



BioNJ 2013 Industry Study

Life Sciences in New Jersey: Looking Beyond Biotech

September 2014



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To our BioNJ Community,

With this year's review of the State of New Jersey's life sciences industry, BioNJ expands on its remit of prior years by assessing the three major sectors that make up New Jersey's life sciences innovation cluster: biotechnology, pharmaceuticals, and medical devices.

The report also is meant to rebut Ben Franklin's infamous pronouncement that New Jersey is "a barrel tapped at both ends". All too often reports analyzing the life sciences industry have followed Franklin's notion by dividing New Jersey along the metropolitan statistical area (MSA) boundaries of New York/Northern New Jersey and the Delaware Valley which incorporates southern New Jersey.

But as Dr. Franklin also said, "Energy and persistence conquer all things," and so with this report, we hope to provide a perspective that is more comprehensive geographically and also broader and deeper in content.

As in past years, BioNJ has partnered with EY (formerly known as Ernst & Young) in conducting a survey of the New Jersey biotechnology industry, providing a multi-metric snapshot of the industry's performance in calendar year 2013 and plans for the future.

However, in contrast to prior years' studies, in keeping with our broadened focus on the life sciences, the emphasis this year is on the vital signs – trends in employment, in facilities, and in wages across the industry.

These are the engines that indicate the health of the industry and demonstrate its vital contribution to the economy of New Jersey and, indeed, the nation. The New Jersey Department of Labor and Workforce Development (LWD) and the Edward J. Bloustein School of Planning and Policy (Bloustein School) at Rutgers University provided the critical data, benchmarked to prior years, which enabled us to identify the salient trends within our State and within the larger national context.

Thanks to the contribution of financial data from VentureSource, we have also examined the state of early and late-stage financing of firms engaged in the research and development of the next era of medicines in New Jersey. The funding of emerging medical science, particularly early stage research, is critical to attracting top talent to our State and to ensuring a sustainable ecosystem of companies at the forefront of innovation.

Among the many findings in this report, four are of particular importance:

- The Bloustein School estimates annual expenditures of \$30.1 billion by the New Jersey life sciences industry.
- As of September 15, 2014, the number of biotechnology companies operating in the State increased to 379 from the 340 reported in the 2012 report, representing an increase of 12 percent. (EY/BioNJ)



- The life sciences industry directly employs 66,451 people in New Jersey, and indirectly supports 146,105 additional jobs through its total expenditures for a total of 212,556 jobs. (Bloustein School)
- The EY survey found that despite the headwinds of recent years, New Jersey’s biotech companies overwhelmingly planned to hire in 2014.

New Jersey’s life sciences sector, as indicated by the Bloustein School, not only positively impacts the State’s economy, it also has an outsized impact on the national economy despite accounting for only 2.8 percent of the nation’s total employment. The overall size of its life sciences workforce, as well as the trends and figures summarized in this study demonstrate New Jersey’s strong capacity in the high-paying life sciences industry.

As noted in the *Goals, Recommendations and Expert Commentary* section of this report, these facts call for continued public policy initiatives to support the health of the life sciences industry and for further investment to sustain its growth.

We stand proud of our industry in New Jersey, proud of the contributions of you, our Members, to the advancement of medical innovation, and proud to share the compelling New Jersey story with you. Because Patients Can’t Wait.

Francois Nader, M.D.
President and CEO
NPS Pharma
Chairman, BioNJ

Debbie Hart
President and CEO
BioNJ

September 2014



Executive Summary

Several important facts and a number of salient trends emerged from the data and analyses provided by EY, the Edward J. Bloustein School of Planning and Policy at Rutgers University and the New Jersey Department of Labor and Workforce Development:

- The Bloustein School estimates annual expenditures of \$30.1 billion by the New Jersey life sciences industry.
- The number of biotechnology companies operating in the State increased to 379 from the 340 reported in the 2012 report, representing an increase of 12 percent. (EY/BioNJ)
- The life sciences industry directly employs 66,451 people in New Jersey, and indirectly supports 146,105 additional jobs through its total expenditures for a total of 212,556. (Bloustein School)
- The EY survey found that despite the headwinds of recent years, New Jersey's biotech companies overwhelmingly planned to hire more employees in 2014.
- The Bloustein School, while using a more research and development focused definition of the life sciences cluster and its constituent sectors than the LWD, agreed directionally with the LWD figures. The Bloustein School estimated 2012 aggregate contributions of life sciences sector to the New Jersey Economy: \$33.54 billion in Gross Domestic Product (GDP); \$20.32 billion in Compensation; \$1.53 billion in State Tax Revenues; and \$1.36 billion in Local Tax Revenues.
- While overall life sciences employment totals, according to the LWD, are down 12.3 percent from 2007 to 2012 -- driven by Big Pharma, which experienced mergers, site closings, patent-cliff-related R&D and sales force cutbacks, and increasing externalization of research -- biotechnology was the only therapeutics sector to post employment gains, growing 2.1 percent through the addition of 856 jobs over the same five-year period.
- Wages industry-wide averaged \$126,794 in 2012, led by pharmaceuticals (\$137,949), followed by biotechnology (\$132,576) and medical devices (\$94,652). Life sciences average annual wage was 118.3 percent higher than New Jersey's total private sector average wages of \$58,093. These wage trends are an important index of the value of the life sciences to New Jersey's economy, not to mention its contribution to State revenues from payroll taxes. (LWD)



- The tracking of facilities (or establishments), as opposed to companies, yields an excellent measure of the total economic impact that the broader life sciences industry has on New Jersey. There were 3,042 facilities across all sectors of New Jersey's life sciences industry in 2012, up 6.3 percent from 2007, led by 10.3 percent growth in the biotechnology component and 9.1 percent growth in the pharma component. Growth in establishments demonstrates New Jersey's ability to attract and retain the industry – a key measure of growth. (LWD)
- Total funding of New Jersey life sciences companies spiked in 2013 with approximately \$900 million in both early and late-stage investments, according to VentureSource. That represents well over 200 percent growth over the prior year. Funding was helped by seven New Jersey companies that completed initial public offerings (IPOs) in 2013.
- Investment in late-stage commercial companies was robust; early stage venture investment as noted in previous reports lagged behind and was basically flat in 2012. (EY)



Goals, Recommendations and Expert Commentary

So that innovative therapies and cures can be discovered and developed to address unmet medical needs – Because Patients Can’t Wait – at BioNJ, we believe it requires a best-in-class, national innovation ecosystems model.

Building such an ecosystem will require multiple levels of engagement by all stakeholders and New Jersey is most fortunate to be able to boast broad and deep excellence in its academic, industrial and government sectors. It is only through continued collaborations that New Jersey can become a more compelling environment for biotechnology innovation and development, driving healthcare solutions.

Data in this report are very encouraging for all stakeholders in the life sciences ecosystem and point to clear opportunities to advance the industry in New Jersey.

To that end, BioNJ recommends actions along several themes: Life Sciences Ecosystem Development Initiatives; Shareholder Integration and Coordination; Tools and Databases; Policy and Funding Initiatives; Corporate Involvement; and Marketing, Communications and Advocacy.

Life Sciences Ecosystem Development Initiatives

Numerous studies and real-time examples demonstrate that inciting start-ups, attracting new companies and fostering existing ones can be enhanced significantly through the establishment of an “innovation ecosystem” that is both geographical and philosophical in nature. To achieve this goal, New Jersey should:

- Support vibrant, early innovation and technology efforts through the establishment and appropriate resourcing of a life sciences innovation ecosystem.
- This ecosystem should leverage New Jersey’s unique expertise and asset base of development talent and academic resources.

“To move forward, we need to cast off the notion of northern, middle and southern New Jersey and unite around the concept of an ecosystem that is both a physical location and an intellectual commitment that will drive medical innovation throughout the state.”

Francois Nader, M.D., President and CEO, NPS Pharma and Chairman, BioNJ Board of Trustees



Stakeholder Integration and Coordination

The integration of Rutgers University and the University of Medicine and Dentistry of New Jersey (UMDNJ) has already begun to demonstrate its potential for increased communications between life sciences companies and academia. To continue this momentum:

- Integrate New Jersey’s research universities more comprehensively into the biotechnology industrial ecosystem.
- Jointly develop long-term, high-impact initiatives, to position the capabilities in-state for holistic investment.
- Foster the development of an ever more entrepreneurial culture.

“A concerted effort will be required to ensure that New Jersey maintains its strong presence in the highly competitive life sciences industry. We at Rutgers intend to play a key role in coordinating and synergizing with biotech research assets across the State.”

Christopher J. Molloy, Ph.D., R.Ph., Senior Vice President, Research and Economic Development, Rutgers University

“Academia, industry and the State should form consortiums dedicated to producing innovative ideas, products and services to increase federal funding.”

Building Bridges II, NJPRO Foundation

Tools and Databases

An organization or institution is only as viable as the quality of its supporting infrastructure. In an ever-evolving world of technological advancement, New Jersey must lead by:

- Creating a web-based economic development dashboard of data from New Jersey’s publicly traded biotechnology companies.
- Creating a first-of-its-kind, web-based translational and clinical research collaborative suite to connect experts and key opinion leaders, ongoing trials, and industry-sourced clinical opportunities for collaboration.
- Developing long-term benchmarking capabilities that will enable longitudinal and trend analysis for economic development and regional performance metrics.



Policy and Funding Initiatives

To remain a leader in a highly competitive marketplace, New Jersey must continue expanding upon its current armamentarium of innovative incentives to do more to encourage, leverage and reward investment. To do this, New Jersey should partner with BioNJ, investors and other industry members to develop novel funding vehicles that provide new and different opportunities for capital formation.

“The Angel Investor Tax Credit Program generates a lot of out-of-state funding but relatively little from in-state. Programs that encourage an entrepreneurial culture in the state will help to drive innovation.”

Kathleen Coviello, Director, Technology & Life Sciences, New Jersey Economic Development Authority (EDA)

“New Jersey needs to support our state infrastructure as well as commercial, industrial and residential development...NJBIA supports targeted tax incentives for specific industries such as life sciences, manufacturing, technology and health care.”

Vision for a Better Business Climate 2012-2013, New Jersey Business and Industry Association

Corporate Involvement

New Jersey is known as “The Medicine Chest of the World” because of the many innovations to health care that have been discovered and developed by its biotechnology, pharmaceutical and medical device companies. To build upon this proud tradition, steps should be taken to:

- Develop New Jersey-focused funding vehicles from corporate sources that support early and mid-stage biotechnology companies.
- Create appropriate public policy incentives in support of such funds.
- Leverage specific expertise, i.e., in product development and resources.
- Benefit from the fact that New Jersey has numerous competitive advantages in the biotechnology sector.

“Start with basic elements and our own pharma environment dedicated to creating our own biocluster through development and commercialization.”

Lorenzo Pellegrini, Ph.D., Partner, Care Capital and BioNJ Board VC Advisor



Marketing, Communications and Advocacy

New Jersey's life sciences sector benefits from the many marketing and communications initiatives undertaken by stakeholders, advocates, policy-makers and public- and private-sector representatives. But widely cited national studies for rankings and various metrics conflate major portions of the New Jersey life sciences sector into New York and Delaware Valley metropolitan statistical areas, confounding analysis and discouraging the consideration of New Jersey as one entity. To counter this restricted perspective marketing, communications and advocacy efforts, should be directed at:

- Formulating and sharing economic development and life sciences industry metrics appropriate for the State of New Jersey as a whole.
- Include core messages that:
 - Identify New Jersey as a single, united ecosystem to create a more representative understanding of the life sciences sector.
 - Identify New Jersey's unique position as a biotechnology development powerhouse by highlighting its excellent and deep talent pool for clinical development and a resource for many of the world's best, world's only, and world's biggest research assets.
- While maintaining the State's separate and distinct identity, communicate more about the strengths and benefits of being a significant part of a major regional life sciences cluster, including the immediate areas adjoining New Jersey (NYC and the Delaware Valley).
- Aggressively expand the promotion within and outside of the State of its grants and incentives that foster entrepreneurship such as the New Jersey Angel Investment Tax Credit and the Technology Business Tax Certificate Transfer programs.



Introduction and Methodology

As we have done in the past, BioNJ and EY co-developed and conducted a survey of the New Jersey life sciences industry for calendar year 2013. The goal of the study, as always, was to assess the vitality of the industry in the State of New Jersey and to determine what can be done to improve New Jersey's position as a life sciences leader going forward.

The survey's results included responses from our traditional survey to the biotech industry from early stage to well established companies that provided a cross section of the industry in New Jersey, as well as data from the LWD and the Bloustein School. Where possible, the data were benchmarked to previous years to help identify trends within our State and compared to data observed on a national and global basis as noted in EY's 2013 Beyond Borders biotechnology report.

The change in our current year study as compared to prior year studies reflects a broader view of our biopharmaceutical cluster in New Jersey as compared to our prior reports which focused solely on trends in the biotechnology industry. However, the life sciences industry is broader than biotechnology, and so we attempted to review data for the broader life sciences industry which includes (i) biotechnology, (ii) pharmaceuticals, (iii) medical device companies, and (iv) other ancillary service providers to the life sciences center that we consider to represent the *New Jersey's Life Sciences Innovation Industry*.

In the last two surveys conducted in partnership with EY, the focus was on the biotech industry and the commentary focused largely on matters of efficiency — the need to do more with less and the measures biotech companies and investors were undertaking to conduct research and development (R&D) more efficiently. This was only natural since capital efficiency was the topmost concern for biotech industry leaders in the aftermath of the financial crisis, when a “new normal” emerged for capital markets, characterized by restricted access to funding for smaller companies and the lack of a risk-taking environment for investors.

This year's survey focuses on the broader life sciences sector that fuels the economic engine of New Jersey and points out the tremendous assets that New Jersey has to help the industry develop drugs, one of our State's key strengths. Also, we note very encouraging progress from the academic sector that will help fuel the research being conducted which will, in turn, support company formation in the years to come.

This report also discusses some steps that need to be taken to maintain New Jersey's presence as a desirable place to establish and grow a life sciences company. These steps are particularly imperative given the fact that New Jersey needs to retain the talented people who are being shed from large pharmaceutical companies during a time when the State is also competing with other states, regions and countries for talent and companies in an increasingly competitive global marketplace.



Acknowledgements

This new approach to the BioNJ Industry Study reflects the contributions of many insightful and dedicated individuals who are committed to growing the life sciences industry in New Jersey and we are indebted for their support.

Special thanks to: Tony Torrington, Partner - Assurance Services/Northeast Life Sciences Assurance Leader at EY; Joseph J. Seneca, Ph.D., University Professor at the Edward J. Bloustein School of Planning and Policy, Rutgers University; Michael L. Lahr, Ph.D., Research Professor, Rutgers University; Associate Researcher Will Irving at Rutgers University; and, John Ehret, Labor Market Analyst, the Office of Research and Information (ORI) at the New Jersey Department of Labor and Workforce Development.

We also appreciate the insights provided by our Expert Commentators: Kathleen Coviello, Director, Technology & Life Sciences, New Jersey Economic Development Authority; Christopher J. Molloy, Ph.D., R.Ph., Senior Vice President, Research and Economic Development, Rutgers University; Francois Nader, M.D., President and CEO, NPS Pharma, and Chairman, BioNJ Board of Trustees; and Lorenzo Pellegrini, Ph.D., Partner, Care Capital and BioNJ Board VC Advisor.



Jobs and Wages

With the support of the LWD, we were able to access information provided in its 2014 report on the New Jersey Biopharmaceutical Life Sciences Cluster (BLSC). The information presented within this section of the presentation was compiled mostly by utilizing various government data sets. For consistency, the data have been filtered using the North American Industrial Classification System (NAICS)¹ for the purpose of analyzing this cluster and (when available and/or applicable) the sectors and industries. Also, the data analyzed are from the 2012 fiscal year, the most current year for which data were available at the time of the study.

Each color-coded component of the BLSC – *Pharmaceuticals*, *Medical Devices*, *Biotechnology* – comprises several industry groups, and the groups in turn comprise industry sectors and subsectors.

The 116,548 jobs in NJ’s BLSC in 2012 broke down as follows among the three primary components: pharmaceuticals (42.8 percent), biotechnology-R&D (35.9 percent) and medical device manufacturing (21.3 percent). The primary components are profiled below, showing the major industry groups per each component.

PHARMACEUTICALS

- Pharmaceutical & Medicine Mfg.
- Cleaning Compound & Other Mfg.
- Drugs & Druggists Sundries Wholesalers

Pharmaceutical component:
Establishments that are primarily engaged in manufacturing or distribution of drug related products.

BIOTECHNOLOGY (R&D)

- Research & Development (R&D) in Physical, Engineering, Life Sciences & Social Science
- Medical & Diagnostic Labs

Biotechnology (R&D) component:
Consists of service related establishments primarily engaged in scientific R&D, analytic and/or diagnostics.

MEDICAL DEVICES

- Navigational, Measuring, Electromedical & Control Instruments Mfg.
- Medical Equipment & Supplies Mfg.

Medical device component:
Establishments primarily engaged in manufacturing medical equipment and supplies.

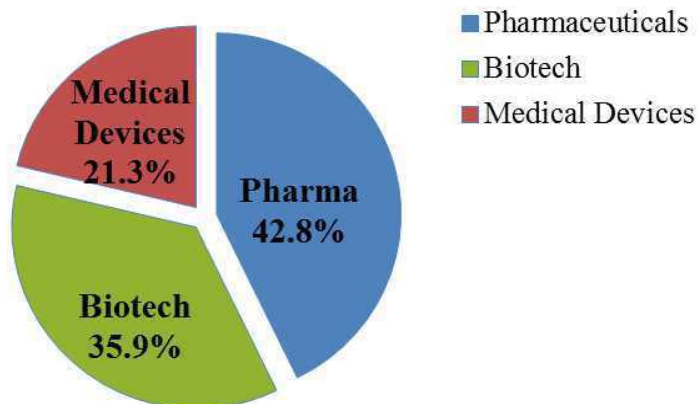
(SOURCE: LWD , Quarterly Census of Employment and Wages, 2012 Annual Averages: 4-digits NAICS)

¹ Additional information about the North American Industrial Classification System (NAICS) is available at: <http://www.census.gov/eos/www/naics/>



The employment concentration within the major sectors per component was as follows:

Cluster Employment 2012



(SOURCE: New Jersey Department of Labor & Workforce Development, Quarterly Census of Employment and Wages, 2012 Annual Averages: 4-digits NAICS)

Pharmaceuticals: Two industries accounted for 81.2 percent employment within this component: pharmaceutical and medicine manufacturing (53.5 percent) and drugs & druggists sundries wholesalers (27.7 percent).

Biotech: R&D bio-life sciences related employment accounted for an average of 28,800 of the nearly 42,000 jobs within this component. R&D in physical, engineering & life sciences led the sector's employment (66.8 percent) followed by jobs in medical & diagnostic labs (31.0 percent).

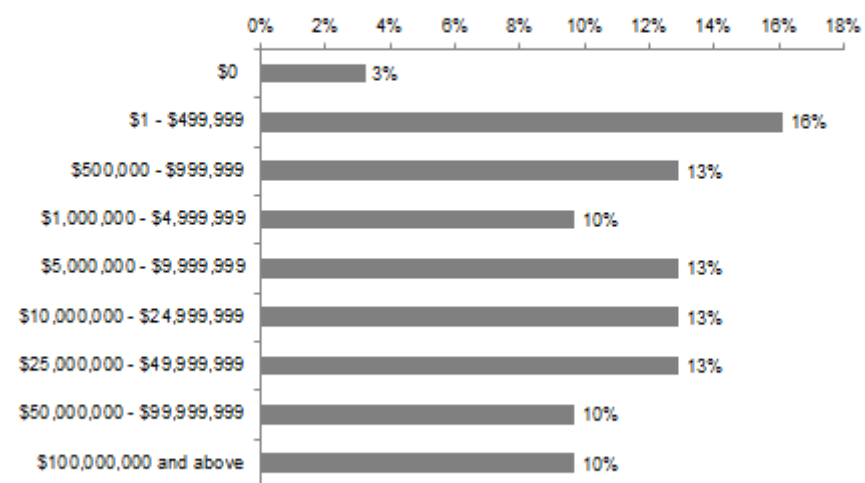
Medical Devices: Employment was closely divided in this component between navigational, measuring, electro-medical and instruments manufacturing (53.2 percent) and medical equipment & supplies manufacturing (46.8 percent).



EY Biotech Industry Snapshot -- R&D Spending:

The EY survey indicates that twenty percent of the responding biotech companies spent between \$50 to \$100 million or more for R&D in 2013.

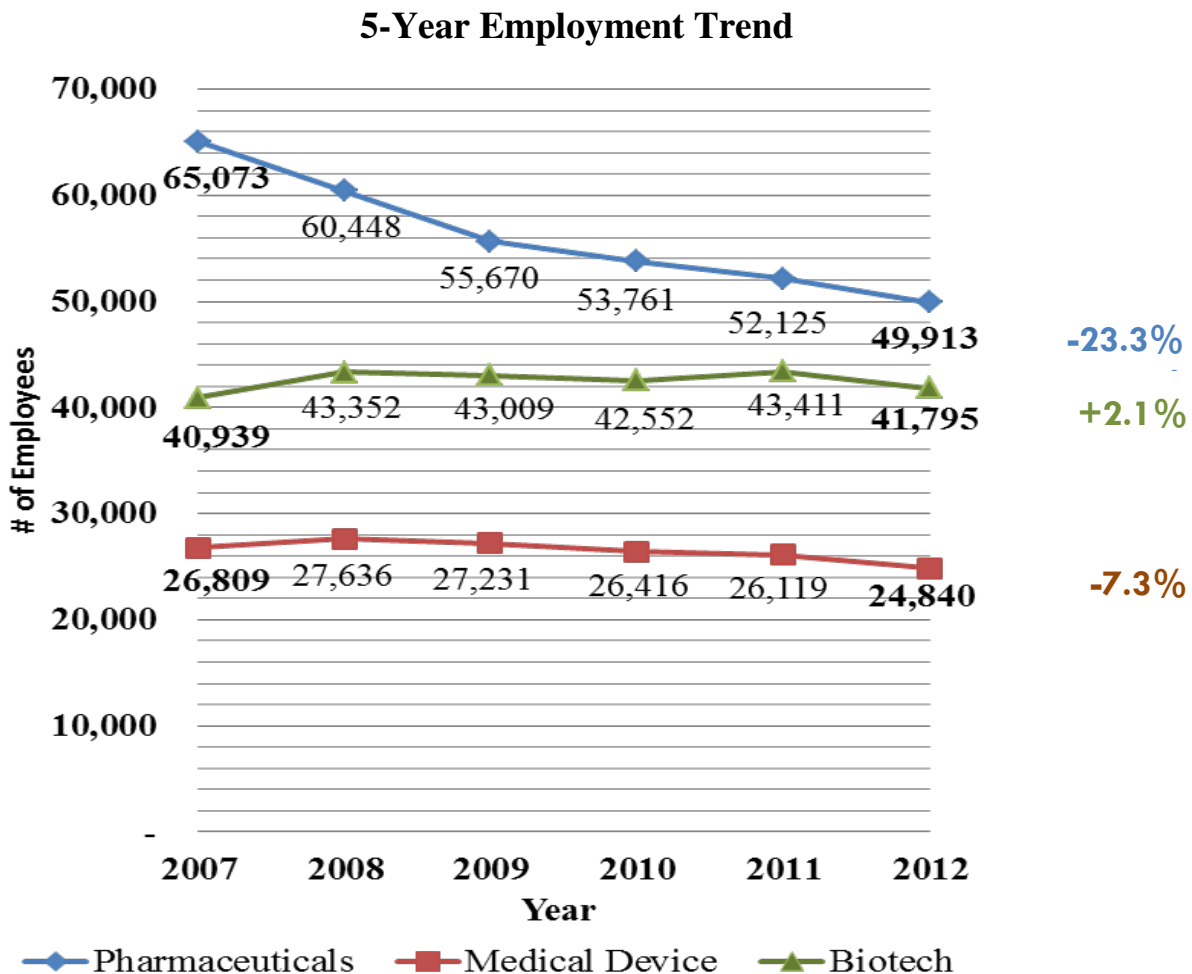
Please indicate your company's research and development expense for your most recent fiscal year-end?





Five-Year Employment Trend

Although the average number of workers employed in the New Jersey cluster in 2012 was approximately 116,500, the employment over the five-year period experienced a decline of 12.3 percent. Not surprisingly, the Pharmaceutical component accounted for the majority of the decline in the labor force, led by job losses in the pharmaceutical and medical manufacturing group (down 36.8 percent). In 2012 the Pharmaceutical component accounted for about 42.8 percent of this cluster's employment, down from 49.0 percent in 2007. Total employment in the Biotechnology component, however, grew over the five-year period and represents a larger portion of the total employment in the cluster as compared to five years ago.



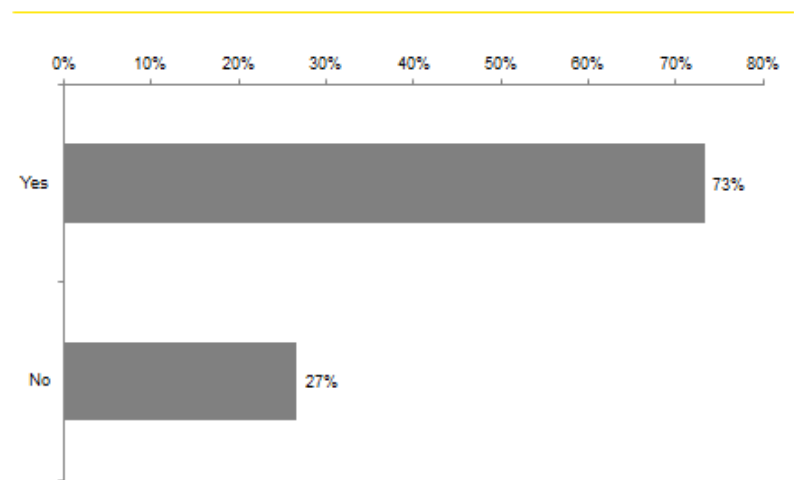
(SOURCE: New Jersey Department of Labor & Workforce Development, Quarterly Census of Employment and Wages, 2007-12 Annual Averages: 5-digits NAICS)



EY Industry Snapshot – Hiring Trends

A majority of biotech companies surveyed by EY plan to hire new employees in 2014.

Do you anticipate hiring additional employees during 2014?



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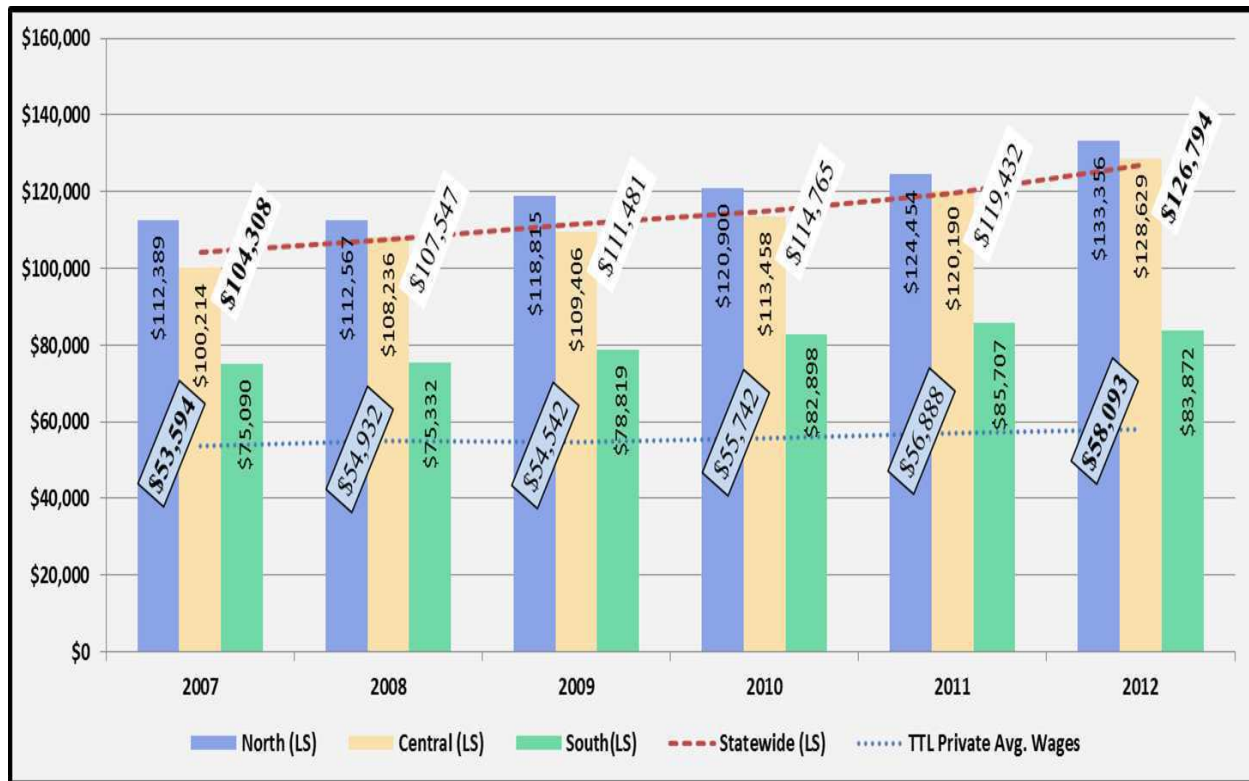




Average Wages

Although total number of employees decreased due principally to the number of pharmaceutical jobs shed over the last five years because of site closures, M&A, and R&D cutbacks, the cluster's statewide annual average wage was \$126,794 in 2012, which was 118.3 percent higher than the state's total private sector's average wage of \$58,093. The cluster's three components (statewide) all had wages that were significantly higher than the statewide total private average wages: Medical Devices \$94,652 (62.9 percent higher than average statewide wages), Biotech \$132,576 (128.2 percent) and Pharmaceuticals \$137,949 (137.5 percent). High wages in NJ's BLSC is an important index of the value of the life sciences to New Jersey's economy and of its contribution to State revenues from payroll taxes.

Five-Year BLSC WAGE Growth Compared to Private Sector by NJ Region



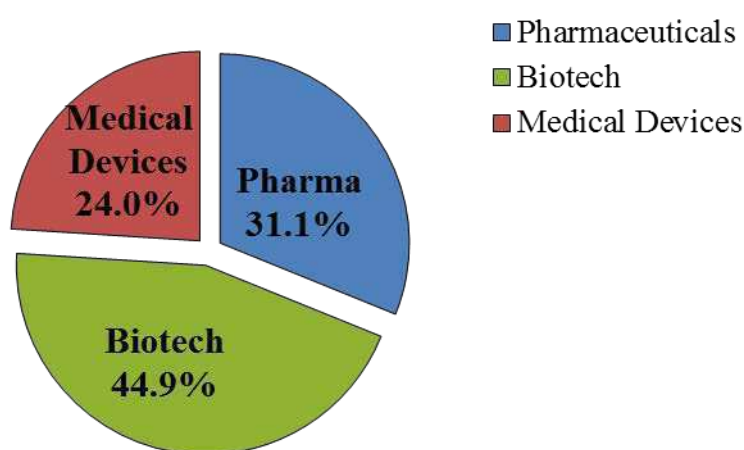
(SOURCE: New Jersey Department of Labor & Workforce Development, Quarterly Census of Employment and Wages, 2007-12 Annual Averages: 4-digits NAICS)



Where We Work

One of the changes in this report as compared to our prior year report is how to track trends in the number of companies that employ our biopharmaceutical workers. The data obtained by the LWD tracks “establishments” as compared to the number of companies. An establishment could be a facility that recently opened in New Jersey, an expansion to another facility, or a new company formed in our geography. In many respects, the tracking of establishments, as compared to the total number of companies, can yield a better measure of the total economic impact that the broader biopharmaceutical industry has on New Jersey. In 2012 there were 3,042 biopharmaceutical establishments concentrated as follows:

Cluster Establishment 2012



Pharmaceuticals: This component, with 947 establishments, was primarily engaged in two industries: drugs & druggists sundries wholesalers (54.4 percent) and pharmaceutical preparation manufacturing (17.6 percent).

Biotechnology: The 1,365 establishments in this component's industries were primarily engaged in R&D related bio-life sciences services (51.3 percent).

Medical Devices: Medical Devices: The 730 establishments in this component consisted of industries largely engaged in dental labs (26.1 percent) and surgical-related manufacturing (24.5 percent)

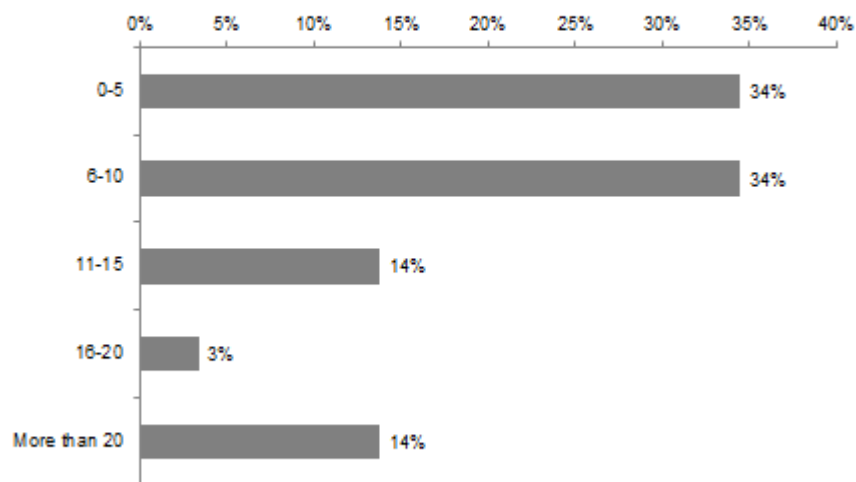
(SOURCE: New Jersey Department of Labor & Workforce Development, Quarterly Census of Employment and Wages, 2012 Annual Averages: 4-digits NAICS)



EY Industry Snapshot – A Balance of the New and the Established

Responses to the EY survey show an industry with a good mix of start-up and established companies, a mix that points to a stable, but still growing industry.

Please indicate the number of years your company has been in business in New Jersey.





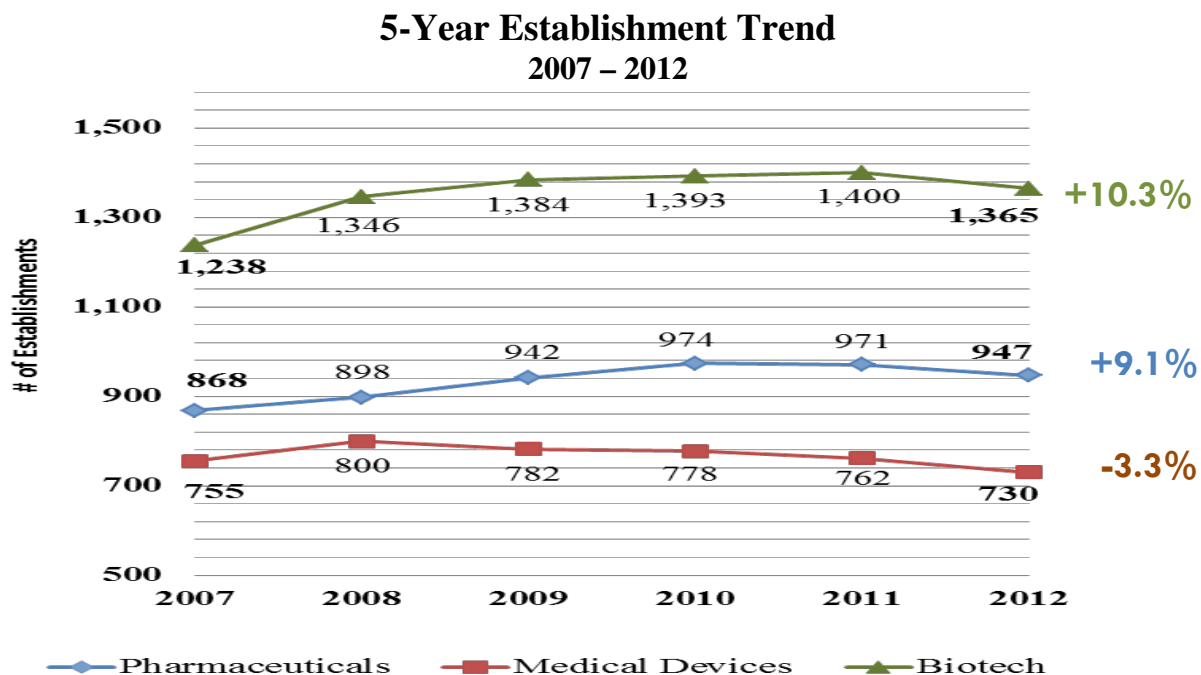
Five-Year Establishment Trend

There were 3,042 establishments in this cluster in 2012, up 6.3 percent from 2,861 in 2007, demonstrating New Jersey’s ability to attract and retain the industry – a key measure of growth.

Pharmaceuticals accounted for 31.1 percent of the cluster’s establishments in 2012, up from 30.3 percent in 2007. While pharma & medicine manufacturing declined (-5.7 percent) over this 5-year period, drug wholesaler and toiletry preparation manufacturing realized an increase, 21.4 & 1.0 percent, respectively.

Biotechnology accounted for 44.9 percent of the establishments in this cluster in 2012, up from 43.3 percent in 2007. All component industries realized gains: medical & diagnostic labs (+10.5 percent); R&D in physical, engineering & life science (+10.2 percent) and R&D in the social sciences (+8.0 percent).

Medical Devices averaged 730 establishments in 2012 and accounted for 24.0 percent of the cluster. Over the 5-year period, this component’s 3.3 percent loss was mainly due to declines among medical equipment & supplies manufacturers (-7.6 percent).



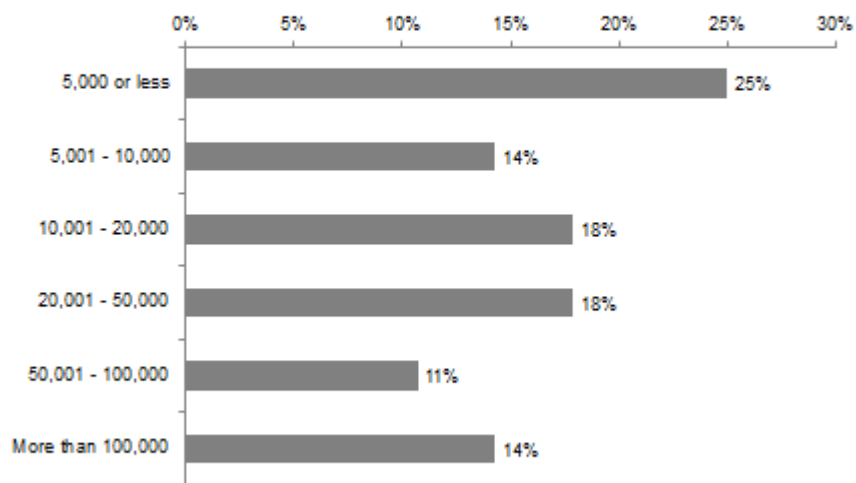
(SOURCE: New Jersey Department of Labor & Workforce Development, Quarterly Census of Employment and Wages, 2012 Annual Averages: 4-digits NAICS)



EY Industry Snapshot – Square Footage Increasing

While one quarter of responding companies occupied facilities of five thousand square feet or less, another 25 percent occupied facilities between 50,000 to 100,000 square feet or larger.

Please indicate below the total square footage for your New Jersey biotechnology operation facilities only (including offices, labs, manufacturing and R&D space).





Summary Cluster Information

The following chart provides a geographic summary of Life Sciences employment and establishments in New Jersey. One key takeaway from this chart is the overall growth that southern New Jersey experienced over the five-year period from 2007-2012.

Employment *	2012		5-Year (2007-2012) Trend			
	Cluster		Pharmaceutical	Biotech	Medical Device	Overall Cluster
Statewide	116,548		-23.3%	2.1%	-7.3%	-12.3%
Nothem New Jersey	55,039	47.2%	-31.0%	14.6%	-14.3%	-16.6%
Central New Jersey	47,372	40.6%	-19.3%	-8.3%	2.1%	-12.2%
Southern New Jersey	11,613	10.0%	23.3%	1.3%	-4.2%	1.5%

Establishments *	2012		5-Year (2007-2012) Trend			
	Cluster		Pharmaceutical	Biotech	Medical Device	Overall Cluster
Statewide	3,054		9.1%	10.3%	-3.3%	6.3%
Nothem New Jersey	1,296	42.4%	1.1%	10.8%	-10.4%	1.3%
Central New Jersey	1,010	33.1%	7.1%	5.7%	-6.3%	3.4%
Southern New Jersey	334	10.9%	14.3%	-3.6%	-1.1%	-0.3%

(SOURCE: New Jersey Department of Labor & Workforce Development, Quarterly Census of Employment and Wages, 2007-12 Annual Averages: 4-digits NAICS)



Life Sciences Funding

Based on rigorous monitoring, BioNJ believes there are more than 379 biotechnology companies in the State of New Jersey as of September 15, 2014, compared to approximately 340 biotechnology companies as of July 30, 2012 and approximately 300 biotechnology companies in 2009, or an increase of 12 percent over the two-year period.

Despite some M&A activity and several companies that moved operations to other locations, the overall number of companies continues to increase with new companies locating to New Jersey and new company formation within the State.

The total number of publicly-held life sciences companies in New Jersey decreased from 48 to 44 as of September 15 due largely to the several companies that merged with other companies; however these amounts were offset by the significant number of initial public offerings – seven – that occurred during 2013 and so far in 2014.

New Jersey is a top-tier state with respects to public biotech companies. South Plainfield, New Jersey's PTC Therapeutics was one of the top three performing IPOs in the nation in 2013. Companies that successfully completed IPOs in 2013 were: Cancer Genetics, Omthera Pharmaceuticals, PTC Therapeutics, Regado Bioscience, Adma Biologics, Ophotech Corp. and Aerie Pharmaceuticals.

New Jersey has the full spectrum of biotech companies: large mature organizations that generate significant earnings as well as companies that focus principally on research. A significant number of companies that responded to our survey are in “start-up” mode (i.e., have been in business five years or less). However, there were also many companies in our survey that have been in business for more than 15 years. This mix of start-up and mature companies is healthy for the future stability and growth of the industry.

New Jersey is also home to a variety of companies offering contract R&D services. Drais Pharmaceuticals, Inc., headquartered in Bridgewater, New Jersey is a unique example of a hybrid company that provides specialized development services for its pharma clients through the creation of virtual asset-centric companies.



A Snapshot of Life Sciences Funding in New Jersey

2013 was an historic year for the biotech industry and certainly a significant financing year as compared to the last ten years. Innovation capital for the industry as a whole rebounded some, however, there continued to be many early stage companies in New Jersey that are looking for funding for early stage research.

Many factors were at play to spur the biotech market rebound during 2013. Nationwide, a record 39 new drugs were approved by the U.S. Food and Drug Administration (FDA), which helped restore investor confidence in the sector. Also, in 2013, the creation of the Breakthrough Therapy Designation program (an expedited approval pathway program) contributed to the enthusiasm in the sector as well as the significant market returns, broader optimism from market “generalists”, and the monetary policies of the U.S. Federal Reserve which ultimately encouraged investors to seek returns through investments in higher risk sectors.

The result of all of this was an Initial Public Offering window that we have not seen since the genomic bubble of 2000. There were approximately 41 IPOs that raised \$3.5 billion, which is second in total funding only to the genomics bubble of 2000 which raised \$4.3 billion from 49 IPOs. As reported previously, in New Jersey, we had seven companies that completed the IPO process (Cancer Genetics, Omthera Pharmaceuticals, PTC Therapeutics, Regado Bioscience, Adma Biologics, Ophotech Corp. and Aerie Pharmaceuticals) and raised gross proceeds totaling approximately \$594 million.

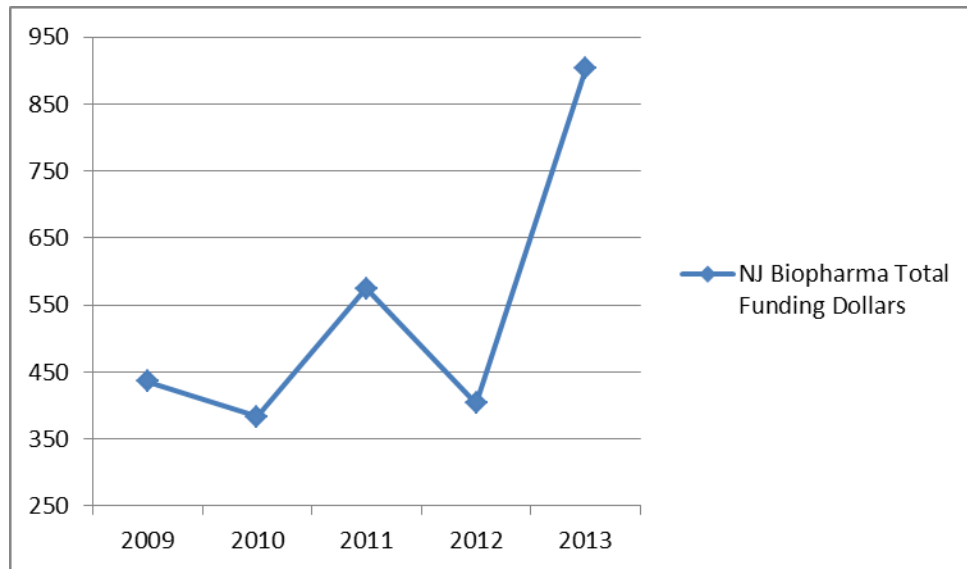
As can be seen in the chart on the following page, data from VentureSource demonstrates that the financing data in New Jersey is consistent with the national trend. VentureSource tracks funding sources for many different industries and the data below are for biopharmaceutical companies².

Historically (i.e., for the past six years and post the economic crisis) New Jersey biotechnology companies rose between approximately \$350 million to \$550 million per year in total aggregate funding, with much of the funding coming from the same seven companies---Cancer Genetics, Omthera Pharmaceuticals, PTC Therapeutics, Regado Bioscience, Adma Biologics, Ophotech Corp. and Aerie Pharmaceuticals -- that completed the IPO process in 2013.

² VentureSource Biopharma sector includes biotechnology companies (companies involved in the industrial use of living organisms or biological techniques developed through basic research), drug delivery companies (companies that develop both a drug and the means of delivery into the body), drug discovery companies (companies developing processes or technologies that research the structure of genes in order to find treatments for specific diseases), and pharmaceutical companies (developers of the more traditional drugs that are derived from plants and other chemical compounds, and do not involve biotechnology.).



**NJ Biopharma Total Funding Dollars (in \$ millions)
Period: 2009 through 2013**

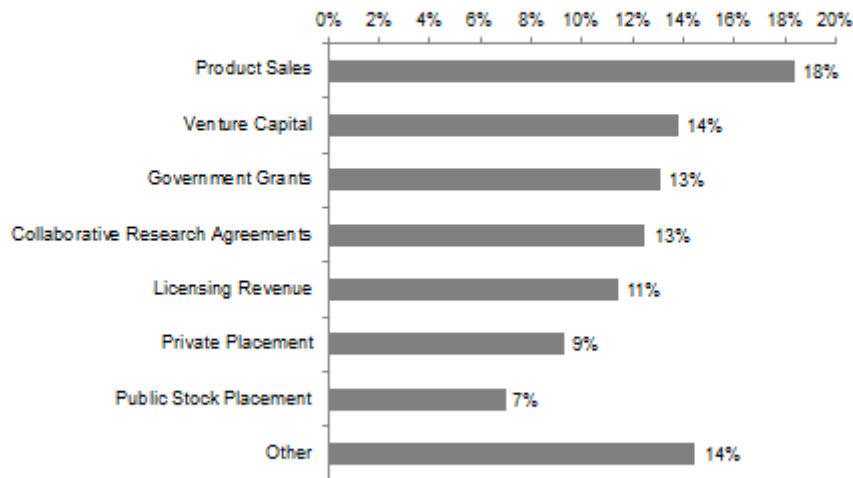


(SOURCE:
Information
obtained from
VentureSource)

EY SNAPSHOT – CASH FLOW

While funding, especially for early-stage companies is strained, respondents to the survey indicate a strong mix of revenue sources.

Please indicate the approximate percentage of your company's cash flow derived from each of the following sources during 2013.





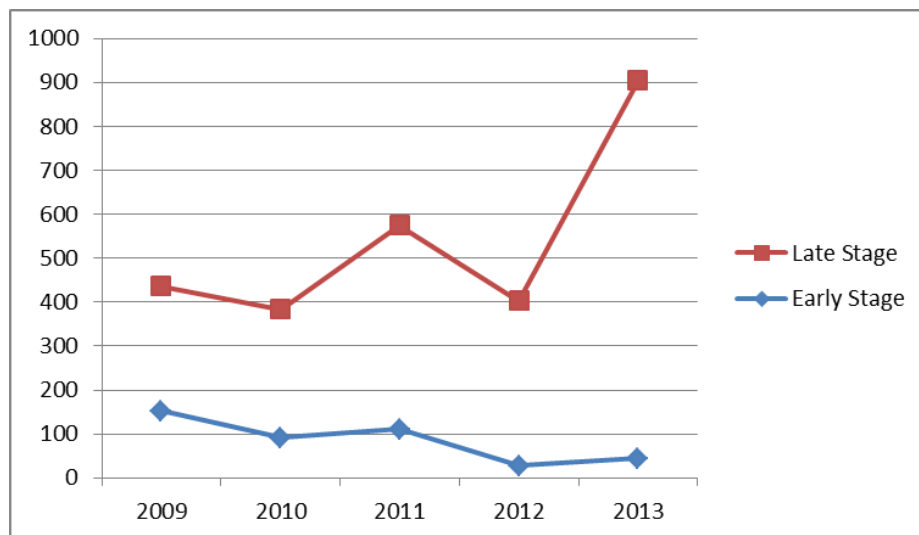
However, to paint a fair and transparent picture of the funding for the years presented, we sorted the VentureSource data based on the category of investments. Venture investments that were characterized as “Seed” or “Series A” investments were disaggregated from all other investments. We believe this view more clearly demonstrates how venture and other investors are investing in New Jersey (i.e. is the funding supporting investments of existing companies with later stage assets, or is the funding supporting research of presumably early-stage/preclinic assets or new company formation).

The table below suggests that funding for early stage research is a continuing challenge as most of the funding appears to be flowing into companies with later-stage assets in New Jersey (which is inconsistent with the national trends that demonstrate a slight rebound in funding for early stage research).

The recent industry-wide emergence of alternative mechanisms for early stage funding has benefitted New Jersey as well as other regional life sciences hubs. These include strategic corporate investors acting as LPs to venture funds or as co-investors in early stage rounds. In 2013, Morris Plains-based electroCore, a leader in non-invasive neurostimulation, received \$12.5 million of a \$40 million Series A round from Merck’s Global Health Innovation venture fund, a case of a New Jersey Big Pharma helping out a young and promising New Jersey medical device specialist. Other alternative mechanisms of funding include well-capitalized disease foundations and highly-motivated angel investors.



**NJ Biopharma Total Funding Dollars – Early Stage versus Later Stage Funding
(in \$ millions)
Period: 2009 through 2013**



(SOURCE:
Information obtained
from VentureSource)

The chart above also tells another story – that New Jersey’s strength over the past several years is in developing assets that have been identified as potential drug candidates, and later in commercializing them.

But looking to the future, New Jersey has promising new drug discovery engines that are being refined.

As an example, driven by the New Jersey Medical and Health Sciences Education Restructuring Act, the recent merger of Rutgers and the University of Medicine and Dentistry of New Jersey (UMDNJ) is expected to have a significant impact on basic research and technology transfer.

Looking at just 2011 dollars, the combined research budget of the two institutions would total \$702 million total and place Rutgers as No. 24 among all U.S. universities, and No. 16 among public U.S. universities. In fact, the research budget of the “new Rutgers” would rank above Harvard, Northwestern, and the University of Illinois.

The ACT is also having a big impact on Rowan University in Glassboro, NJ. On July 1, 2013, the Restructuring Act designated Rowan as New Jersey’s second comprehensive public research institution, transferred the University of Medicine and Dentistry of New Jersey’s School of Osteopathic Medicine and the Graduate School of Biomedical Sciences in Stratford to Rowan and partnered Rowan with Rutgers-Camden to create a College of Health Sciences in the City of Camden.

Rowan became the second institution in the nation to have both a D.O.-granting medical school, Rowan University, New Jersey School of Osteopathic Medicine (RowanSOM), and an M.D.-granting medical school, Cooper Medical School of Rowan University.



Bloustein School Report: Economic Contributions of Life Sciences Industry

Editor's Note: The following presents a summary of a 16-page report detailing the contributions of the New Jersey life sciences industry to the State's economy that was prepared by the Edward J. Bloustein School of Planning and Policy. To access the full report, please go to:

<http://www.bionj.org/wp-content/uploads/2014/09/Economic-Contribution-of-the-Life-Sciences-Industry-BioNJ-6-5-2014.pdf>.

For purposes of this section of our study, the life sciences industry or sector is defined by biological or healthcare-related industries whose core activities are involved in research, development and/or production processes. Such a definition identifies the key business sectors that are responsible for the creation of new products, new scientific findings, and from these, new commercial activity in the life sciences in New Jersey. Those activities then act as a catalyst for further economic development with a clustering effect involving higher education research universities, medical facilities, medical testing, and other related services.

The definition used by the Bloustein School is more limited than that used in recent studies by the Battelle Institute³ and the LWD, as it excludes ancillary industries engaged primarily in the delivery of medical services, wholesalers of medical and related supplies, and industries involved in the distribution or application of existing technologies, such as diagnostic laboratories. These latter types of businesses are largely population and health care coverage driven and are not directly related to the central focus of generating new life sciences knowledge that is then commercially developed in extensive geographic market areas well beyond New Jersey.

The definition used in this study is more focused on the research dimension of life sciences. While this reduces the apparent size of the sector, it provides, instead, a more precise grouping of industries that represent the critical core of life sciences research and its role as an economic catalyst.

Industry Magnitude

In order to assess the contribution of the life sciences industry to the State economy, it is necessary to understand the magnitude of the industry's annual operating expenditures, the types of expenditures made, and the distribution of these expenditures across other industries. For this analysis, data on the size of the life sciences industry in New Jersey was drawn from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages. The number of jobs and establishments and the total wages for each of the sectors included in the life sciences industry are shown in the table on the following page.

³ See *Battelle/BIO State Bioscience Industry Development 2012*, Battelle, BIO-Biotechnology Industry Organization, PMP Public Affairs Consulting, Inc. (http://www.bio.org/sites/default/files/v3battelle-bio_2012_industry_development.pdf)



The key data for each industry are the level of employment, and most importantly for modeling purposes, the total wages paid. Economic input-output tables (see next section) produced by the U.S. Bureau of Economic Analysis (U.S. BEA) and adapted for New Jersey provide information on the portion of each industry’s total economic output that is comprised by wages. Thus, based on the wage estimates from the U.S. BLS, it is possible to estimate total output for the life sciences sector, and thus to estimate the sector’s overall contribution to the State economy.

Based on the industry definition used for this analysis, in 2012 the life sciences sector in New Jersey directly employed 66,451 people in 2012 at 1,064 establishments, with a total payroll of nearly \$10 billion. The average annual pay for these industries was nearly \$150,000 – or, 2.5 times larger than the average annual pay for all jobs in the State.

Life Sciences Employment, Establishments and Wages: New Jersey, 2012				
NAICS Code	NAICS Industry	Employment	Establishments	Total Wages (\$000)
325411	Medicinal and Botanical Manufacturing	4,515	35	942,019
325412	Pharmaceutical Preparation Manufacturing	20,070	167	2,891,290
325413/325414	In-Vitro Diagnostic Substance Manufacturing/ Biological Product (except Diagnostic) Manufacturing	2,140	19	235,977
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	1,905	40	167,088
339112	Surgical and Medical Instrument Manufacturing	3,048	89	290,916
339113	Surgical Appliance and Supplies Manufacturing	6,089	90	691,862
339114	Dental Equipment and Supplies Manufacturing	745	19	46,467
541710	Research and Development in the Physical, Engineering, and Life Sciences	27,939	605	4,594,957
	Life Sciences Total	66,451	1,064	9,860,576

Note: Data for NAICS sectors 325413 and 325414 was not directly available from the BLS. Estimates were calculated as the difference between the totals for the broader pharmaceutical sector (NAICS 32541) and the two subsectors for which data was available (NAICS 325411 and NAICS 325412). NAICS 334516 and 334517 (table 1) are sub-sectors of NAICS 334510, which is included in its entirety in the Rutgers definition of the industry.

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

Input-Output Analysis and the R/ECON™ Input-Output Model

The annual expenditures of the life sciences sector in New Jersey constitute a significant recurring economic contribution to the New Jersey economy. Economic input-output modeling estimates the overall economic impact of contributions such as these based on the interrelationships of sales and purchases among sectors of the economy.

The R/ECON™ Input-Output model developed and maintained by the Center for Urban Policy Research at Rutgers University’s Edward J. Bloustein School of Planning and Public Policy is used to estimate the economic impacts of various types of expenditures or investments, in terms of employment, gross domestic product, compensation (i.e., income) and tax revenues. The model consists of 463 individual sectors of the New Jersey economy and measures the effect of expenditures in one industry on economic activity in all other industries.



Thus, the distribution of expenditures made on labor, materials, equipment, laboratory and production space, and other inputs necessary for the ongoing operations of companies in the life sciences sector included in the definition set forth above, are captured in the inter-industry relationships embodied in the model. These have both direct economic effects as those expenditures become incomes and revenues for workers and businesses, and they also have subsequent indirect effects as those workers and businesses, in turn, spend those dollars on other goods and services. These expenditures on consumer goods, business investment expenditures, and other items, in turn, become income for other workers and businesses. This income gets further spent, and so on, in a multiplier process that has a cumulative impact on the overall economy of the State.

Results of the Analysis – Aggregate Impacts

The table below provides the aggregate economic contribution of the life sciences industry in New Jersey, based on the 2012 wage and employment data in the prior table showing establishments and wages.

Contribution of the Life Sciences Sector to the New Jersey Economy			
	Direct	Indirect	Total
Employment (job-years)	66,451	146,105	212,556
Gross Domestic Product (\$ millions)	\$15,487.3	\$18,061.6	\$33,548.9
Compensation (\$ millions)	\$9,860.6	\$10,458.8	\$20,319.4
State Tax Revenues (\$ millions)			\$1,535.6
Local Tax Revenues (\$ millions)			\$1,361.7



Per-Million-Dollar Impacts

The table below presents the estimated annual economic contribution of the life sciences sector to the New Jersey economy per \$1 million of industry outlays. Based on the compensation-to-output ratio for the various sectors included in the life sciences definition, total industry expenditures are estimated to be approximately \$30.1 billion annually.

Per-Million Dollar Annual Economic Contribution of the Life Sciences Industry in New Jersey	
Indicator	Impact
Employment	7
Gross Domestic Product	\$1,116,209
Compensation	\$676,048
State Tax Revenues	\$51,093
Local Tax Revenues	\$45,304

Economic Impact Conclusion

In conclusion, as the Rutgers study indicates, New Jersey's life sciences sector makes a significant contribution to the State's economy. The State accounts for a disproportionate share of the national life sciences industry relative to its share of the broader national economy. While New Jersey accounts for 2.8 percent of the nation's total employment, it accounts for 23.3 percent of the nation's medicinal and botanical manufacturing, 9.8 percent of pharmaceutical preparation manufacturing and 6.4 percent of the nation's biotechnology R&D activities.

These high shares of U.S. total life sciences economic activity demonstrate New Jersey's strong capacity in the relatively high-paying life sciences industry. In total, despite declines in the State's share of national employment in some of the above life sciences sub-sectors, and an overall 18 percent decline in life sciences jobs (in the face of 12.7 percent national growth) over the past 13 years, the size of the New Jersey economy when compared to larger states belies the vigor and productive capacity of its life sciences sector. This strongly argues for the continuance of public policy to support the health of the life sciences industry and for further investment to sustain its growth.



Conclusion and a Final Thought

New Jersey's life sciences industry has continued to grow despite the patent cliff, the Big Pharma Layoff and the challenges of the economy since 2008.

The economic and scientific environment indicates that there are bright years ahead for the life sciences in New Jersey and nationwide but not without some concern for how it will be funded.

With the significant presence of Big Pharma in New Jersey, the continued growth of the biotechnology sector, the evolving academic research institution landscape and the wealth of scientific talent available to continue research and development of life sciences technology, the future in New Jersey is promising, however there remains a constant need to attract capital, and government must provide a business friendly environment that will foster more early stage research and spur innovation.



About BioNJ

With more than 325 member companies, BioNJ is focused on the growth and prosperity of New Jersey's life sciences cluster. Founded in 1994 by New Jersey industry CEOs, BioNJ serves as the voice of companies located in New Jersey, seeks to advance their economic growth and development and works to encourage new and established companies from around the world to locate in New Jersey.

To learn more about BioNJ, please visit www.BioNJ.org.

About EY

EY, a global leader in professional services, is committed to restoring the public's trust in professional services firms and in the quality of financial reporting. Its 103,000 people in more than 140 countries around the globe pursue the highest levels of integrity, quality, and professionalism to provide clients with solutions based on financial, transactional, and risk-management knowledge in Ernst & Young's core services of audit, tax, and corporate finance. Ernst & Young practices also provide legal services in those parts of the world where permitted. Further information about EY and its approach to a variety of business issues can be found at www.ey.com/us/perspectives. EY refers to all the members of the global EY organization.

EY has a long standing commitment to the life sciences industry serving more than 40 percent of the public life sciences companies; EY is the largest professional services practice serving the industry. Our life sciences practice includes biotech, medical device, generic pharmaceutical, and specialty pharmaceutical companies.

Our size and success has allowed us to make enormous investments in research and keep our professionals current on the evolving issues and trends facing the industry today and what is most likely to affect the life sciences industry moving into the future. Industry focus means we recruit, train and reward our professionals within the context of industry specialization. We develop technologies and processes that are guided by industry considerations.

For more information about EY, contact: Tony Torrington, Partner - Assurance Services/Northeast Life Sciences Assurance Leader at Anthony.Torrington@ey.com.

About the Edward J. Bloustein School of Planning and Public Policy

The Bloustein School serves as one of the nation's key centers for the theory and practice of planning and public policy scholarship and analysis. As part of Rutgers, The State University of New Jersey, the school capitalizes on the strength and resources of this major research university. The Bloustein School reaches to the larger world beyond the realm of academia to contribute to the regional, national, and international communities.

For more information about the Bloustein School, go to: <http://www.policy.rutgers.edu/>.



About the Office of Research and Information at the New Jersey Department of Labor and Workforce Development

The New Jersey Department of Labor and Workforce Development's Office of Research and Information (ORI) collects, analyzes and disseminates economic, labor market and demographic data, identifies workforce and economic trends for the State's key industries, and produces reports on employment and population trends. The Office develops performance metrics for the Department's programs, maintains workforce development data systems, analyzes data to inform program decisions, and produces reports on employment and labor topics. Within ORI, the Center for Occupational Employment Information (COEI) approves occupational training providers and disseminates career information.

For more information, go to: http://lwd.state.nj.us/labor/lpa/pub/empecon/empeconomy_index.html