D Tax Credit was increased from 50% to 100%
NM	■			
NC	■			
ND	■			
NY	■		■	
OH	■			
OR	■			
PA	■	■		
PR	■	■		
RI	■			The R & D tax credit has a carry forward of 14 years
SC	■			
TX	■			
UT	■			
VA	■		■	
WV	■		■	Investment Credit
WI	■			

Source: PMP Public Affairs Consulting

Capital Formation

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.

CALIFORNIA

In 2013, California's state government modified state tax breaks, replacing those breaks with new tax incentives by the state's GoBiz Department of Economic Development. One of the new programs created a statewide sales tax exemption on manufacturing of equipment purchases for biotech R&D.

CONNECTICUT

In 2013, Connecticut created a \$200 million fund to spur bioscience R&D. The fund provides grants, equity investments, loans and loan guarantees to bioscience related initiatives over the next 10 years. It follows the \$864 million that the Bioscience Connecticut initiative approved in 2011, and a \$291 million investment in Jackson Laboratory.¹

FLORIDA

The Florida Technology Seed Capital Fund was launched in 2013 to foster private-sector investment funding, encourage state investments through seed funding for start-up companies, and advise companies on how to restructure their organizations in order to attract greater business opportunities. The Florida Capital Technology Seed Fund is a corporate subsidiary of Florida's Institute for the Commercialization of Public Research.²

INDIANA

The Indiana Biosciences Research Institute was launched in 2013 to accelerate collaboration among Indiana's academic and commercial research assets. By the end of 2013, the Institute had raised \$25 million from corporate and philanthropic funders, matching the \$25 million appropriated by the Indiana General Assembly.³

KANSAS

A new proof-of-concept fund supported by the University of Kansas will provide funding to mature research projects in all areas of technology, helping to attract industry investment and bring products to market. Applicants can apply for up to \$50,000 per proposal. They must clearly indicate the economic potential of their technology and identify companies that would be suitable partners for commercial success.⁴

KENTUCKY

Working with investors and high-tech companies focused on early-stage capital, Kentucky created the Kentucky Angel Investors Network (Kentucky Angels) in 2013 to link companies needing funds and accredited investors.⁵

MARYLAND

The Maryland Venture Fund is a state-funded seed and early-stage equity fund that receives annual allocations from the Maryland State Legislature. The Fund makes direct investments in technology and life science companies and indirect investments in venture capital funds. Approximately 40% of the Fund is invested in life science companies in the areas of therapeutics, medical devices and diagnostics.⁶

¹ Greg Bordonaro, "CI's \$200 Million Fund to Nurture Bioscience Research," *HartfordBusiness.com*, June 24, 2013, accessed May 2, 2015, <http://www.hartfordbusiness.com/article/20130624/PRINTEDITION/306209954/1004>.

² "Company Funding," Florida Institute for the Commercialization of Public Research, accessed May 2, 2015, <http://www.florida-institute.com/programs/company-funding>.

³ Indiana Biosciences Research Institute, accessed May 2, 2015, <http://www.indianabiosciences.org/pages/Home/default.aspx>.

⁴ "Proof of Concept Fund," KU Innovation and Collaboration, accessed May 2, 2015, <http://www.ctc.ku.edu/faculty/pursue-funding/proof-of-concept-fund>.

⁵ "Gov. Beshear Launches Kentucky Angel Investors Network to Support Kentucky Entrepreneurs, Investors," Governor Steve Beshear's Communications Office, November 22, 2013, <http://migration.kentucky.gov/newsroom/governor/20131122angel.htm>.

⁶ "Maryland Venture Fund," Maryland Department of Business & Economic Development, accessed May 4, 2015, <http://business.maryland.gov/mvf>.

“Supporting biotech innovation is not just key to growing Indiana’s economy and creating more jobs, but in the case of Senate Bill 262, it unlocks the door to medical advances that may ultimately save lives and reduce healthcare expenses.”

Indiana Governor Mike Pence June 2014

MASSACHUSETTS

The Massachusetts Emerging Technology Fund (ETF) assists technology companies by offering of up to \$2,500,000 for qualifying companies that are starting or expanding manufacturing in the state. Loans may be used for the improvement of real estate, working capital and/or purchase of equipment.⁷

NEW MEXICO

The New Mexico Angel Investment Credit allows a taxpayer who files a state income tax return and who is a “qualified investor” to take a tax credit of up to \$25,000 (25 percent of a qualified investment of no more than \$100,000) for an investment made in a New Mexico company that is engaging in high-tech research or manufacturing. The taxpayer may claim the angel investment credit for up to two investments in a taxable year, provided that each investment is in a different qualified business.⁸

PENNSYLVANIA

Innovate in PA, a new economic development program in Pennsylvania, auctions off up to \$100 million in tax credits to generate revenue for funding investments in tech and biotech startups. Insurance companies may purchase deferred premium tax credits and will be able to claim up to \$20 million annually.⁹

SOUTH DAKOTA

South Dakota's state government initiated a proof-of-concept program managed jointly by the state university Board of Governors and the Governor's Office of Economic Development. The purpose of grants up to \$25,000 is to spur investments emanating from state universities that have the potential for commercialization. The biosciences are an area of special focus in the program along with other technology sectors.¹⁰

WISCONSIN

The governor and legislature in Wisconsin passed a measure that created a \$75 million early stage seed capital fund-of-funds to support high growth technology sectors including the biosciences. The state will contribute \$25 million to the fund and raise an additional \$50 million coming from private sources.¹¹

⁷ “Emerging Technology Fund,” MassDevelopment, accessed May 4, 2015, <http://www.massdevelopment.com/financing/specialty-loan-programs/emerging-technology-fund/>.

⁸ “New Mexico Angel Tax Credit,” New Mexico Angels: Investing In Innovation, accessed May 5, 2015, <http://www.nmangels.com/nma-angel-investors/new-mexico-angel-tax-credit/>.

⁹ “Innovate in PA,” Pennsylvania Department of Community & Economic Development, accessed May, 5, 2015, <http://www.newpa.com/business/innovate-in-pa>.

¹⁰ “Proof of Concept Fund,” South Dakota Governor's Office of Economic Development, accessed May 26, 2015, www.sdreadytowork.com/Financing-Incentives/Public-Records/Proof-of-Concept-Fund.aspx

¹¹ “2013 Wisconsin Act 41,” State of Wisconsin, accessed May 26, 2015, <https://docs.legis.wisconsin.gov/2013/related/acts/41.pdf>.

Workforce and Talent Pool

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.

GEORGIA

The Georgia BioScience Training Center supports training for a number of bioscience industry companies adjacent to Baxter International's biomanufacturing facility. Georgia QuickStart is a division of the Technical College System of Georgia and operates in a 52,000-square-foot facility.¹

MAINE

In 2014 Maine voters approved a \$3 million bond to support biotech workforce training. The measure helps finance a new building at the non-profit MDI Biological Lab in order to expand its workforce training and research work. The ballot measure specified that the funding would be used to modernize and expand infrastructure in a biological laboratory specializing in tissue repair and regeneration located in the state. The goal is to increase biotechnology workforce training, retain and recruit biomedical research and development groups, and create a drug discovery and development facility that will improve human health and stimulate biotechnology job growth and economic activity.²

MARYLAND

BIOTrain is a partnership of biotechnology companies, government entities, nonprofits, and teaching institutions working together to shape a technical workforce. BIOTrain began in 2013 with an EARN grant from the State of Maryland Department of Labor, Licensing, and Regulation. The Partnership is tasked with improving the job readiness of entry level employees and sharpening the skills of incumbent employees. BIOTrain offers Introduction to Drug Development, Process Improvement and Protein Purification courses.³

MASSACHUSETTS

The Biomanufacturing Education and Training Center (BETC) at Worcester Polytechnic Institute, a pilot-scale biomanufacturing facility that offers customized training courses, opened in May 2013. The BETC curriculum is designed to help biomanufacturing employees improve and expand their skills. The BETC also offers open-enrollment, nonproprietary programs for individuals in the industry and a fundamentals course designed for people seeking entry into the field.⁴

NORTH CAROLINA

The National Center for Biotechnology Workforce joined approximately 120 community colleges across the nation to develop a highly skilled and educated 21st century bioscience and pharmaceutical production workforce partially funded by a US Department of Labor grant. Headquartered at Forsyth Community College in Winston-Salem, the Center supports advancements in career technical education, such as developing community college programs in biotechnology, pharmaceutical production, and medical device manufacturing aligned to industry standards.⁵

¹ "David Nuckolls, "Georgia Leading the Way as a Health IT Hotbed," *We Speak Business Blog*, June 6, 2014, <http://www.georgia.org/2014/06/20/georgia-leading-way-health-hotbed/>.

² "Robert Levin, "Bonds would aid area labs," *Mount Desert Islander*, October 30, 2014, <http://www.mdislander.com/maine-news/health-news/bonds-aid-area-labs>.

³ "BIOTrain, accessed May 4, 2015, <http://www.biotrain.org/>.

⁴ "Biomanufacturing Education & Training Center," Worcester Polytechnic Institute, accessed May 4, 2015, <http://wp.wpi.edu/beto/>.

⁵ National Center for the Biotechnology Workforce, accessed May 4, 2015, <http://biotechworkforce.org/>

“Advanced manufacturing is now the leading industry in our state and Iowa is at the forefront when it comes to turning corn and soy beans into sources of renewable energy, building products and even pharmaceuticals.”

Iowa Governor Terry Branstad January 2015



OREGON

The BioCatalyst Advanced Training Program offers bioscience-specific professional training to under/unemployed Oregonians hoping to launch their careers in the bioscience industry. The objective is to prepare qualified, mid-career candidates to earn sector-specific bioscience 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 2014.⁶

PUERTO RICO

The Bioprocess Development and Training Complex (BDTC) was conceived as a collaboration between industry, government and academia to enhance Puerto Rico's capabilities in biotechnology manufacturing, research, bioprocessing 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, providing a venue to conduct training in cutting-edge technologies in biotechnology manufacturing and bioprocess engineering.⁷

TEXAS

The National Center for Therapeutics Manufacturing (NCTM) is an interdisciplinary workforce education institution and biopharmaceutical manufacturing facility located at Texas A&M University in College Station, Texas. The NCTM, which opened in 2012, offers accredited academic and technical certificate programs, professional development, and industry training-on-demand.⁸

⁶ "BioCatalyst Advanced Training," Oregon Bioscience Association, accessed May 4, 2015, <https://www.oregonbio.org/biopro/biocatalyst>.

⁷ "Bioprocess Development and Training Complex (BDTC)," Industry University Research Center, Inc., accessed May 26, 2015, <http://www.induniv.org/home/initiatives/bioprocess-development-complex-and-training-bdte>.

⁸ "National Center for Therapeutics Manufacturing," Texas A&M University, accessed May 4, 2015, <http://nctm.tamu.edu/>.

Innovation Partnerships: Moving Academic/Industry Innovations Forward

A strong partnership between 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 supports for industry-university collaborations, provision of R&D tax credits, business incubator development, risk-capital supports, and other innovation 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.

ARIZONA

The Arizona Innovation Challenge (AIC), funded through the Arizona Commerce Authority (ACA), is one of the largest state innovation competitions in the nation. The AIC provides \$3 million per year in competitive grants to innovative technology companies. Awards range from \$100,000 to \$250,000 per company.¹

COLORADO

The Innovation Center of the Rockies (ICR) has partnered with Colorado State University (CSU) Ventures to accelerate technology commercialization based on faculty research across the state. CSU faculty and graduate researchers will be matched with ICR's network of more than 1,000 advisors and mentors to spur new business creation.² The focus is primarily on the commercialization of bioscience, cleantech, engineering, aerospace and IT/ software technologies.

DELAWARE

Delaware state leadership committed funding from the Bioscience Center for Advanced Technology to support innovation and job creation. They also approved a preferential \$3 million loan from

their Delaware Strategic Fund to support wet labs for early stage bioscience companies at the University of Delaware STAR campus.³

GEORGIA

Georgia's six Centers of Innovation provide unique, technology-oriented support to businesses and start-ups in the areas of Aerospace, Agribusiness, Energy, Life Sciences & IT, Logistics and Advanced Manufacturing. Each center provides direct access to university and technical college applied research, commercialization resources, technology connections, matching grant funds, potential investor networks and key government agencies. Client companies are connected with industry-specific experts who are on the leading edge of technology and new ideas.⁴

ILLINOIS

MATTER is a new startup center for the next-generation of healthcare technology companies located in Chicago's Merchandise Mart. The collaborative workspace allows interaction among entrepreneurs, academics and investors in order to create and grow new companies in biopharmaceuticals, medical devices and medical diagnostics. The state's funding package, administered through the Illinois Department of Commerce and Economic Opportunity (DCEO), consists of a \$2.5 million state investment and a loan of \$1.5 million that provides seed funding support for the project.⁵

KANSAS

A new proof-of-concept fund supported by the University of Kansas will provide funding to mature research projects in all areas of technology, helping to attract industry investment and bring products to market. Applicants can apply for up to \$50,000 per proposal and must clearly indicate the economic potential of their technology and identify companies that would be suitable partners for commercial success. The university announced that it awarded a total of nearly \$200,000 in 2014.⁶

¹ "Arizona Innovation Challenge," Arizona Commerce Authority, accessed May 4, 2015, <http://www.azcommerce.com/programs/arizona-innovation-challenge>.

² Innovation Center of the Rockies, accessed May 4, 2015, <http://www.innovationcenteroftherockies.com/>.

³ Delaware Bioscience Center for Advanced Technology, accessed May 4, 2015, <http://www.cat.dbi.udel.edu/index.php>.

⁴ "Georgia Centers of Innovation," Georgia Newsroom, accessed May 4, 2015, <http://www.georgia.org/business-resources/georgia-centers-of-innovation/>.

⁵ Matter Chicago, accessed May 4, 2015, <http://www.matterchicago.com/>.

⁶ "Proof of Concept Fund," University of Kansas Office of Research, accessed May 4, 2015, http://research.ku.edu/proof_of_concept_fund.

MARYLAND

The Maryland Innovation Initiative is a new fund administered by the Maryland Technology Development Corporation (TEDCO) that aims to move new discoveries a year out of the lab and into the marketplace. The five participating universities contribute between \$100,000 and \$200,000 on an annual basis, combined with \$5 million in state funding approved in the FY14 budget.⁷ Funding supports startup grants to innovators best positioned to push their technology and business plans into the marketplace quickly.

MICHIGAN

Six of Michigan's 15 public universities established the Michigan Corporate Relations Network (MCRN) which connects businesses to university resources through their Business Engagement Center.⁸ MCRN has also developed three program activities for small and large firms including matching funds, internship awards and collaborative efforts with industry.

NEW YORK

The Rochester Institute of Technology (RIT) dedicated \$3.5 million in reserves to launch a venture fund for assisting companies with ties to the university. RIT officials touted the ability to offer financial assistance on top of their already comprehensive suite of services such as Venture Creations and a Center for Student Innovation and Entrepreneurship. RIT awards \$500,000 per year to approved businesses.⁹

NEW YORK

The Buffalo Medical Innovation and Commercialization Hub is a shared pharmaceutical research and development facility that will support drug screening, pharmaceutical development, technology optimization, business attraction, workforce training, and bioinformatics operation research, development and technology. A \$50 million state investment in the Hub will leverage \$200 million in private sector investment. The Buffalo Medical Innovation and Commercialization Hub will make its permanent home at Conventus, which is under construction and scheduled to open in Spring 2015.¹⁰

NORTH CAROLINA

In 2013, Wake Forest University's Biotech Place opened in the Wake Forest Innovation Quarter in Winston-Salem. The 242,000-sq. ft. building is a renovated tobacco warehouse that now houses custom-built laboratories for Wake Forest School of Medicine researchers as well as private biotech companies.¹¹

OHIO

The UC Technology Commercialization Accelerator is the result of a partnership agreement between the University of Cincinnati (UC) and the Midwest EB5 Regional Center to help transition technologies out of the university into the marketplace. A total of \$750,000 was committed toward the project. A competitive application process is used to assess a technology's viability for startups and licensing opportunities. Gap funding and pre-seed awards will be provided by the accelerator to the most promising ideas.¹²

VIRGINIA

The Virginia Biosciences Health Research Corporation, "The Catalyst," provides grants to collaborations of two or more Virginia public universities and one or more industry partners. It also requires the industry partners to match or exceed the state award.¹³

WASHINGTON

With funding from foundations, investors and the state, a \$20 million early stage venture fund was launched in 2013 at the University of Washington (UW) for investing in promising startups spun out of UW and other research institutions across the state. The W Fund will help the most promising research and student-generated startups clear early financing hurdles, gain traction more quickly, and reach venture-fundable milestones. It is also expected to help advance UW's Commercialization Initiative, which aims to double the number of new companies created at the university over the next three years.¹⁴

⁷ "The Maryland Innovation Initiative," TEDCO, accessed May 4, 2015, <http://tedco.md/program/the-maryland-innovation-initiative-mii/>.

⁸ Michigan Corporate Relations Network, accessed May 4, 2015, <http://michiganocrn.org/>.

⁹ "RIT Venture Fund," Rochester Institute of Technology, accessed May 4, 2015, <http://www.rit.edu/venturefund/>.

¹⁰ "Buffalo Medical Innovation & Commercialization Hub," Buffalo Billion, accessed May 4, 2015, <http://buffalobillion.ny.gov/buffalo-medical-innovation-commercialization-hub>.

¹¹ "Biotech Place," Wake Forest innovation quarter, accessed May 4, 2015, <http://www.innovationquarter.com/facilities/wake-forest-biotech-place/>.

¹² Dama Ewbank, "New Tech Accelerator Aims to Commercialize UC Research," University of Cincinnati, accessed May 4, 2015, <http://www.uc.edu/news/NR.aspx?id=15202>.

¹³ "Virginia Biosciences Health Research Corporation Awards Inaugural Grants to Fund Four Private-Public Research Collaborations," *Business Wire*, April 29, 2015, accessed May 4, 2015, <http://www.businesswire.com/news/home/20140429005249/en/>.

¹⁴ Drew DeSilver, "New fund has \$20M to spur university startups," *The Seattle Times*, June 20, 2012, accessed May 26, 2015, <http://www.seattletimes.com/business/new-fund-has-20m-to-spur-university-startups/>.

Supportive Tax Policies

Bioscience companies need a regulatory climate and environment that encourage and support the growth and development of their industry. Tax policies that recognize the long development cycle required to bring new bioscience discoveries to the market can provide additional capital for emerging companies as well as ensure an even playing field between older, traditional industries and emerging industries such as biosciences.

CALIFORNIA

In 2013, California phased out enterprise zone credits and replaced them with a sales and use tax exemption, a hiring credit and the “California Competes” tax credit.¹ The incentives established:

- **Sales Tax Exemption:** A statewide sales tax exemption on all manufacturing equipment and research and development equipment purchases for biotech and manufacturing companies
- **Hiring Credits:** Hiring credits for businesses in areas with the highest unemployment rate and highest rates of poverty
- **California Competes Investment Incentives:** The opportunity for California businesses to compete for available tax credits based on the number of jobs to be created and retained, wages paid in those jobs and other factors.

CONNECTICUT

The Connecticut Angel Investor Tax Credit was extended for two additional years, with \$6 million in additional funding. The Stem Cell Research Program was expanded to include regenerative medicine and renamed the Regenerative Medicine Research Fund². A bill aimed at better understanding chronic disease, chronic disease treatment and prevention, and coordination of care for conditions underlying chronic disease passed with overwhelming support.

MARYLAND

Maryland's Biotechnology Investment Tax Credit provides income tax credits for investors in qualified Maryland biotechnology companies. The value of the credit is equal to 50% of an eligible investment made in a qualified Maryland biotechnology company during the taxable year. The maximum amount of the credit cannot exceed \$250,000 for investors. If the credit exceeds the tax liability, the remaining credit is refundable. The program has a program cap and credits are awarded on a first come, first serve basis.³

NEW HAMPSHIRE

In 2013, New Hampshire doubled the maximum amount of tax credits available for research and development activities, from \$1 million annually to \$2 million. Originally enacted in 2007, the tax credit was set to expire in 2015, but it has been extended permanently.⁴

NEW YORK

The Excelsior Jobs Program in New York State provides job creation and investment incentives to firms in such targeted industries as biotechnology, pharmaceuticals, high-tech, clean-technology, green technology, financial services, agriculture and manufacturing. Firms in these industries that create and maintain new jobs or make significant financial investment are eligible to apply for up to four new tax credits.

Excelsior encourages businesses to expand in and relocate to New York while maintaining strict accountability standards to guarantee that businesses deliver on job and investment commitments. Program costs are capped at \$500 million annually to maintain fiscal affordability and ensure that New Yorkers realize a positive return on their investment.⁵

¹ “Governor Brown Signs Legislation in San Diego to Help Create Jobs, Grow Economy,” CA.gov, accessed May 4, 2015, <http://gov.ca.gov/news.php?id=18137>.

² “Angel Investor Tax Credit,” Connecticut Innovations, accessed May 4, 2015, <http://ctinnovations.com/angels>.

³ “Biotechnology Investment Incentive Tax Credit,” BIO Maryland: From Research to Reality, accessed May 4, 2015, <http://bio.maryland.gov/funding/pages/biitc.aspx>.

⁴ “Frequently Asked Questions—research and Development Tax Credit,” New Hampshire Department of Revenue Administration, accessed May 4, 2015, <http://revenue.nh.gov/faq/research-development.htm>.

⁵ “Excelsior Jobs Program,” New York State's Empire State Development, accessed May 26, 2015, <http://esd.ny.gov/BusinessPrograms/Excelsior.html>.

“Innovation is key to making Illinois the most competitive state in the country, and the work coming out of MATTER (a healthcare technology startup hub) will have a tangible impact on the future of the healthcare industry and the state. Innovation jobs have a ripple effect on the workforce by creating more jobs and growing the economy. Innovation will help us create a 21st century economy in Illinois.”

Illinois Governor Bruce Rauner February 2015



SOUTH DAKOTA

The South Dakota Reinvestment Payment Program, the result of 2013 state legislation, assists companies in offsetting upfront costs associated with relocating, expanding operations and upgrading equipment in South Dakota. The program allows for project owners to receive a reinvestment payment, not to exceed the South Dakota sales and use tax paid on project costs, for new or expanded facilities with project costs in excess of \$20 million or for equipment upgrades with project costs in excess of \$2 million. Areas of industry focus include agriculture and industrial biotechnology.⁶

TEXAS

Effective January 1, 2014, taxpayers engaged in “qualified research” in Texas can claim a sales and use tax exemption for the purchase, lease, or rental of depreciable tangible personal property used in research. The exemption is scheduled to expire on December 31, 2026.⁷

⁶ “Reinvestment Paymnet Program,” South Dakota Governor’s Office of Economic Development, accessed May 4, 2015, <http://www.sddreadytowork.com/Financing-Incentives/Reinvestment-Payment-Program.aspx>.

⁷ “Sales Tax Exemption or Frachise Tax Credit for Qualified Research Effective Jan. 1, 2014,” Texas Comptroller of Public Accounts, accessed May 4, 2015, http://www.window.state.tx.us/taxinfo/qualified_research/.

City/County Initiatives Moving Forward

As the bioscience industry continues to grow in the states, there is an increasing awareness by county and city economic development leaders that retaining and growing the industry in their communities provides strong economic value.

Through the creation of bioscience incubators, accelerators and local tax breaks for small and emerging companies, county commissions and city economic development departments are actively creating ordinances and business climate measures to assist bioscience companies in their locations.

Columbus, Ohio: The Ohio State University and the local economic development partner TechColumbus created a \$1 million evergreen fund to support commercialization of OSU-based intellectual property in sectors that include life sciences-medical research efforts for therapeutics and diagnostics platforms.¹

District of Columbia: A new \$50 million investment fund in Washington, D.C. provides seed capital to launch new businesses that use technologies from government and university research labs in Maryland, Virginia, Delaware and the District of Columbia. The Chesapeake Regional Innovation Fund will provide seed capital for startups and emerging technology companies focused on innovations in energy, life sciences and security.²

Maricopa County, Arizona: In 2014, the Maricopa County Industrial Development Authority awarded a \$1 million grant to fund early stage manufacturing companies coming out of Arizona State University accelerator programs. The venture capital fund will operate as an evergreen fund and take equity positions in companies ranging from \$50,000 to \$250,000. ASU's goal is to build the fund to \$10 million through private donations.³

Memphis, Tennessee: Memphis Bioworks was created as part of a citywide effort to foster economic growth by building on the city's strengths and potential in the medical, agricultural and logistics fields. The organization features an incubator, accelerator, networking and mentoring efforts. In 2013 the entrepreneurial impact was impressive with 60 companies, \$53 million in revenue, \$52 million in invested capital and 266 employees of the center.⁴

New York, New York: The five boroughs of New York City, in cooperation with private investors and life science companies, have embarked on a \$100 million effort to grow the life sciences industry in that city. Named the City of New York Life Sciences Fund, this effort will couple industry and academic research centers and foundations to launch 10-20 companies in this important technology sector. Announced in 2013, the effort will co-invest NYC seed and Series A funding sources with venture partners.⁵

San Diego, California: CONNECT of San Diego, one of the oldest industry partnering organizations in the US, continues to link entrepreneurs with critical resources for success by providing networking opportunities as well as expertise to the city's technology-based firms. Through the use of partnerships with the region's industry specific organizations and individuals, the organization assists entrepreneurs and bioscience companies with commercializing ideas, patents, and other opportunities surrounding university or private research institute R&D efforts.

CONNECT has assisted more than 3,000 companies in attracting more than \$2 billion in investment capital by building successful mentorship and education programming for entrepreneurs.⁶

St. Louis, Missouri: In St. Louis a five year, \$2.5 million grant from the Monsanto Company will support bioscience industry partners to promote regional economic growth and advance St. Louis' standing in agriculture and industrial biotechnology sectors.⁷

¹ Joshua Sophy, "TechColumbus Spurs Startup Success with Relaunch as Rev1," Small Business Trends, March 12, 2015, accessed May 5, 2015, <http://smallbiztrends.com/2015/03/techcolumbus-rev1-business-incubator.html>.

² "CCI and TEDCO form regional innovation fund for startups," Chesapeake Crescent Initiative, December 5, 2012, accessed May 5, 2015, <http://chesapeakecrescent.org/chesapeake-crescent-initiative-and-tedco-forming-regional-innovation-fund-for-start-ups-2/>.

³ "ASU Foundation Awarded \$1 Million for ASU-Accelerated Companies," PRWeb, February 12, 2015, accessed May 5, 2015, <http://www.prweb.com/releases/2014/02/prweb11579299.htm>.

⁴ "Key Results," Memphis Bioworks Foundation, accessed May 5, 2015, <http://www.memphisbioworks.org/about/key-results/>.

⁵ "Programs for Entrepreneurs," New York City Economic Development Corporation, accessed May 5, 2015, <http://www.nycedc.com/program/nyc-early-stage-life-sciences-funding-initiative>.

⁶ "Entrepreneur Resources," CONNECT, accessed May 5, 2015, <http://connect.org/entrepreneur-resources/>.

⁷ "Monsanto's \$2.5 Million Commitment Expands BioSTL Effort to Grow St. Louis' Prosperity through Bioscience," BioSTL, March 27, 2014, accessed May 5, 2015, https://d10k7k7mywg42z.cloudfront.net/assets/53340969f002ff4ee8000506/BioSTL____Monsanto_Press_Release_03_27_14.pdf.

Success Stories

CALIFORNIA

The California Institute for Regenerative Medicine (CIRM) was launched as a \$3 billion commitment over 10 years, beginning in 2006. In January 2013, CIRM reported that the first \$1.5 billion in committed grants had generated 38,000 jobs and \$286 million in new tax revenue in California through 2014.¹

COLORADO

Colorado's Bioscience Discovery Evaluation Grant Program was created in 2006 by the Colorado General Assembly to grow the biosciences industry to fund advanced research (both public and private) in the state. From 2006 to 2014 the efforts generated:²

- 285 total bioscience—related grants
- 46 new companies
- 1,959 jobs averaging \$84,000
- \$469.1 million in matching and follow-on capital investments
- 5 major institutes created at Colorado research universities
- 197 proof of concept grants to Colorado research institutions

CONNECTICUT

The Regenerative Medicine Research Fund, as of June 24, 2014, allocated nearly \$90 million toward stem cell research. The funding has supported 170 research projects at Yale University, the University of Connecticut, Wesleyan University, The Jackson Laboratory, as well as private companies. From 2007 through 2012, Connecticut's stem cell fund awarded 129 grants for a total of \$68.8 million. These grants were leveraged with \$290 million in additional funds from other sources, which means that over \$350 million was dedicated to stem cell research in the state over six years.³

Other impacts since 2006:

- More than 500 papers have been published
- About 200 inventions have been disclosed
- Approximately 150 patents have been applied for
- Three stem cell-related companies have sprung up

GEORGIA

Since its formation in 1990, Georgia Research Alliance has leveraged \$600 million of state funding into:⁴

- \$2.6 billion of direct federal and private investment in Georgia
- 150+ newly launched companies
- 6,000+ high-skill, high-value jobs
- A portfolio of inventions, processes and technologies that benefit humankind

MARYLAND

Since its inception in 2006, Maryland's Stem Cell Research Fund has committed funding of more than \$112 million for 320 peer reviewed research grants. In November 2014, the Maryland Stem Cell Research Commission announced that interest in the program was at an all-time high, having received 240 Letters of Intent from universities, research institutions, hospitals and 16 companies for the FY2015 funding cycle. The MSCRF budget for FY2015 is \$9.4 million.⁵

MASSACHUSETTS

The Massachusetts Life Sciences Center's Accelerator Loan Program provides working capital to early stage life sciences companies. Since 2009, the Accelerator program has awarded \$20.8 million in loans to 30 companies. Eight of these companies have paid back their Accelerator loans early with interest after generating more than \$180 million in equity or acquisition proceeds.⁶

NEW JERSEY

BioNJ published *Life Sciences in New Jersey: Looking Beyond Biotech* in September 2014. The report assessed the contributions of the life sciences sector to New Jersey's economy, including employment and economic impact.

According to the report, the number of biotechnology companies operating in the state increased 12 percent to 379 from the 340 reported in a 2012 study. Overall, the life sciences industry directly employs 66,451 people in New Jersey and spending by New Jersey life sciences companies contributes about \$30.1 billion annually to the state's economy.⁷

PENNSYLVANIA

The Ben Franklin Technology Partnership marked its 30th anniversary in 2014 with a focus on accelerating commercialization and supporting start-ups, entrepreneurship and established manufacturers. Since 1984, the partnership has produced a 3.5-to-1 return on investment.⁸ In 2013 and 2014 they have had the following life science successes:

- 51 investments
- \$7.47 million invested
- \$139.7 million leveraged
- 183 jobs created
- 114 jobs retained

¹ "Return on Investment," California Institute for Regenerative Medicine, accessed May 4, 2015, <https://www.cirm.ca.gov/our-impact/return-investment>.

² "Bioscience Discovery Evaluation Grants," Colorado Office of Economic Development and International Trade, accessed May 4, 2015, <http://www.advancecolorado.com/funding-incentives/financing/bioscience-discovery-evaluation-grants>.

³ "Regenerative Medicine Research Fund," bioinnovation connecticut, accessed May 4, 2015, <http://www.bioinnovationct.com/regen/>.

⁴ "Driving Science and Technology Economic Development in Georgia," Georgia Research Alliance. Accessed May 26, 2015, www.gra.org/page/1025/about_ara.html

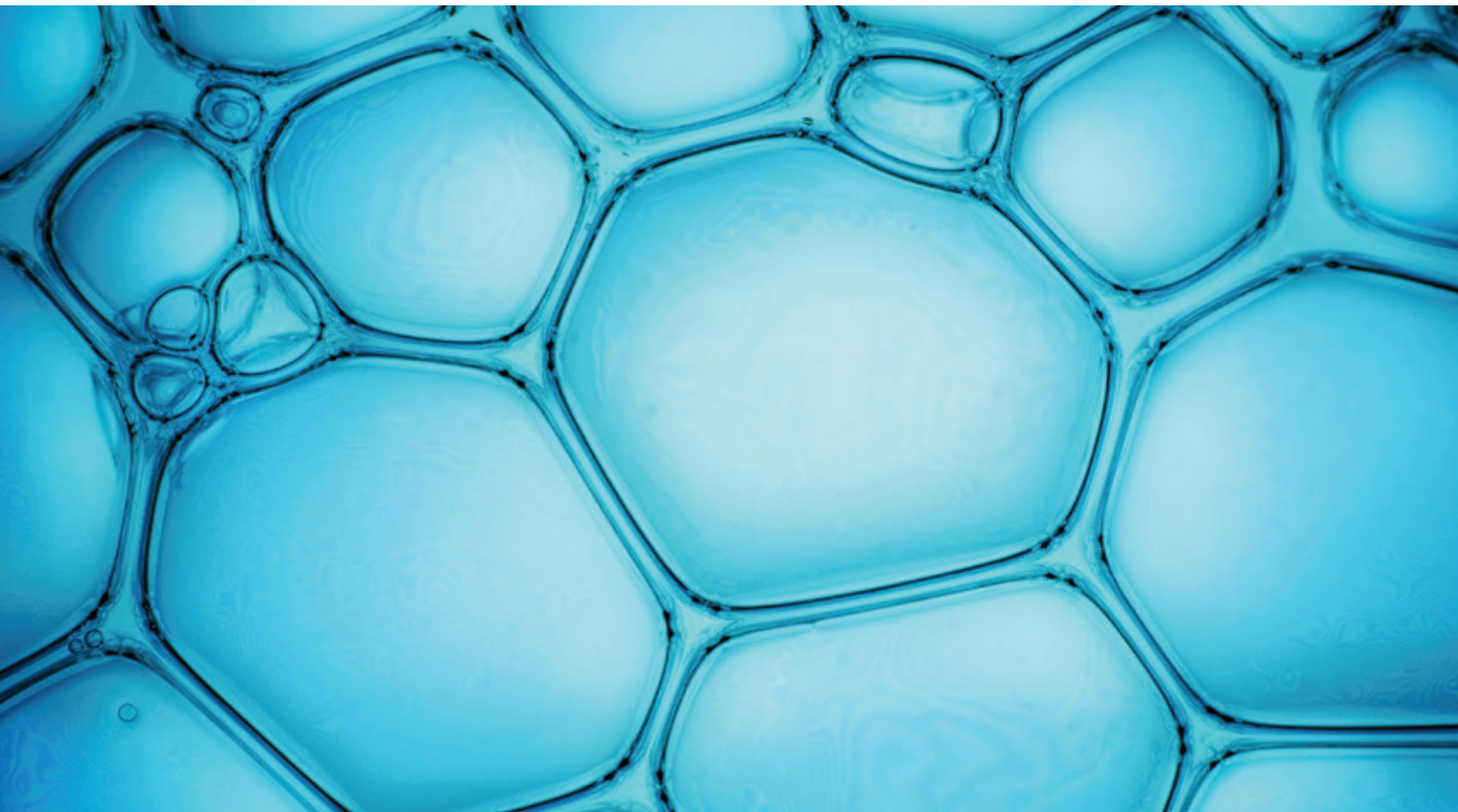
⁵ Maryland Stem Cell Research Fund, accessed June 1, 2015, <http://www.msccrf.org/>

⁶ "Accelerator Loan Program," Massachusetts Life Sciences Center, accessed June 1, 2015, <http://www.masslifesciences.com/programs/accelerator/>.

⁷ "BioNJ 2013 Industry Study –Life Sciences in New Jersey: Looking Beyond Biotech," BioNJ, September 2014, accessed June 1, 2015, <http://bionj.org/wp-content/uploads/2014/11/IS-Study-9-19-14-Final-Final-Revised.pdf>.

⁸ "Driving Innovation With: Capital, Knowledge & Networks. 2013-2014 Annual Report," Ben Franklin Technology Partners, accessed May 4, 2015, http://www.benfranklin.org/wp-content/uploads/2014/10/BFTP_2014_AR-final_review-1.pdf.

Regional Round Up



Once research yields a new discovery, there is still a great deal of work in creating a company and funding that research before the technology can be incorporated into the marketplace. The following are additional ways that industry, academic research centers, and policymakers are coming together to create essential building blocks of bioscience industry growth.

Northeast/Central Atlantic Region

Connecticut announced that an agreement has been reached to revitalize two vacant buildings on Pfizer's Groton campus, creating a bioscience innovation center for Connecticut United for Research Excellence (CURE).

The **Delaware** Research and Development Tax Credit program now provides credits for up to \$5 million for R&D expenditures in a taxable year with unused credits carried forward for 15 years.

The **Maryland** state government expanded the state's allowable R&D tax credit from \$3 million to \$8 million annually and increased the Biotechnology Tax credit by \$2 million (\$10 million total) to encourage investment in the biotechnology industry.

New Jersey signed into law the Angel Tax Credit Program, which provides tax credits for up to 10 percent of a qualified investment in businesses that conduct research, manufacturing or technology commercialization and have fewer than 225 employees. In addition, their Net Operating Loss (NOL) program may be sold for at least 80% of their value, up to \$15 million per business.

After a three year effort to garner support from the governor and state legislature, **Rhode Island** state leadership and life science companies created the first matching grant initiative in the state.

Virginia's Bioscience Initiative is a multiple-year initiative that focuses on key academic commercialization efforts including elevating the profile of the biosciences industry in the state, expanding strategies that support entrepreneurship and innovation, and creating the Virginia AgBiotech Initiative and advisory committee.

West

Arizona passed legislation to encourage investment, job creation and economic growth by providing advance manufacturers, including bioscience manufacturers, sales and use tax exemptions on the purchase of manufacturing equipment.

Colorado's new Biotechnology Sales and Use Tax refund promotes the industry by providing taxpayer-friendly means to recover the sales and use tax expenses previously paid on equipment and supplies used for research and development. Also, the Bioscience Discovery Evaluation Grant Program receives high marks from their governor, with \$5.5 million specifically going toward bioscience projects.

The **Oregon** state government created the Regional Accelerator and Innovation Network (RAIN), linking academic research centers with incubator and accelerator capacity. The state provided \$3.75 million to create the organizational and cost infrastructure.

South

Georgia now offers Research and Development Tax Credits for companies that increase their qualified research spending and unused credits can be carried forward for up to 10 years.

Louisiana State University created the LSU LIFT Fund with \$2 million in restricted funds from previously licensed inventions to provide small grants to help faculty bring inventions to market. The Leveraging Innovation for Technology Transfer, or LIFT fund, will award grants twice per year, up to \$50,000.

Texas passed an R&D tax credit for franchise or sales tax to encourage innovation, efficiency and capacity increases for manufacturing in skilled sectors such as the biosciences.

Midwest

The **Illinois** Advantage effort accelerates investments by spurring institutional lending to small businesses and leveraging private venture capital in start-ups and high-growth businesses like the biosciences.

Indiana's MOMENTUM program prepares leaders of small companies by connecting them with industry mentors. The Indiana Clinical and Translational Sciences Institute (CTSI) provided a \$250,000 grant to the effort.

Iowa's Cultivation Corridor initiative, which creates new partnerships among regional leaders in economic development, education and bioscience, aims to market central Iowa as the home of "science that feeds the world."

North Dakota's Research NDBIO targets state companies with R&D or commercialization needs that can be met through partnership with one of North Dakota's research universities. It includes partnerships in vaccines and treatments for cancer and infectious disease.

South Dakota's Reinvestment Payment Program assists companies in offsetting sales and use tax costs that are associated with relocating or expanding operations for up to \$2 million in reimbursement.

Glossary of Economic Development Tax Support Terms for the Biosciences Sector

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.

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 2012 analysis by the Tufts Center for the Study of Drug Development, the average cost is \$1.2 billion.

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.

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.

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.

Tax Incentives: The use of various tax relief measures such as tax exemptions, tax credits or tax abatements to recruit and attract businesses to a community or help local businesses expand.

Technology Incubator: Often designed for public and private R&D facilities, high-tech companies and science-based companies, a technology incubator is an entity that helps companies by providing necessary resources and support including infrastructure, technology development, research assistance, and assistance in securing funding.

Technology Transfer: The process of transferring scientific findings from one organization to another for the purpose of furthering development and commercialization.

Venture Capital: Money provided by investors to startup firms and small businesses that have long-term growth potential. Venture capital is an important source of equity for start-up companies.

Workforce Development: An economic development approach focused on enhancing the training, skills and performance of the employees.





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