Contribution of the Life Sciences Industry to the New Jersey Economy

Submitted to:

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Executive Summary

This study analyzes the contribution of the life sciences industry to the New Jersey economy in 2012. The report provides a focused definition of the life sciences industry, an estimate of its annual economic impacts in New Jersey, and an overview of recent employment trends in the industry in New Jersey and the nation.

Among the study's findings, the life sciences industry:

- Directly employs over 66,000 people in New Jersey, and indirectly supports over 145,000 additional jobs through its total expenditures;
- Generates over $20 billion in compensation annually in association with the over 212,000 jobs directly or indirectly supported by the industry;
- Generates an estimated $33.5 billion in GDP in New Jersey annually through its activities and their economic ripple effects;
- Indirectly generates approximately $1.5 billion in state taxes and $1.4 billion in local taxes annually in New Jersey.

In addition, each $1 million in total expenditures made by the industry is estimated to generate:

- seven direct and indirect jobs
- $676,048 in compensation
- $551,093 in State tax revenues
- $45,304 in local tax revenues

The study finds that, while certain segments of the industry have experienced employment declines in New Jersey in recent years, others have continued to grow, and the overall representation of the industry remains strong in the state. As of 2012, New Jersey accounts for 5.8% of life sciences industry employment in the U.S. (versus 2.8% of all employment).

The study also notes that New Jersey's share of the national life science sector remains significantly disproportionate to the overall economic size of the state. Accordingly, it is in New Jersey's deep self-interest to ensure that public policy continues to support the location, development, and growth of the life science industry.

Introduction

This study provides an analysis of the economic impacts of the operations of companies in the life sciences sector in New Jersey. As of 2012, there were an estimated 1,064 establishments[1] of life sciences companies in New Jersey, employing over 66,000 workers. In addition to the important health, quality of life, and medical outcomes the work of such companies can lead to, the ongoing annual expenditures and employment associated with their operations constitute a significant contribution to the state's economy.

This report estimates the size of this contribution. It begins with a definition of the industry, followed by an assessment of its size in New Jersey. There is also a description of the methodology and the input/output model used in the analysis. Estimates of the direct and indirect economic and fiscal impacts of the industry's operations in New Jersey are then provided. This is followed by an overview of state and national trends in life sciences industry employment and some concluding remarks.

A Note on the Broader Benefits Provided by the Life Sciences Industry

While this study provides estimates of the economic and fiscal impacts of the business expenditures made by the life sciences industry in the state, it does not attempt to quantify the broader economic and social benefits that also result from the work of these companies. These benefits are significant and may far exceed the impacts analyzed here, particularly in cases where research and development result in fundamental improvements in the quality of life and health outcomes for large numbers of people within New Jersey and throughout the nation and the world.

[1] "An establishment is an economic unit, such as a factory, mine, store, or office that produces goods or services. It generally is at a single location and is engaged predominantly in one type of economic activity. Where a single location encompasses two or more distinct activities, these are treated as separate establishments, if separate payroll records are available, and the various activities are classified under different industry codes." (U.S. Bureau of Labor Statistics)

Definition of the Life Sciences Industry

For purposes of this 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. 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.

This focused definition of life sciences industries in this study also permits a consistent evaluation of changes over time of the performance of the sector. Such comparisons can be done for New Jersey, a cohort of other states, and the nation as a whole.

The definition used in this study is somewhat more limited than that used in recent studies by the Battelle Institute[2] and the New Jersey Department of Labor and Workforce Development, 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 science knowledge that is then commercially developed in extensive geographic market areas well beyond New Jersey.

A comparison of the definition of the life science industry used in this report to those employed in the aforementioned studies is provided in table 1. Note the extensive use of agricultural based manufacturing industries in the Battelle definition, a categorization of life sciences that is not central to the current business structure of 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 precise grouping of industries that represent the critical core of life science research and its role as an economic catalyst.[3]

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[2] 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)

[3] The New Jersey Department of Labor definition of the life sciences sector would result in an estimate of industry employment approximately 57% greater than the estimate based on the definition used here. Most of this difference is accounted for by the wholesale, soap and cleaning compounds, and medical laboratories industries (see table 1 for NAICS codes).

Table 1 Industries Included in the Analysis			
NAICS Industry	**Battelle**	**NJDOL**	**Rutgers**
311221 Wet Corn Milling	x		
311222 Soybean Processing	x		
311223 Other Oilseed Processing	x		
325193 Ethyl Alcohol Manufacturing			
325199 All Other Basic Organic Chemical Manufacturing	x		
325221 Cellulosic Organic Fiber Manufacturing	x		
325311 Nitrogenous Fertilizer Manufacturing	x		
325312 Phosphatic Fertilizer Manufacturing	x		
325314 Fertilizer (Mixing Only) Manufacturing	x		
325320 Pesticide and Other Agricultural Chemical Manufacturing	x		
325411 Medicinal and Botanical Manufacturing	x	x	x
325412 Pharmaceutical Preparation Manufacturing	x	x	x
325413 In-Vitro Diagnostic Substance Manufacturing	x	x	x
325414 Biological Product (except Diagnostic) Manufacturing	x	x	x
325600 Soap, Cleaning Compound and Toilet Preparation Manufacturing		x	
334510 Electromedical and Electrotherapeutic Apparatus Manufacturing	x	x	x
334516 Analytical Laboratory Instrument Manufacturing (subsector of 334510)	x	x	x
334517 Irradiation Apparatus Manufacturing (subsector of 334510)	x	x	x
339112 Surgical and Medical Instrument Manufacturing	x	x	x
339113 Surgical Appliance and Supplies Manufacturing	x	x	x
339114 Dental Equipment and Supplies Manufacturing	x	x	x
339115 Ophthalmic Goods Manufacturing		x	
339116 Dental Laboratories		x	
541380* Testing Laboratories**	x		
541710* Research and Development in the Physical, Engineering, and Life Sciences	x	x	x
621511 Medical Laboratories	x	x	
621512 Diagnostic Imaging Centers		x	
423450 Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	x		
424210* Drugs and Druggists' Sundries Merchant Wholesalers	x	x	
424910* Farm Supplies Merchant Wholesalers	x		

* Includes only the portion of these industries engaged in relevant life science activities (Battelle).

** Only a small element of this sector, a subsector of architectural and engineering services, is involved in biological testing. It is excluded from this study due to a lack of data at this detailed level.

However, the definition of life sciences used here is *not meant to discount or diminish the importance and economic effects of these related industries* (e.g., wholesaling, medical and dental diagnostic lab services, medical and dental equipment). They are large and contributing sectors in the economy of any state and many of these businesses in New Jersey are members of BioNJ. This analysis, however, focuses on those sectors that are life science knowledge developers that create new products, new services, and lead to new employment and new investment based on seminal new research. This enables public policy to be effectively targeted to a more homogenous and responsive set of businesses.

Industry Data and Methodology

This section presents the economic data from the U.S. Bureau of Labor Statistics that is used in the analysis. It also describes the R/ECON™ Input-Output Model of the New Jersey economy used to estimate the contribution of the life sciences sector to the state economy.

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 table 2 (the definition of the life science industry in New Jersey is given in table 1).

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.

Table 2
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, state 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.

In addition, embodied in the model are estimates – known as regional purchase coefficients, or RPCs – of the share of local (i.e., in-state) demand for labor and material that can be met by in-state supply. That is, based on historical inter-industry relationships, the model can estimate the portion of an industry's expenditures that are made on labor, material and services produced (i.e., sourced) *in New Jersey*. Similarly, these inter-industry relationships also capture the portion of *indirect* expenditures (i.e., spending of the business revenues and personal incomes generated by the initial industry expenditures) that remain in the state. Any initial expenditures and indirect impacts that spill out of the state are referred to as economic "leakage." Estimates of "leakage" associated with expenditures can be further refined based on specific information regarding the expected sourcing of labor, materials or other services.

Industry operating expenditures are comprised of annual outlays that generate recurring economic impacts each year. That is, the economic ripple effects – or "multiplier" effects – that result from the expenditures of the life sciences sector recur annually, as long as the industry continues to operate at existing levels. If the industry and its expenditures grow or contract, the indirect impacts – in terms of employment, income, output (GDP), and tax revenues – will increase or decrease accordingly.

Results of the Analysis

Aggregate Impacts

Table 3 provides the aggregate economic contribution of the life sciences industry in New Jersey, based on the 2012 wage and employment data provided in table 2.

Table 3
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**

The estimated contribution of the life sciences industries to the New Jersey economy includes:

- **Employment**
  212,556 jobs are estimated to be supported annually by the activities of the life sciences industry in New Jersey. These include both direct jobs in the industry and indirect jobs supported by the industry's activities and expenditures.

212,556 jobs supported annually in New Jersey

Employment is generated across a wide range of sectors, as the initial direct expenditures supporting jobs and business revenues in the life sciences "ripple" through the broader economy, generating indirect employment in other industries such as retail, services, transportation, etc.[4] The large number of indirect jobs (more than twice as many as direct jobs) results from the high-paying direct jobs and high

[4] The broadly defined services sector includes professional and business services (e.g., engineering, architecture, accounting, legal services, etc.), education and health services, leisure and hospitality services, the information sector, and other service industries.

level of other (non-labor) expenditures in the life sciences sector. Average compensation for the direct jobs within the life sciences is estimated at $148,389, compared to $71,584 for the indirect jobs. Table 4 provides the estimated sector distribution (job categories are from the U.S. Bureau of Labor Statistics) of the over 212,000 direct and indirect jobs supported in New Jersey by the activity of the life sciences industry.

Table 4
Distribution of Employment Impacts by Sector

Sector	Employment
Services	107,090
Manufacturing	61,362
Retail Trade	18,254
Financial Activities	8,822
Wholesale Trade	8,455
Transportation & Public Utilities	6,603
Natural Resources & Mining	1,742
Construction	228
Total	**212,556**

- **Compensation**

  Labor compensation represents the total wages, salaries and wage supplements (i.e., employer contributions to government and private pension funds) paid for all direct *and* indirect jobs generated in New Jersey as a result of the expenditures made *in New Jersey* by firms in the life sciences industry. Total annual compensation for all jobs supported directly and indirectly by the industry is estimated at $20.3 billion.

$20.3 billion in compensation

- **State Gross Domestic Product**

  Total gross domestic product (GDP), a measure of the value of the new economic output generated in the state as a result of the industry's expenditures, is estimated at $33.5 billion.

$33.5 billion in GDP

- **State Tax Revenues**

  Estimated annual state tax revenues generated by the industry comprise the income taxes associated with the salaries paid to the workers in the direct and indirect jobs supported by the industry, as well as the sales taxes associated with the economic output generated by those expenditures. In total, the life science industry's operations are estimated to generate approximately $1.5 billion in annual state tax revenues.

  $1.5 billion in state tax revenues

- **Local Tax Revenues**

  The estimated local tax revenues for the state represent property tax revenues that accrue, over time, as a result of improvements to existing or construction of new property afforded by the personal and business incomes generated directly and indirectly by the operations of the life sciences sector. These local tax revenues are ultimate estimated at $1.4 billion. Unlike the other impacts, the increase to this level occurs over a considerably longer period (see Appendix A for additional detail).

  $1.4 billion in local tax revenues

Per-Million-Dollar Impacts

Table 5 presents the estimated annual economic contribution of the life sciences sector 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.

Table 5
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**

Each $1 million in *total* expenditures made by the industry is estimated to generate *in New Jersey*:

- 7 (direct and indirect) jobs;
- $1,116,209 in GDP;
- $676,048 in compensation;
- $51,093 in state tax revenues; and
- $45,304 in local tax revenues.

Overview of the Life Sciences Sector in New Jersey and the United States

New Jersey has long had a strong position in the life sciences industries. Table 6 shows the New Jersey and United States employment in each industry in 2012 and New Jersey's share of the national total. This data reflects the Rutgers definition of the life sciences industry for purposes of this study as identified in table 1.

Table 6
Life Sciences Employment: New Jersey and U.S., 2012

NAICS Code	NAICS Industry	New Jersey	United States	NJ Share (%)
325411	Medicinal and Botanical Manufacturing	4,515	19,343	23.3
325412	Pharmaceutical Preparation Manufacturing	20,070	204,255	9.8
325413/325414	In-Vitro Diagnostic Substance Manufacturing / Biological Product (except Diagnostic) Manufacturing*	2,140	46,062	5.3
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	1,905	57,676	3.3
339112	Surgical and Medical Instrument Manufacturing	3,048	120,653	2.5
339113	Surgical Appliance and Supplies Manufacturing	6,089	98,934	6.2
339114	Dental Equipment and Supplies Manufacturing	745	16,352	4.6
541710	Research and Development in the Physical, Engineering, and Life Sciences**	27,939	575,243	4.9
	Life Sciences Total	**66,451**	**1,138,518**	**5.8**

* Data for NAICS sectors 325413 and 325414 was not directly available from the BLS. Estimates for the two sectors 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).

** This sector includes Research and Development in Bioetechnology (NAICS 541711) and Research and Development in the Physical, Engineering and Life Sciences except Biotechnology (NAICS 541712). The latter subsector includes companies engaged in research and development in fields not directly related to the life sciences, including physics, mathematics, engineering and computer hardware. It also includes firms engaged in life sciences research in fields such as biology, botany, chemical research and food science. Because the U.S. Bureau of Labor Statistics data does not provide subsector detail beyond the six digit NAICS level, NAICS 541712 is included in the analysis in its entirety in order to fully capture the impacts of the life sciences research activities it includes. As such, the size of the sector and the resulting impact estimates may somewhat overstate the sector's contribution specific to the life sciences. Research and Development in Biotechnology (NAICS 541711) accounts for approximately 32% of the broader industry (NAICS 541710) in New Jersey, and approximately 24% of the broader industry nationally.

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

New Jersey represents approximately 2.8% of the nation's total employment and population. For comparison, note the state's high employment shares in medicinal and botanical manufacturing (23.3% of the nation), pharmaceutical preparation manufacturing (9.8% of the nation), surgical appliances and supplies manufacturing (6.2% of the nation), and research and development (4.9% of the nation, including 6.4% in the biotechnology subsector). In total, New Jersey had 66,451 jobs in the life sciences in 2012, or approximately 5.8% of the national total. This represents more than twice the state's overall employment or population share in the nation. These high shares of the U.S. totals demonstrate New Jersey's strong capacity in the relatively high-pay life sciences industries that have historically been strong drivers of the state's economy.

At the same time, the state has experienced employment declines in these sectors in recent years (table 7). In some sectors, such as pharmaceutical preparation manufacturing, New Jersey has accounted for a significant portion (67.5%) of national losses since 2001; in others, such as research and development, the state has not participated in nationwide

growth. In all, between 2001 and 2012, New Jersey had a decline of 14,558 jobs, or 18%, in the life sciences sector, versus national growth of 128,623 jobs in the sector, or 12.7%.

Table 7
Change in Life Sciences Employment: New Jersey and U.S., 2001-2012

		New Jersey		United States	
NAICS Code	NAICS Industry	Absolute	Percent	Absolute	Percent
325411	Medicinal and Botanical Manufacturing	-1,530	-25.3	-4,950	-20.4
325412	Pharmaceutical Preparation Manufacturing	-10,128	-33.5	-14,997	-6.8
325413/325414	In-Vitro Diagnostic Substance Manufacturing / Biological Product (except Diagnostic) Manufacturing	511	31.4	8,942	24.1
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	-254	-11.8	3,863	7.2
339112	Surgical and Medical Instrument Manufacturing	495	19.4	13,614	12.7
339113	Surgical Appliance and Supplies Manufacturing	-245	-3.9	7,986	8.8
339114	Dental Equipment and Supplies Manufacturing	109	17.1	204	1.3
541710	Research and Development in the Physical, Engineering, and Life Sciences	-3,516	-11.2	113,961	24.7
	Life Sciences Total	**-14,558**	**-18.0**	**128,623**	**12.7**

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

These declines and slow growth rates are also visible in the state's declining shares of national employment in the life sciences sectors from 2001 to 2012 (table 8). Note the drop of four percentage points in the state's share of pharmaceutical preparation manufacturing. New Jersey's share of the life sciences sector as a whole has decreased from 8% in 2001 to 5.8% in 2012.

Table 8
Change in New Jersey Share of U.S. Life Sciences Employment Share: 2001-2012

NAICS Code	NAICS Industry	2001 (%)	2012 (%)	Change (% points)
325411	Medicinal and Botanical Manufacturing	24.9	23.3	-1.6
325412	Pharmaceutical Preparation Manufacturing	13.8	9.8	-4.0
325413/325414	In-Vitro Diagnostic Substance Manufacturing / Biological Product (except Diagnostic) Manufacturing	4.4	5.3	0.9
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	4.0	3.3	-0.7
339112	339112 Surgical and Medical Instrument Manufacturing	2.4	2.5	0.1
339113	339113 Surgical Appliance and Supplies Manufacturing	7.0	6.2	-0.8
339114	339114 Dental Equipment and Supplies Manufacturing	3.9	4.6	0.7
541710	54171 Research and Development in the Physical, Engineering, and Life Sciences	6.8	4.9	-1.9
	Life Sciences Total	**8.0**	**5.8**	**-2.2**
	Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.			

These trends highlight the need for innovative and effective policies that encourage sustained investment in the life sciences industries that have historically served as strong engines of economic growth in the state.

Conclusion

This report provides a research core function definition for the life science industry and estimates the size and economic impacts of this sector in New Jersey. The high-value added, high salary nature of the industry along with high non-salary expenditures result in its highly leveraged impact on the overall economy of the state.

The employment multiplier of the industry in New Jersey – i.e. the total jobs created (direct and indirect) divided by the number of direct jobs in the life science sector – is 3.2. This high multiplier is a telling example of the significant impact potential of the industry. It also succinctly explains the intense competition (among states and among nations) to retain and attract life science investments and businesses.

The report also indicates that the life science sector in New Jersey continues to make significant annual economic and fiscal contributions to the New Jersey economy. In addition, although diminished recently, New Jersey's share of the national life science sector remains significantly disproportionate to the overall economic size of the state. Accordingly, it is New Jersey's deep self-interest to ensure that public policy continues to support the location, development, and growth of the life science industry.

Appendix A

The estimated local tax revenues for the state estimated in this analysis represent property tax revenues that accrue, over time, as a result of improvements to existing or construction of new property. This activity is afforded by the personal and business incomes generated directly and indirectly by the expenditures of the life sciences industry.

Local tax revenues result from the expenditures generated from the income for workers and revenues for business.[5] The personal incomes and business revenues are, in part, used to pay property taxes and to improve properties (both residential and commercial). Thus, households and businesses that benefit from the industry's activities acquire and/or improve residential and commercial properties or alternatively are able to pay rents that include associated property taxes.

Historical New Jersey fiscal and economic data are used to measure the relationship between business revenues and the amount of commercial property tax revenues collected, and between household incomes and the amount of residential property tax revenues collected.[6] Given both household income and business revenues associated with the operations of the life sciences industry, the R/ECON™ Input-Output Model invokes the known statistical relation of local property tax revenues to both household income and business revenues in order to estimate the addition to local tax revenues attributable to the expenditures.

[5] For businesses, the revenue increase is measured in terms of value-added, and it is the change in value added in the business sector that is the basis for the estimated change in property tax revenues.

[6] For the entire state, approximately 76% of total local property tax revenues are attributable to residential property; with approximately 21% derived primarily from commercial and industrial property.