STATE OF NEW HAMPSHIRE

LIFE SCIENCES INDUSTRY ASSESSMENT AND STRATEGY

FEBRUARY 2023

SUBMITTED TO:

BEA New Hampshire Department of BUSINESS AND ECONOMIC AFFAIRS

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INTRODUCTION

The State of New Hampshire Department of Business and Economic Affairs (BEA) retained Camoin Associates to study the Life Sciences sector across the state and determine how BEA and its partners can leverage the state's assets to drive opportunity in industries suited to New Hampshire's landscape. To complete this project, Camoin Associates conducted a comprehensive data analysis and led interviews with businesses from across the state. This work was also supported by on-the-ground site visits where our team toured laboratories and saw the latest in research from educational institutions and their private sector partners. Together, this information brought out the best opportunities for the state, while at the same time identifying the barriers or gaps that are preventing the industry from reaching its highest potential. The research tasks are divided into three sections, noted below.

I. **Situational Assessment, Part I –** Data in this report include a breakdown of the industry's jobs, where there are concentrations in certain industry specialties, earnings by industry group, the number and size of establishments in industry groups, and worker productivity.

II. **Situational Assessment, Part II –** Data in this report include a supply chain analysis that details who industries are buying from and selling to, a workforce analysis that looks at the types of occupations and skillsets in the industry, and a competitive analysis that compares the State of New Hampshire's Life Science industry to other leading states and metros in this industry.

III. **Emerging Opportunities and Industry Trends –** Data in this report examine the emerging trends at a national and global level and determine the strengths, challenges, and opportunities related to these trends.

Highlights of Data Sources Used

- Labor market data from *Lightcast*, a global workforce data analytics firm
- Detailed industry reports at the 5-digit NAICS level from *IBISWorld*, a leading industry market research provider
- Data on Innovation and R&D from Crunchbase, National Institutes of Health, National Science Foundation and Small Business Administration
- The 2021 New Hampshire University Research and Industry Plan
- Desktop research & interviews

Interviews / Site Visits with Companies or Institutions based in:

- Bedford
- Durham
- Jaffrey
- Keene
- Lebanon
- Londonderry
- Manchester
- Merrimack
- Portsmouth
- West Lebanon

INDUSTRY ECONOMIC HIGHLIGHTS

Life Sciences have made a strong contribution to the State's Economic growth.

New Hampshire's Life Sciences cluster included 11,290 jobs in 2021. This amounts to 1.5% of the state's total employment. This proportion is slightly above the national average for Life Sciences employment (1.4%) but lower than New England's (2.6%).

The cluster added 1,484 net new jobs since 2012, an increase of +15.1%. The new jobs represent 3.8% of New Hampshire's job growth during this period. While the state experienced growth in Life Sciences, it lagged the growth rate of New England, which reached +31.3%, and the US, which expanded the Life Sciences cluster by +18.8%.

The average earnings for a New Hampshire Life Sciences worker are $130,848. This is higher than the state average for all industries ($82,113). New Hampshire Life Sciences workers are compensated better than the national average ($126,539) but not as highly as their counterparts in New England ($142,946).

There are 612 payrolled businesses in New Hampshire's Life Sciences cluster. These establishments average 25 jobs, which is smaller than similar firms in New England (41 jobs/establishment) or the US (33 jobs/establishment).

The cluster contributes $2.8 billion in Gross Regional Product to the State. This represents 3.0% of the state total. Productivity (GRP per worker) for Life Sciences is $247,822, which is on par with the national average for this type of activity ($248,067) but behind New England ($303,953).

Total sales for firms in this cluster equals $4.3 billion in 2021. These sales are primarily export-oriented, with 73.8% of sales occurring outside New Hampshire.

Industry Groups

- Medical Device Manufacturing
- Medical Equipment and Supplies Manufacturing
- Research and Development
- Pharmaceutical and Medicine Manufacturing
- Medical and Diagnostic Laboratories

INDUSTRY ASSESSMENT: STRENGTHS AND CHALLENGES

Overall, Life Sciences is performing well in New Hampshire and offers significant future economic opportunities. Highlights of the industry include:

- There are strong companies with a national and global presence, as well as a growing presence of small- to medium-sized companies.
- A high proportion of STEM occupations.
- A strong presence of high-tech industry employment.
- A large number of patents awarded within the state compared to its size and scale.
- Relatively high value of SBIR/STTR awards in the state.
- R&D at educational institutions, including unique research strengths at Dartmouth, University of New Hampshire, and Keene State College.
- Strong growth in total R&D expenditures.
- Good connections to a national and global Life Sciences cluster (Boston, MA MSA).
- Strong potential to become a national and global leader in advanced regenerative manufacturing via ARMI and their partners.
- Industry leadership creating a statewide organization for industry-driven initiatives.

The challenges facing the industry include:

- Meeting the needs of a rapidly growing and changing workforce. This includes attracting and retaining the number of workers needed in the future at all education and skill levels.
- A relatively small number of venture capital investments.
- The lack of distribution for SBIR/STTR awards; in other words, the awards are highly concentrated in one company.
- The lack of awareness for the Life Sciences industry in State-led economic development efforts.
- Lack of an organized and coordinated expansion and attraction effort.
- The state is still nascent in the realm of startups and accelerating startup growth.
- The lack of a medical school at University of New Hampshire.

Opportunities in Emerging Sectors

With strategic investment, resources, and support, the State of New Hampshire has the potential to encourage growth in some of the leading subsectors within the Life Sciences industry. Based on the culmination of interviews, data analysis, and site visits, the following list reflects which emerging subsectors are well suited to flourish in the state. These subsectors are:

- **Life Sciences Manufacturing and a broader connection to Advanced Manufacturing**
- **Digital Technology and the growth of MedTech**
- **Advanced Materials including Regenerative Manufacturing**
- **Personalized Medicine**

NEW HAMPSHIRE LIFE SCIENCES STRATEGY

Based on data analysis, interviews, site visits, and ongoing coordination with other work overseen by BEA, there are six categories where BEA can have the greatest impact on the Life Sciences industry. Strategies are primarily targeted at the BEA, and opportunities for partnerships or other lead roles are indicated below.

1. MARKETING AND COMMUNICATION

a. Build awareness about the state's extensive Life Sciences market and proximity to regional assets. An external marketing campaign with the objective of growing awareness of the size and scale of the Life Sciences industry in the State of New Hampshire is necessary to showcase the assets, existing industry mix, and prospects for expansion or relocation in the state. Using industry data from this report and drawing on supporting evidence from the Business Recruitment Strategy, New Hampshire has a solid case to make for why it is a strong market for Life Sciences. Within a competitive industry like Life Sciences, communicating the State's Life Sciences advantages to a targeted audience will begin to further grow the profile of New Hampshire within the market.

Marketing and communication efforts will emphasize that the Life Sciences market is strong in New Hampshire and can compete with other leading metros and states in New England and the Northeast. One of the priorities for BEA will be using the marketing campaign to promote the valuable assets across the state that make it a competitive location to support Life Sciences. This includes companies in neighboring geographies like Western Massachusetts, Connecticut, and Upstate New York, who are prime candidates for attraction or growth opportunities and may not be aware of New Hampshire's Life Sciences profile.

b. Expand messaging for attraction to include industry-specific data and targeted messaging. The awareness and marketing effort must go beyond the baseline of the State's advantageous business environment, the State's quality of life, or general promotion of "live, work and play." These messages are useful but are not tailored enough within a targeted technical sector like Life Sciences. The marketing campaign should include a range of tactics, including a coordinated web presence, ongoing social media posts, and working closely with businesses and industry leaders to highlight the success

Industries for attraction and business development:

- Research, Testing, and Medical Laboratories
- Medical Devices and Equipment
- Bioscience-Related Distribution
- Drugs and Pharmaceuticals
- Cross-section of Life Sciences and Manufacturing

New Hampshire industry and research strengths to promote and leverage:

- Biotherapeutics
- Quantitative Biology & Bioinformatics
- MedTech/Medical IT
- Environmental Remote Sensing
- Each has significant and relevant facilities and equipment

stories of what is happening within New Hampshire. BEA should also leverage and be consistent with the workforce marketing strategies occurring simultaneously in the State.

c. Facilitate communication and resource sharing with existing businesses in New Hampshire. Within a relatively small state like New Hampshire, there are substantial opportunities to make personal connections, problem solve business concerns, and elevate the voices of regional businesses.

Partners: Partnering with the private sector to craft messaging and distribute materials is imperative to the success of elevating the State's profile in Life Sciences. Partnerships could include any related industry associations and ongoing communications with the State's most influential employers in this sector. As the BEA seeks to continue to build internal relations with its business community, it is imperative that the State operate with a high degree of transparency and accountability with its intentions. This may include but is not limited to sharing relevant market data, business attraction goals, or other mutually beneficial information.

Top MSAs by Jobs:
- New York-Newark-Jersey City
- Boston-Cambridge-Newton
- Los Angeles-Long Beach-Anaheim
- San Francisco-Oakland-Berkeley
- San Diego-Chula Vista-Carlsbad

Top MSAs by Location Quotient
- Los Alamos, NM
- Warsaw, IN
- Bloomington, IN
- Brookings, SD
- McPherson, KS

Refer to Data Attachment: B in the Emerging Opportunities and Trends Appendix to see a full list of metros by employment and location quotient.

2. BUSINESS DEVELOPMENT AND ATTRACTION

a. Continue to grow the concentration of businesses that fit within the opportunity sectors through attraction. The case for business attraction will be closely tied to the marketing and communication efforts noted above. There are several areas of focus for which audiences to target with a tailored message about the State's assets and opportunities for business. These include:

Export/International Attraction Markets

- Begin with Canada and when capacity grows, advance to Europe (UK, Germany, Netherlands)

Domestic Markets

- **Metros by employment:** The largest US metros by employment in the Life Sciences industry should be targeted because businesses may be looking for expansion into new regions or prefer a less "crowded" environment. Businesses within these larger metros can also help New Hampshire companies and institutions seeking business-to-business relationships and expanding markets.
- **Metros by concentration:** The metros with the highest concentrations of Life Sciences employment include some of the country's most notable cities, but also smaller cities that should be approached for attraction. Companies in these locations may be looking to expand or relocate to a market like New Hampshire that has strengths and is also within close proximity to major markets, specifically Boston.

Messages to promote in business attraction efforts include:

- New Hampshire is one of a few clusters that exist in the United States that has a strength in medical device manufacturing.
- New Hampshire's proximity to Boston, MA means that any company (re)locating in New Hampshire is situated within one of the world's most well-known and heavily concentrated areas for Life Sciences research.
- The state's strength in manufacturing is a tremendous asset for crossover opportunities in Life Sciences and can be leveraged and highlighted in the attraction strategies.
- New Hampshire has several significant Life Sciences research and development institutions and centers, including those at Dartmouth, ARMI, and the University of New Hampshire.

b. Expand BEA's digital presence and usage of communication channels in attraction efforts. BEA's communication needs to reflect the key takeaways from this data analysis, along with coordinating strengths identified in the Business Recruitment Strategy. This includes, at a minimum, an updated web presence for BEA that communicates the industry strengths and assets. Tracking the visitation to the website through an application like Camoin's ProspectEngage will help build relationships with companies interested in learning more about what the State has to offer and develop warm attraction leads. In partnership with tracking visitation to the website, developing an email marketing campaign with targeted messages will keep New Hampshire front of mind in an increasingly competitive sector. Trade shows will also be an important component of attraction and building recognition for the State's profile. Select events are suggested below.

Strategic Trade Shows for Life Sciences Business Attraction*			
Target Industry	**Name of Show**	**Location**	**Schedule**
Bio	BIO International Convention	Boston, MA	June 5–8, 2023
Medical Device Manufacturing	IM Engineering East	New York, NY	June 13–15, 2023
Medical Technology	MEDICA Trade Fair	Dusseldorf, Germany	November 13–16, 2023

**This is an abridged version of the suggested trade show schedule from the Business Recruitment Strategy*

Partners: Partnering with existing companies will play a critical role in attraction efforts. Clearly communicating the value and possible supply chain coordination will help the State refine its messaging and closely target the right audiences.

3. WORKFORCE AND TALENT

a. Look for cross-industry partnerships to support occupations that have a substantial impact on the economy. The workforce analysis revealed that the industry is primarily comprised of Production occupations, followed by Engineering and Management. This further stresses the importance and connection between manufacturing and the Life Sciences industry. Based on

current needs and emerging trends, skills in computer sciences, mathematics, and diagnostics will also be critical to supporting the industry. Additionally, the State must recognize and craft messages for workers at different skill levels – entry, middle, and high.

b. Continue to pursue public-private-philanthropic partnerships in workforce development efforts. Workforce is a pressing issue across all industries in New Hampshire and to successfully grow the Life Sciences industry, strategic partnerships with the private sector and educational institutions will be necessary to support the spectrum of positions that currently stand unfilled and those that will evolve as the cluster grows. A lack of workforce will greatly hinder the growth of industry and will have devastating effects on the economic potential, and thereby opportunities for prosperity, for the state's residents.

c. Support workforce initiatives that highlight opportunities to grow from within the state and from outside attraction. In line with the state Workforce Assessment that was completed in August 2022, the State must tackle the workforce challenges through both attraction and growth from within. Shifting demographics and population decline mean that workforce attraction will be a necessary component of the State's workforce strategy. This can be further broken down into two cohorts:

- Regional Commuters – New Hampshire is a net exporter of labor, particularly among its higher-paying jobs. Interviews confirmed cross-state commuting was prevalent and the ability to fully articulate the range of opportunities within the state for Life Sciences jobs was modest, even among those in the industry.
- Workers outside of New England – While regional commuters to Massachusetts are a source of potential attraction, there are additional factors that would, and do, draw workers to New Hampshire. Whether cost of living, access to recreation and major metros, or other lifestyle factors, there is an opportunity to partner the messaging between economic opportunity and lifestyle amenities.

While attracting workers from out of state or regionally may play a role in supporting the needs of employers, growing from within New Hampshire will be key to tackling the dramatic challenges facing the industry. This includes:

- Increasing opportunities for apprenticeships, paid internships, and on-the-job training.
- Targeting the K-12 system to communicate the opportunities within the state and developing understanding of pathways for a range of skillsets, talents, or personal interests.
- Working with underrepresented groups in the industry including women, Hispanics or Latinos, Blacks, and those with other culturally diverse backgrounds.
- Demonstrating career pathways for entry level workers and opportunities for upskilling – for all levels of positions (entry level, middle skill, and high skill).

Partners: Higher education, community colleges, industry associations, New Hampshire Department of Labor, workforce recruiters, and HR directors within Life Sciences companies or with knowledge of the industry

4. ORGANIZATION AND PARTNERSHIPS

a. Enlist a Life Sciences specialist at BEA to play the role of network builder and facilitator and where appropriate, provide direct support and services. As part of supporting the industry, the BEA must grow its internal knowledge and expertise of industry trends. The role of a Life Sciences specialist at BEA would help to coordinate strategies and action around industry marketing, trade shows, attraction, and trade development. This includes marketing sites and facilities available for development that fit industry needs like production, wholesaling/logistics, wet lab space, other R&D space, and/or incubation space.

The Life Sciences specialist would also participate as a liaison to the newly developed statewide industry association. This may require a partnership agreement and possibly membership support. It is also important that the State recognize and share resources where possible for this burgeoning statewide industry association. The specialist will continue to learn from and collaborate with industry groups to help inform and educate the executive and legislative branches of State government as to challenges and opportunities facing the industry. The goal here is to champion, as appropriate, legislation and policies that advance the competitiveness of the industry. This includes navigating issues of regulatory relief and local actions that can impede industry growth.

b. Provide continuous training for business development industry representatives. This training is critical so individuals can help tell the story and market the competitive advantages of doing business in the state. Ideally, these staff members or contract employees would be trained or have prior work experience in Life Sciences and demonstrate a strong passion for understanding epic global health challenges that are being addressed by the state's private and academic institutions.

Additional details on state approaches to industry development can be found in Appendix III.

Partners: Industry organizations, Life Sciences companies, and research institutes

5. REGULATION AND POLICIES

a. Actively support the Life Sciences business community and look for partnership opportunities. While BEA and its partners have a valuable role to play in supporting the Life Sciences industry in some capacities, it is equally important to recognize that the State not become overly burdensome so that it begins to obstruct or inhibit the environment for organic growth to occur. Industry-driven initiatives play a unique role in growing the industry and are critical for businesses to respond to challenges or opportunities in a way that matches their highest needs.

If financial assistance is a future consideration of the BEA or related State partners, the top priorities that fit with New Hampshire's needs are:

- **R&D tax credit** – offsetting the cost to develop and accelerate new ideas to market.
- **Grants** – If funds are made available for grants, the State's criteria for distribution should:

- Highly encourage and/or require proposals that are collaborative among multiple institutions and include industry partnerships.
- Be tied to specific commercialization, acceleration, and, in private investment, business and employment growth.
- Support or leverage shared assets like equipment and facilities.

Partners: Private sector, *i*ndustry associations, State Legislature

6. ENTREPRENEURSHIP

a. **Address gaps in the statewide entrepreneurial resource system.** The realm of entrepreneurship was identified as a weakness within the EPSCoR report and in business interviews. This strategy is an opportunity to address this gap, particularly within the growing and emerging connection to R&D strengths. The State's involvement in elevating access to entrepreneurship resources could include:

- Supporting additional opportunities for incubation and acceleration – starting and growing companies from within New Hampshire.
- Supporting an acceleration program that attracts a cohort of entrepreneurs and connects them to New Hampshire companies and institutions.
- Statewide SBIR/STTR match – This federal program has had some success in New Hampshire, although access has been limited to a small number of firms. Some states, like Maine, provide a state match to encourage more private sector involvement. Maine also provides pre-phase 1 assistance to help firms prepare for their SBIR applications.

Partners: Industry associations, entrepreneurs and small businesses, startup and entrepreneur ecosystem builders, existing entities within higher education, and research institutions

New Hampshire Life Sciences Industry Strategy

Situational Assessment I

Industry Definition, Industry Economic Highlights

Contents

Methodology

Region of Analysis

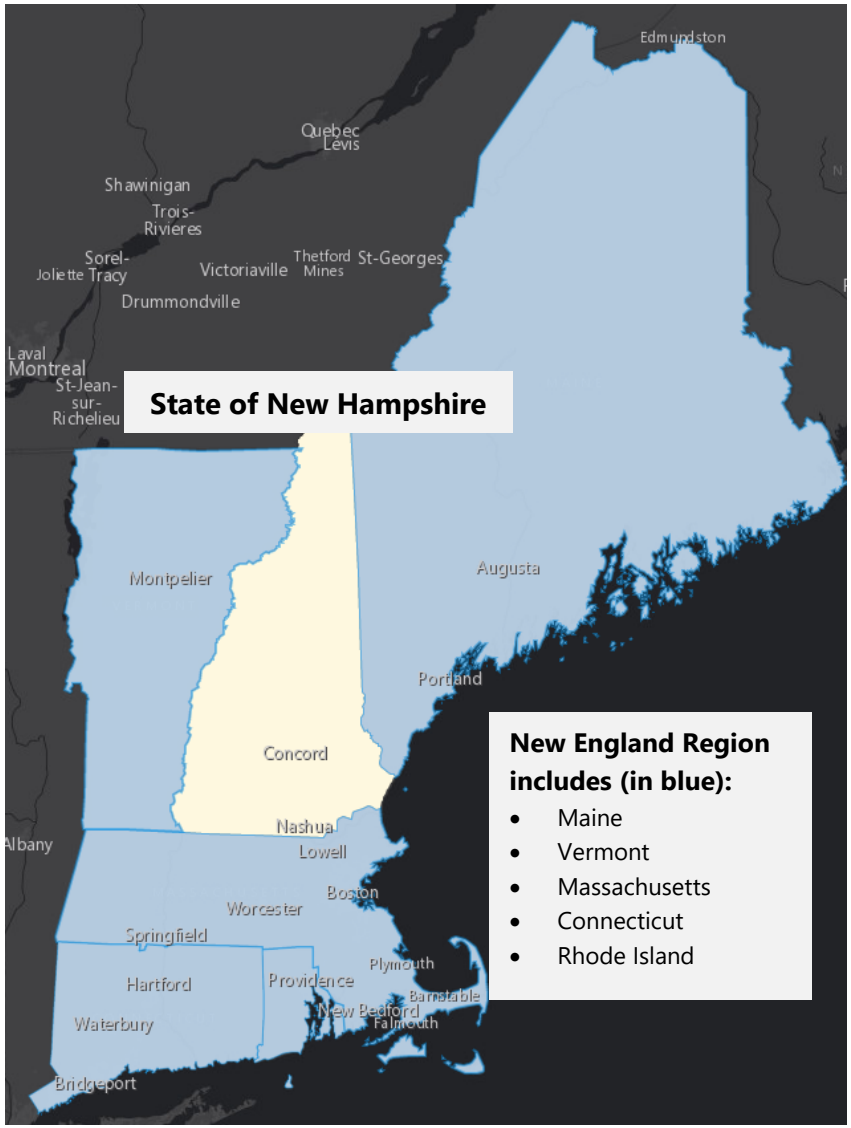
Camoin performed analysis at the state level to establish the industry dynamics and supply chain flows of Life Sciences industries. New England and the nation were used as benchmarks for analysis where relevant.

Time Period

All data is for 2021 unless otherwise noted. For historical analysis, trends were analyzed from 2012 through 2021, with a particular focus on 2019 to 2022 to gauge the impacts of the COVID-19 pandemic on the State and the Life Sciences industry cluster. Projections are included through 2026 where relevant; however, since projections are backwards looking (i.e. predictions of future performance are based on historical performance), they are likely to overemphasize the impacts of the pandemic and may not fully capture regional and industry performance in some cases.

Data Sources

All data was sourced from Lightcast (formerly known as EMSI/Burning Glass) unless otherwise noted.



Introduction

The State of New Hampshire Department of Business and Economic Affairs (BEA) retained Camoin Associates to study the Life Sciences sector across the state and determine how BEA and its partners can leverage the state's assets to drive opportunity in industries suited to New Hampshire's landscape. The Life Sciences Strategy will be comprised of in-depth data analysis along with primary interviews and an analysis of how the industry fits into the broader economic development system.

In this document, comprehensive data analysis and findings are provided for the Life Sciences cluster as a whole, as well as further broken-down by industry groups and industries within the cluster. This situational assessment will be used to understand the strengths, opportunities, and challenges for supporting and growing Life Sciences in New Hampshire.

Topics that this situational assessment, along with upcoming research, will uncover include:

- Defining and establishing New Hampshire's niche
- Understanding the offerings and pipeline of workforce and education programs
- Documenting and measuring the innovation ecosystem
- Determining the state's locational advantages based on geographical context
- Navigating leadership roles around the Life Sciences cluster in the public and private sectors

Life Sciences Cluster Definition

Life Sciences is a broad grouping of industry sectors and subsectors. In economic development, the definition of life sciences and the specific subsectors that are included typically vary by jurisdiction based on the assets and surrounding environment and the purpose for which the assessment is being conducted. For this assessment of New Hampshire, the Life Sciences cluster consists of 5 industry groups at the 4-digit NAICS code level (in **bold** throughout this report) which contain a total of 25 industries at the 6-digit level (in *italics*). This definition was also reviewed and discussed with BEA prior to analysis.

Medical Device Manufacturing

- *Optical Instrument and Lens Manufacturing*
- *Electromedical and Electrotherapeutic Apparatus Manufacturing*
- *Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables*
- *Totalizing Fluid Meter and Counting Device Manufacturing*
- *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals*
- *Analytical Laboratory Instrument Manufacturing*
- *Irradiation Apparatus Manufacturing*
- *Other Measuring and Controlling Device Manufacturing*

Medical Equipment and Supplies Manufacturing

- *Other Pressed and Blown Glass and Glassware Manufacturing*
- *Surgical and Medical Instrument Manufacturing*
- *Surgical Appliance and Supplies Manufacturing*
- *Dental Equipment and Supplies Manufacturing*
- *Ophthalmic Goods Manufacturing*
- *Dental Laboratories*

Research and Development

- *Testing Laboratories*
- *Research and Development in Nanotechnology*
- *Research and Development in Biotechnology (except Nanobiotechnology)*
- *Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)*

Pharmaceutical and Medicine Manufacturing

- *Medicinal and Botanical Manufacturing*
- *Pharmaceutical Preparation Manufacturing*
- *In-Vitro Diagnostic Substance Manufacturing*
- *Biological Product (except Diagnostic) Manufacturing*

Medical and Diagnostic Laboratories

- *Medical Laboratories*
- *Diagnostic Imaging Centers*
- *Blood and Organ Banks*

Industry Groups (4 Digit)

Industries (6 digit)

Life Sciences Cluster

Description of Activity

This cluster includes a broad range of professional and technical services and manufacturing of specialized goods such as commercial research and testing, biopharmaceuticals, animal/agriculture bioscience and medical instruments and devices, a wide range of advanced health sector instruments and common laboratory chemicals and medical, health and diagnostic services.

Key Takeaways

- New Hampshire's Life Sciences cluster included 11,290 jobs in 2021. This amounts to 1.5% of the state's total employment. This proportion is slightly above the national average for Life Sciences employment (1.4%) but lower than New England's (2.6%).
- The cluster has added 1,484 net new jobs since 2012, an increase of +15.1%. The new jobs represent 3.8% of New Hampshire's job growth during this period. While the state experienced growth in Life Science, it lagged the growth rate of New England, which reached +31.3% and the US, which expanded the Life Sciences cluster by +18.8%.
- The average earnings for a New Hampshire Life Sciences worker are $130,848. This is higher than the state average for all industries ($82,113). New Hampshire Life Sciences workers are compensated better than the national average ($126,539) but not as highly as their counterparts in New England ($142,946).
- There are 612 pay rolled business locations in New Hampshire's Life Sciences cluster. These establishments average 25 jobs in size, which is lower than similar firms in New England (41 jobs/establishment) or the US (33 jobs/establishment).
- The cluster contributes $2.8 billion in Gross Regional Product to the State's economy. This represents 3.0% of the state total. Productivity (GRP per worker) for the Life Sciences is $247,822 which is on par with the national average for this type of activity ($248,067) but behind New England ($303,953).
- Total sales for firms in this cluster equals $4.3 billion in 2021. These sales are primarily export-oriented, with 73.8% of sales occurring outside New Hampshire.

Industry Groups


Medical Device Manufacturing

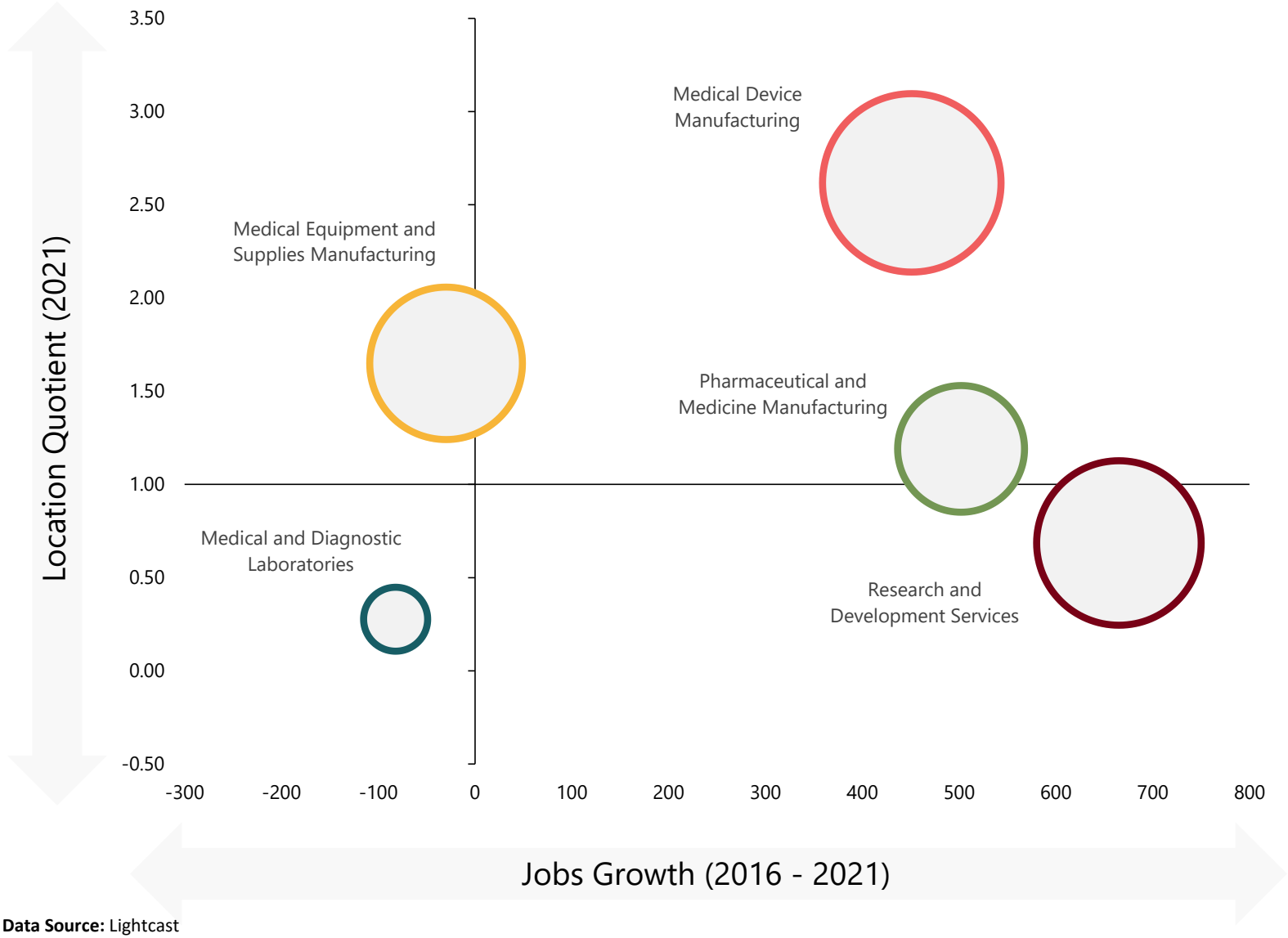

Medical Equipment and Supplies Manufacturing


Research and Development


Pharmaceutical and Medicine Manufacturing


Medical and Diagnostic Laboratories

Life Sciences Industry Groups By Key Metrics (bubble size indicates 2021 jobs), New Hampshire



Data Source: Lightcast

New Hampshire Life Sciences Overview

Jobs: 11,290

- Data for 2021
- 1.5% of State's jobs, lower than New England (2.6%) but higher than the U.S. (1.4%)
- 5.5% of New England's Life Sciences jobs

Job Growth: 1,484

- Data compares 2012 - 2021
- 3.8% of the State's new jobs during this period

Growth Rate: 15.1%

- Data compares 2012 - 2021
- Growth underperforms New England (31.3%), and the U.S. (18.8%)

Concentration: 1.07

- Data for 2021
- Jobs are more concentrated in this industry group than would be expected for an area of this size
- Less concentrated compared to New England (1.80)

Competitive Effect: 441

- Data compares 2016 - 2021
- Local competitive factors contribute to more jobs than expected than if New Hampshire was only trending with national and industry growth

Average Earnings: $130,848

- Data for 2021
- Lower compared to both New England ($193,537) and the U.S. ($142,946)
- Higher than the State's average earnings across all industries ($82,113)

Establishments: 612

- Data for 2021
- 8.1% of New England's Life Sciences businesses
- 25 jobs per establishment. which is lower than that of New England (41), and the nation (33)

Gross Regional Product: $2,798 M

- Data for 2021
- 3.0% of State's GRP, lower than New England (5.6%) but higher than the U.S. (2.8%)
- 4.5% of New England's Life Sciences GRP

Productivity: $247,822

- Data for 2021
- GRP per worker
- Lower compared to New England ($303,953), and below but almost equal to the U.S. ($248,067)

Total Sales: $4,317 M

- Data for 2021
- 2.4% of State's total sales, lower than New England (4.5%) but higher than the U.S. (2.0%)
- 73.8% of sales exported out of state

Demand: $3,688 M

- Data for 2021
- 70.1% of NH demand is met out of state, which is high compared to New England (26.7%), and the U.S. (0.0%).

Leakage: $2,585 M

- Data for 2021
- Estimated $259 M could be recaptured by New Hampshire firms

Source: Lightcast

New Hampshire Life Sciences Key Metrics (6 Digit NAICS) and Cluster Level Geographic Comparisons

NAICS	Industry	Jobs 2012	Jobs 2021	Jobs Change 2012-2021	Jobs % Change 2012-2021	Jobs Annualized Growth 2012-2021	Location Quotient 2021	Payrolled Business Locations 2021	Average Earnings Per Job 2021
Medical Device Manufacturing		3,797	3,460	(337)	-9%	-1%	2.62	90	$111,116
333314	Optical Instrument and Lens Mfg.	1,725	1,998	273	16%	2%	20.41	23	$104,673
334510	Electro- medical/therapeutic Apparatus Mfg.	152	263	111	73%	6%	0.78	12	$127,449
334513	Instruments to Control Industrial Processes	374	361	(13)	-3%	0%	1.34	21	$94,314
334514	Totalizing Fluid Meter and Counting Device Mfg.	23	0	(23)	-100%	-100%	0.21	2	Ins. Data
334515	Instrument Mfg. to Measure & Test Electrical	799	406	(393)	-49%	-7%	2.38	14	$158,050
334516	Analytical Laboratory Instrument Mfg.	340	248	(92)	-27%	-3%	1.34	10	$97,573
334517	Irradiation Apparatus Mfg.	0	0	0	100%	.	0.15	1	Ins. Data
334519	Other Measuring and Controlling Device Mfg.	384	184	(200)	-52%	-8%	1.18	7	$105,396
Research and Development Services		2,091	2,959	868	42%	4%	0.69	335	$142,366
541380	Testing Laboratories	519	714	195	38%	4%	0.9	71	$83,769
541713	Research and Dev. in Nanotechnology	20	38	18	90%	7%	0.34	15	$202,618
541714	Research and Dev. in Biotechnology	366	652	286	78%	7%	0.56	101	$211,058
541715	Research and Dev. in Life Sciences	1,186	1,555	369	31%	3%	0.69	148	$138,998
Medical Equipment and Supplies Manufacturing		2,317	2,565	248	11%	1%	1.65	75	$149,449
327212	Other Pressed and Blown Glass and Glassware Mfg.	249	164	(85)	-34%	-5%	2.72	6	$106,111
339112	Surgical and Medical Instrument Mfg.	767	1,215	448	58%	5%	1.97	28	$205,119
339113	Surgical Appliance and Supplies Mfg.	1,024	964	(60)	-6%	-1%	2.05	16	$102,127
339114	Dental Equipment and Supplies Mfg.	0	22	22	100%	.	0.29	5	$117,225
339115	Ophthalmic Goods Mfg.	17	29	12	71%	6%	0.27	3	$75,114
339116	Dental Laboratories	260	171	(89)	-34%	-5%	0.76	17	$78,990
Pharmaceutical and Medicine Manufacturing		1,064	1,802	738	69%	6%	1.19	18	$130,676
325411	Medicinal and Botanical Mfg.	0	0	0	.	.	0	0	$0
325412	Pharmaceutical Preparation Mfg.	412	481	69	17%	2%	0.48	14	$102,603
325413	In-Vitro Diagnostic Substance Mfg.	0	378	378	100%	.	2.46	1	$127,286
325414	Biological Product (except Diagnostic) Mfg.	652	943	291	45%	4%	5.12	3	$146,354
Medical and Diagnostic Laboratories		537	504	(33)	-6%	-1%	0.28	94	$104,622
621511	Medical Laboratories	311	299	(12)	-4%	0%	0.28	73	$106,546
621512	Diagnostic Imaging Centers	226	129	(97)	-43%	-6%	0.33	12	$108,287
621991	Blood and Organ Banks	0	76	76	100%	.	0.21	9	$90,830
Total for New Hampshire		9,806	11,290	1,484	15.1%	1.6%	1.07	612	$130,848
Total for New England		157,505	206,740	49,235	31.3%	3.1%	1.80	7,510	$193,537
Total for United States		1,964,280	2,333,202	368,922	18.8%	1.9%		102,845	$142,946

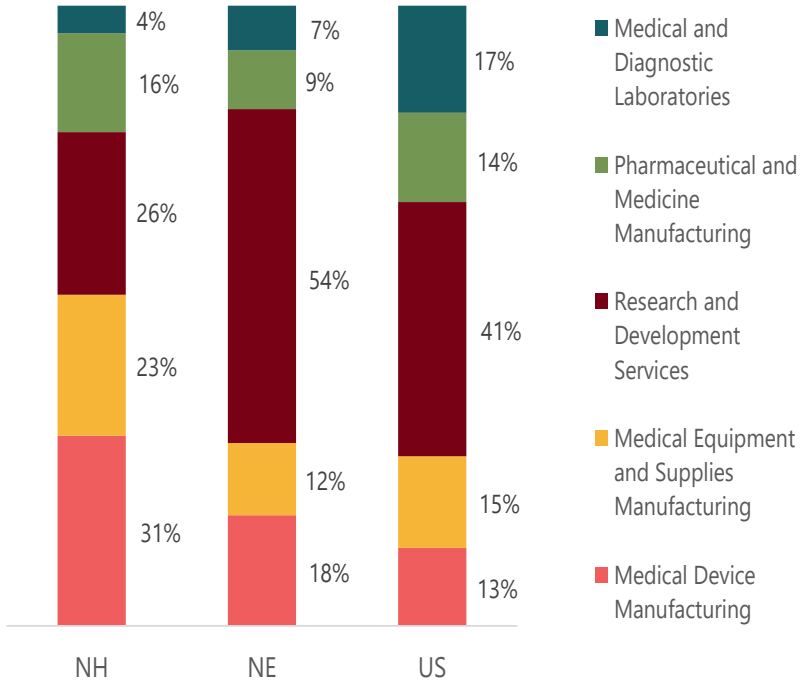
Industry Mix

The Life Sciences clusters for the United States and New Hampshire are compared in the chart below according to the proportion of 6-digit NAICS industries jobs as a % of the total cluster for each geography. Industries where New Hampshire's proportion of jobs exceeds the national average indicate a higher share of the cluster and a potential competitive advantage where local advantages can be leveraged.

- Based on 2021 employment data, **Medical Device Manufacturing,** with 3,460 jobs represented the largest industry group. It represents 30.6% of all life science jobs in New Hampshire. This is followed by **Research and Development Services** with 2,959 jobs, representing 26.2% and **Medical Equipment and Supplies Manufacturing** with 2,565 jobs representing 22.7%. Combined these three industry groups represent 79.6% of all life science jobs in New Hampshire.
- Compared to New England and the US, New Hampshire Life Sciences jobs are more concentrated in **Medical Device Manufacturing** and **Medical Equipment and Supplies Manufacturing** industries and less concentrated in **Research and Development** Services.

  It should be noted that **Research and Development Services** for this industry analysis excludes R&D occurring at colleges and universities. Their employment is conserved in separate industry codes of Educational Services and Government Educational entities and that data cannot be broken out by industry research are for comparative analysis. It is assessed separately in the section of this analysis on R&D Innovation and Investment.

Jobs as Percent of Total Cluster, 2021, New Hampshire, New England, U.S.



Source: Lightcast

Employment

Life Sciences Cluster Jobs and Jobs as % of Cluster, 2021, New Hampshire, New England, United States

	New Hampshire		New England		United States	
Description	**Jobs**	**% of Cluster**	**Jobs**	**% of Cluster**	**Jobs**	**% of Cluster**
Medical Device Manufacturing	3,460	30.6%	36,798	17.8%	293,048	12.6%
Medical Equipment and Supplies Manufacturing	2,565	22.7%	24,106	11.7%	344,791	14.8%
Research and Development Services	2,959	26.2%	111,318	53.8%	956,255	41.0%
Pharmaceutical and Medicine Manufacturing	1,802	16.0%	19,532	9.4%	335,465	14.4%
Medical and Diagnostic Laboratories	504	4.5%	14,986	7.2%	403,643	17.3%
Total	**11,290**	**100.0%**	**206,740**	**100.0%**	**2,333,202**	**100.0%**

Source: Lightcast

Job Growth

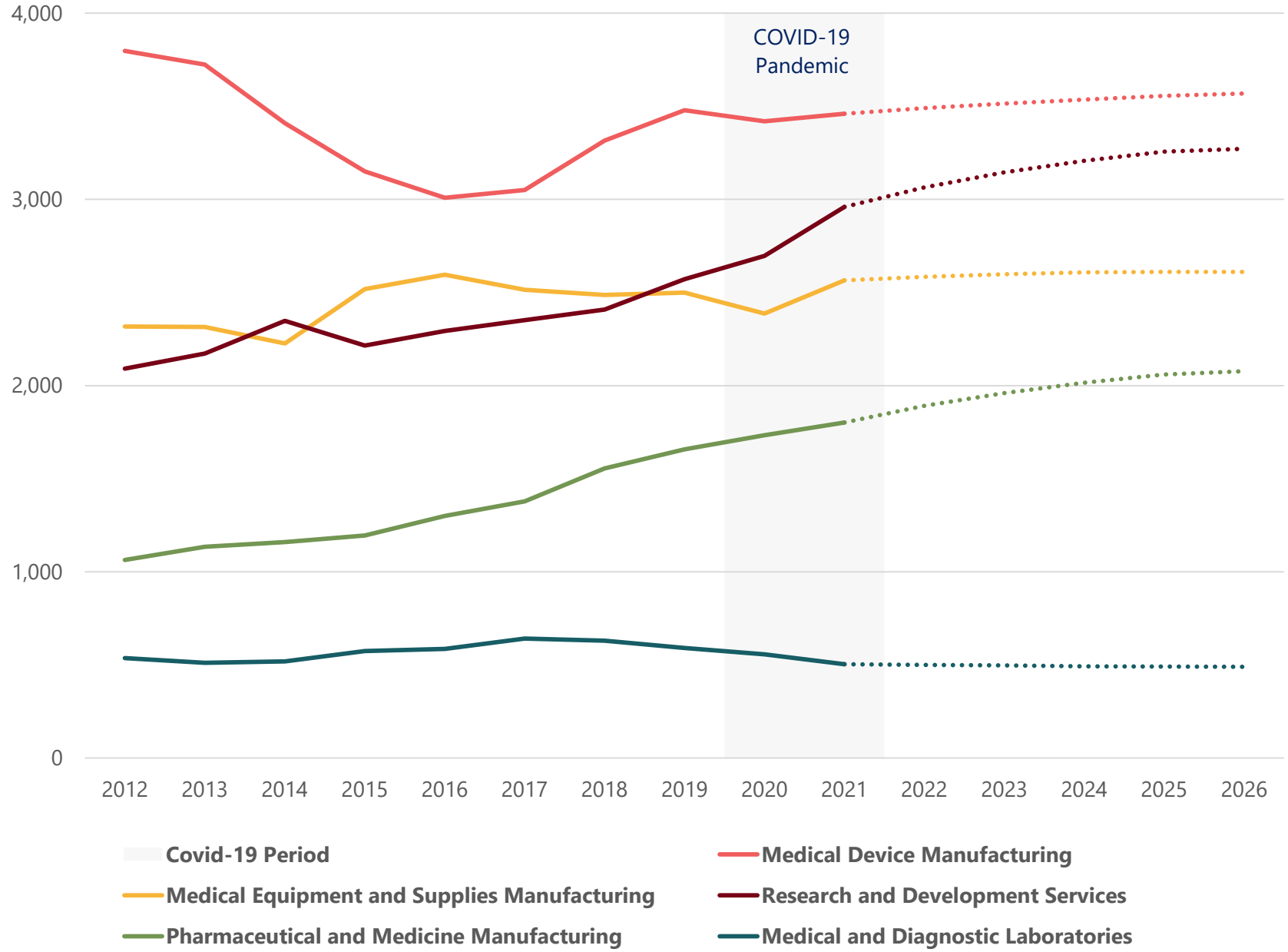
- After a few years of modest decline from 2012 to 2016, Life Sciences in New Hampshire experienced growth through 2021 except for a small drop in 2020, likely due to the first year of COVID-19. The Life Sciences cluster is projected to continue growing through 2026.
- Growth is projected to occur across all five industry groups except **Medical and Diagnostic Laboratories** which is projected to experience a slight decline.
- A graph demonstrates these changes over time on the following page.

Life Sciences Cluster Jobs By Year, New Hampshire

									COVID-19		Forecast				
Description	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Medical Device Manufacturing	3,797	3,724	3,410	3,150	3,009	3,051	3,316	3,479	3,420	3,460	3,490	3,514	3,536	3,556	3,568
Medical Equipment and Supplies Manufacturing	2,317	2,315	2,227	2,518	2,595	2,514	2,487	2,499	2,387	2,565	2,584	2,598	2,608	2,611	2,611
Research and Development Services	2,091	2,172	2,348	2,215	2,294	2,352	2,408	2,571	2,697	2,959	3,064	3,145	3,207	3,256	3,271
Pharmaceutical and Medicine Manufacturing	1,064	1,135	1,160	1,195	1,300	1,379	1,555	1,658	1,734	1,802	1,892	1,960	2,015	2,060	2,077
Medical and Diagnostic Laboratories	537	511	519	574	586	642	630	591	557	504	500	497	492	491	490
Total	**9,806**	**9,857**	**9,664**	**9,652**	**9,784**	**9,938**	**10,396**	**10,798**	**10,795**	**11,290**	**11,530**	**11,714**	**11,858**	**11,974**	**12,017**

Source: Lightcast

Life Sciences Jobs By Industry Group, New Hampshire (Lightcast Projection 2022 - 2026)



Source: Lightcast

Concentration

- New Hampshire is slightly more concentrated in jobs overall in Life Sciences compared to the US. (LQ1.07) However, New Hampshire's cluster is less concentrated than New England (LQ 1.80)
- Among the industry groups within Life Sciences in New Hampshire, **Medical Devices** has the highest concentration relative to the US (LQ 2.62). This is followed by **Medical Equipment and Supplies Manufacturing** (LQ 1.65), and **Pharmaceutical and Medicine Manufacturing** (LQ1.19). **Research and Development Services** and **Medical and Diagnostic Laboratories** are significantly less concentrated than the US.

Life Sciences Cluster Location Quotient, New Hampshire, New England, United States

	New Hampshire	New England
Description	**Location Quotient**	
Medical Device Manufacturing	2.62	2.56
Research and Development Services	0.69	2.37
Medical Equipment and Supplies Manufacturing	1.65	1.42
Pharmaceutical and Medicine Manufacturing	1.19	1.19
Medical and Diagnostic Laboratories	0.28	0.76
Total	**1.07**	**1.80**

Source: Lightcast

Competitiveness – Shift Share Analysis

- Life Sciences in New Hampshire experienced competitive growth between 2016 and 2021 (+423 jobs attributable to competitiveness). This positive competitive effect is based on growth between 2016 and 2021 and shows that Life Sciences has made job gains relative to the nation.
- Three out of the five industry groups outperformed growth expectations based on national jobs growth and industry trends. The competitive growth for **Medical and Diagnostic Laboratories** (+226), **Research and Development Services** (+282) and **Pharmaceutical and Medicine Manufacturing** (+199) more than made up for **Medical Equipment and Supplies Manufacturing** and **Medical and Diagnostic Laboratories,** both of which saw declines in actual jobs levels between 2016 and 2021 (-30 and -82 respectively), as well as failing to outperform job growth expectations.

Life Sciences Shift Share Analysis, New Hampshire

Description	Ind. Mix Effect	+	Nat'l Growth Effect	=	Expected Job Change	Actual Job Change	-	Expected Job Change	=	Competitive Effect
Medical Device Manufacturing	171		54		225	451		225		226
Medical Equipment and Supplies Manufacturing	39		46		85	(30)		85		(115)
Research and Development Services	342		41		383	665		383		282
Pharmaceutical and Medicine Manufacturing	280		23		303	502		303		199
Medical and Diagnostic Laboratories	76		11		87	(82)		87		(169)
Total	**908**		**175**		**1,083**	**1,506**		**1,083**		**423**

Source: Lightcast

Average Earnings

- Life Sciences has relatively high average earnings. Average annual earnings per employee in New Hampshire's Life Sciences cluster was $130,848. This is lower than the earnings in New England and the US. This is an indication that New Hampshire can compete in terms of costs to businesses, as long as they are able to attract and retain skilled workers. However, Life Science earnings are significantly higher than the average annual earnings in New Hampshire for all industries, which is $82,130.
- Among the industry groups, **Medical Equipment and Supplies Manufacturing** has the highest earnings per worker, followed by **Research and Development Services.**

Life Sciences Cluster Earnings, 2021, New Hampshire, New England, United States

Description	New Hampshire	New England	United States
	Avg. Earnings Per Job		
Medical Device Manufacturing	$111,116	$143,848	$134,923
Medical Equipment and Supplies Manufacturing	$149,449	$125,142	$110,482
Research and Development Services	$142,366	$238,719	$171,705
Pharmaceutical and Medicine Manufacturing	$130,676	$189,674	$165,314
Medical and Diagnostic Laboratories	$104,622	$94,983	$89,778
Total	**$130,848**	**$193,537**	**$142,946**

Source: Lightcast

Establishments

- In 2021 there were 612 business establishments in Life Sciences in New Hampshire.
- **Research and Development Services** is the largest industry grouping, including 335 establishments and representing 54.7% of Life Sciences establishments in New Hampshire.
- The mix of establishments in New Hampshire is similar to that in New England except slightly higher in **Medical Device, Equipment, and Supplies Manufacturing** in New Hampshire and slightly lower in **Research and Development Services**.

Life Sciences Cluster Establishments, 2021, New Hampshire, New England, United States

Description	New Hampshire Establishments	New Hampshire	New England	United States
		Establishments % of Total		
Medical Device Manufacturing	90	14.7%	9.0%	8.3%
Medical Equipment and Supplies Manufacturing	75	12.3%	8.5%	13.1%
Research and Development Services	335	54.7%	66.5%	46.5%
Pharmaceutical and Medicine Manufacturing	18	2.9%	3.3%	5.8%
Medical and Diagnostic Laboratories	94	15.4%	12.7%	26.4%
Total	**612**	**100.0%**	**100.0%**	**100.0%**

Source: Lightcast

Gross Regional Product

- In 2021 the Life Sciences cluster generated $2.8 billion towards New Hampshire's Gross Regional Product.
- **Pharmaceutical and Medicine Manufacturing** had the largest contribution to GRP in 2021 within Life Sciences with $867 million or 31% of Life Sciences in New Hampshire, followed by **Medical Equipment and Supplies Manufacturing** ($759 million) and **Medical Device Manufacturing** ($616 million). Together these three-industry groups represent 80.1 % of Life Sciences GRP in New Hampshire. **Research and Development Services** in New England and the US plays a larger role in GRP contribution.

Life Sciences Cluster Gross Regional Product, 2021, New Hampshire, New England, United States

Description	NH GRP	NH % of Cluster	NE % of Cluster	US % of Cluster
Medical Device Manufacturing	$616	22.0%	20.9%	17.7%
Medical Equipment and Supplies Manufacturing	$759	27.1%	9.9%	13.6%
Research and Development Services	$486	17.4%	48.5%	32.6%
Pharmaceutical and Medicine Manufacturing	$867	31.0%	17.7%	28.2%
Medical and Diagnostic Laboratories	$70	2.5%	2.9%	7.9%
Total	**$2,798**	**100.0%**	**100.0%**	**100.0%**

Source: Lightcast

Productivity

- Productivity for Life Sciences (in other words, GRP/Job), in New Hampshire is slightly lower compared to New Hampshire and considerably lower than New England.
- New Hampshire's lower productivity is driven by lower productivity in **Medical Device Manufacturing**, one of its largest industry groups.
- The exact difference in productivity depends on the specific businesses within the industry however it can be a sign of companies that require highly specialized labor relative to the level of capital investment.

Life Sciences Cluster Productivity, 2021, New Hampshire, New England, United States

Description	New Hampshire	New England	United States
	Productivity (GRP per worker)		
Medical Device Manufacturing	$178,026	$356,945	$350,015
Medical Equipment and Supplies Manufacturing	$295,742	$259,142	$228,147
Research and Development Services	$164,392	$273,958	$197,383
Pharmaceutical and Medicine Manufacturing	$481,356	$571,016	$485,699
Medical and Diagnostic Laboratories	$137,951	$120,643	$113,643
Total	**$247,822**	**$303,953**	**$248,067**

Source: Lightcast

Sales

- In 2021, Life Sciences generated $1.1 billion in total sales in New Hampshire, of which 73.8% were made to out of state entities through a mix of domestic and foreign trade. All the industry groups generated a high proportion of sales exported out of state, except for **Medical and Diagnostic Laboratories** and **Research and Development Services**. Both of these industry groups primarily service in-state entities.
- The higher percent of exported sales indicates a strong value-add by the industry in terms of bringing economic activity and wealth to the state.

Life Sciences Cluster Sales (in $M), 2021, New Hampshire

Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
Medical Device Manufacturing	$70	7.5%	$865	92.5%	$935
Medical Equipment and Supplies Manufacturing	$144	12.1%	$1,047	87.9%	$1,190
Research and Development Services	$590	66.6%	$297	33.4%	$887
Pharmaceutical and Medicine Manufacturing	$206	17.5%	$970	82.5%	$1,176
Medical and Diagnostic Laboratories	$122	95.1%	$6	4.9%	$129
Total	**$1,132**	**26.2%**	**$3,185**	**73.8%**	**$4,317**

Source: Lightcast

Supply Chain Demand and Leakage

- Life Sciences in New Hampshire had total purchases (demand) of $1.1 billion in 2021. Of this amount, 70.1% was purchased from out of state sellers. All the industry groups except **Research and Development Services** (with 55.8%) have a high percentage of purchases met out of state.
- This creates opportunity to connect in -state sellers, to in state buyers for greater industry impact in New Hampshire. As an example, if New Hampshire was able to recapture 10% of imported purchases in Life Sciences, it would amount to an estimated $259 more million in sales, and have the potential for 57 new firms and 703 new jobs.

Life Sciences Cluster Demand (in $M), 2021, New Hampshire

Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
Medical Device Manufacturing	$62	14.4%	$366	85.6%	$428
Medical Equipment and Supplies Manufacturing	$141	27.5%	$371	72.5%	$511
Research and Development Services	$584	44.2%	$738	55.8%	$1,322
Pharmaceutical and Medicine Manufacturing	$201	19.8%	$813	80.2%	$1,014
Medical and Diagnostic Laboratories	$115	28.0%	$297	72.0%	$412
Total	**$1,102**	**29.9%**	**$2,585**	**70.1%**	**$3,688**

Source: Lightcast

Life Sciences Cluster Leakage (Proposed Recapture=10%), 2021, New Hampshire

Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment (in $M)	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
Medical Device Manufacturing	$366	$37	$10	4	136
Medical Equipment and Supplies Manufacturing	$371	$37	$16	2	80
Research and Development Services	$738	$74	$3	28	246
Pharmaceutical and Medicine Manufacturing	$813	$81	$65	1	125
Medical and Diagnostic Laboratories	$297	$30	$1	22	116
Total	**$2,585**	**$259**	**.**	**57**	**703**

Source: Lightcast

Multipliers

- A multiplier is a way of measuring how strongly one industry affects other industries, services, and spending or sales in that region. A jobs multiplier, for example, indicates how important an industry is in regional job creation. A jobs multiplier of 3, for example, would mean that for every job created by that industry, two other jobs would be created in other industries for a total of three jobs. Multipliers are sourced from Lightcast's model with supporting data from the Bureau of Economic Analysis.
- For New Hampshire's Life Sciences cluster the multipliers indicate that these industries are highly impactful to the local economy. A multiplier greater than 1.00 means that the economic activity is creating more than its direct effects alone. For the cluster as a whole and for each industry group the multipliers are all above 1.50 and many are greater than 2.00. The jobs multiplier relates that for each 100 Life Sciences jobs in the state, there are another 130 jobs in other sectors due to further spending and investment.
- The highest multiplier effects come from the **Pharmaceutical and Medicine Manufacturing** industry group. It has a Sales multiplier (1.69) that is well over 1.00 and is proximate to the tightly numbered Sales multipliers of the rest of the Life Sciences industry groups (between 1.68 and 1.73). For the other two types of impact, multipliers for Jobs (2.89) and Earnings (2.05), this industry group has the highest measure.
- The **Research and Development Services** and **Medical Equipment and Supplies Manufacturing** industry groups are also key employment generators. They have jobs multipliers that are well over 2.00, meaning that their economic footprint is more than double their direct activity.

Life Sciences Multipliers By Industry Group, 2021, New Hampshire

Description	Sales	Jobs	Earnings
	Total Aggregate Multiplier		
Medical Device Manufacturing	1.68	1.89	1.61
Research and Development Services	1.71	2.41	1.60
Medical Equipment and Supplies Manufacturing	1.65	2.49	1.70
Pharmaceutical and Medicine Manufacturing	1.69	2.89	2.05
Medical and Diagnostic Laboratories	1.73	1.91	1.64
Total	**1.67**	**2.30**	**1.72**

Source: Lightcast

Medical Device Manufacturing

Industry Group

Description of Activity

This industry group comprises establishments primarily engaged in manufacturing navigational, measuring, electromedical, and control instruments. Examples of products made by these establishments are aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment.

Key Takeaways

- **Medical Device Manufacturing** is the largest of the five industry groups that form the Life Sciences cluster in New Hampshire.
- The industry group saw a decline in jobs since 2012. However, after a few years of decline from 2012 to 2016, the industry group experienced growth through 2021 and is projected to continue growing through 2026.
- New Hampshire has a high concentration of **Medical Device Manufacturing** employment in addition to a positive competitive growth effect of jobs between 2016 and 2021. This is positive that this industry group is reversing past loss and gaining relative to the nation as a whole.
- **Medical Device Manufacturing** is a highly export driven industry in New Hampshire (domestic and foreign trade)
- **Medical Device Manufacturing** in New Hampshire purchases must of their goods and services form out of state. This creates opportunity to connect in-state sellers, to in state buyers for greater industry impact in New Hampshire.

Industries

- *Optical Instrument and Lens Manufacturing*
- *Electromedical and Electrotherapeutic Apparatus Manufacturing*
- *Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables*
- *Totalizing Fluid Meter and Counting Device Manufacturing*
- *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals*
- *Analytical Laboratory Instrument Manufacturing*
- *Irradiation Apparatus Manufacturing*
- *Other Measuring and Controlling Device Manufacturing*

Opportunities to Examine

Highest Opportunities Based on New Hampshire Data Performance:

- *Optical Instrument and Lens Manufacturing*:
  - Largest industry in industry group
  - Historic and projected growth and growth that is competitive nationally
  - High concentration of employment relative to US as a whole
  - High exported sales
  - Low imports (most purchases by industry made in state)

Additional Opportunities Based on New Hampshire Data Performance:

- *Electromedical and Electrotherapeutic Apparatus Manufacturing*
  - Historic and projected growth and growth that is competitive nationally
  - High average earnings
  - High productivity
  - High exported sales
  - Opportunity to reduce imports made by industry

- *Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables*
  - Third largest industry in industry group
  - Slight employment concentration relative to US as a whole
  - High exported sales
  - Opportunity to reduce imports made by industry

- *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals*
  - Second largest industry in industry group
  - High employment concentration relative to US as a whole
  - High earnings

- High exported sales
- Opportunity to reduce imports made by industry

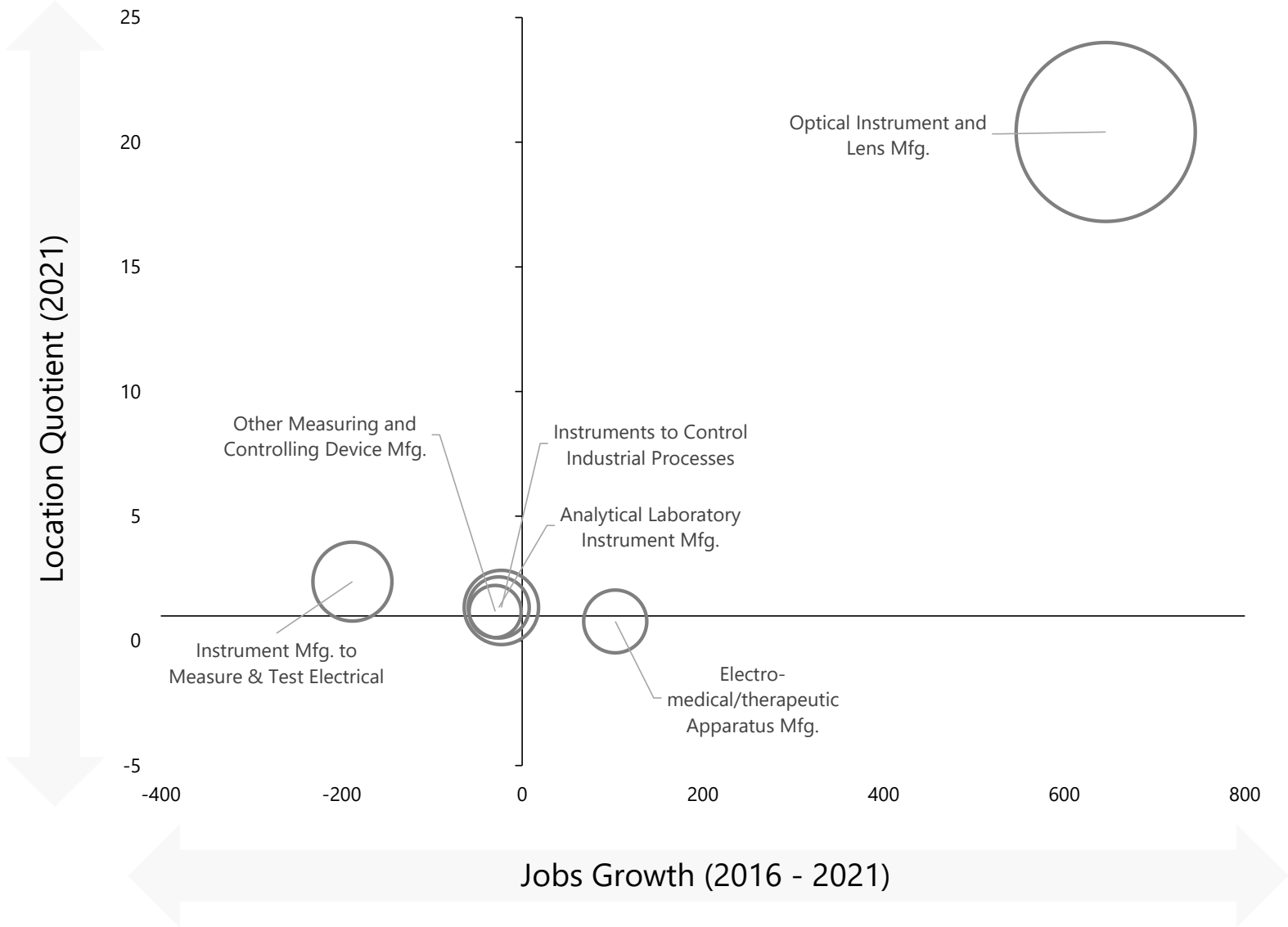
Lowest Opportunities Based on New Hampshire Data Performance:

- *Analytical Laboratory Instrument Manufacturing*
  - Slight employment concentration relative to US as a whole
  - High exported sales
  - Opportunity to reduce imports made by industry

- *Other Measuring and Controlling Device Manufacturing*
  - Slight employment concentration relative to US as a whole
  - High exported sales
  - Opportunity to reduce imports made by industry

- Both *Totalizing Fluid Meter and Counting Device Manufacturing* and *Irradiation Apparatus Manufacturing* have no significant presence in New Hampshire.

Medical Device Manufacturing Industries By Key Metrics (bubble size indicates 2021 jobs), New Hampshire



Data Source: Lightcast

Industry Group Overview for: Medical Device Manufacturing

Jobs: 3,460

- Data for 2021
- 30.6% of state's Life Science Jobs
- 0.5% of State's jobs (all sectors)

Job Growth: -337

- Data compares 2012 - 2021
- -0.9% of the State's change in jobs during this period

Growth Rate: -8.9%

- Data compares 2012 - 2021
- Growth underperforms New England (3.0%), and the U.S. (8.2%)

Concentration: 2.62

- Data for 2021
- Jobs are more concentrated in this industry group than would be expected for an area of this size
- More concentrated compared to New England (2.56)

Competitive Effect: 245

- Data compares 2016 - 2021
- Local competitive factors contribute to more jobs than expected than if New Hampshire was only trending with national and industry growth

Average Earnings: $111,116

- Data for 2021
- Higher compared to New England ($141,314), and the nation ($130,320)
- Higher than the State's average earnings across all industries ($82,113)

Establishments: 90

- Data for 2021
- 14.7% of state's Life Science Establishments
- 38 jobs per establishment. which is lower than that of New England (53), and the nation (43)

Gross Regional Product: $616 M

- Data for 2021
- 0.7% of state economy's total GRP
- 22.0% of state's GRP in the Life Science cluster

Productivity: $178,026

- Data for 2021
- GRP per worker
- Lower compared to New England ($356,945), and the nation ($350,015)

Total Sales: $935 M

- Data for 2021
- 7.5% of this industry group's sales occur within NH
- 92.5% of sales exported out of state

Demand: $428 M

- Data for 2021
- 85.6% of NH demand is met out of state, which is high compared to New England (32.2%).

Leakage: $366 M

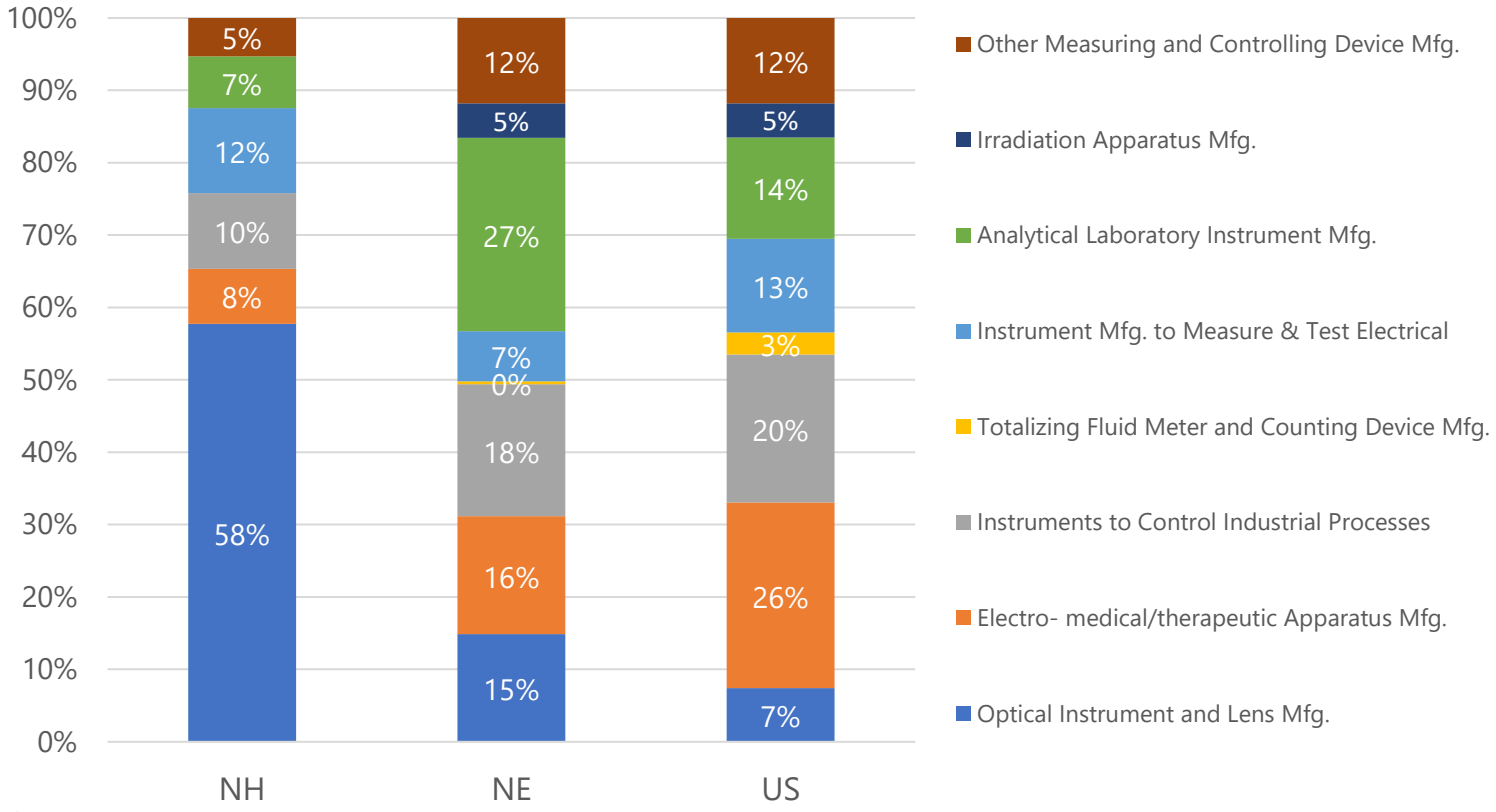
- Data for 2021
- Estimated $37 M could be recaptured by New Hampshire firms

Source: Lightcast

Employment and Industry Group Mix

- *Optical Instrument and Lens Manufacturing* makes up the largest share of the **Medical Device Manufacturing** industry group in New Hampshire and has a larger share than the US by a factor of 8 to 1.
- The rest of the subsectors see smaller jobs shares compared to both New England and the US except for *Instrument Manufacturing to Measure and Test Electrical* which has nearly double the percentage of jobs compared to New England.

Medical Device Manufacturing Job Distribution, 2021



Source: Lightcast

Employment

The **Medical Device Manufacturing** industry group has the largest jobs footprint of the five groups (3,460 or 30.6% of the cluster's total).

- *Optical Instrument and Lens Manufacturing* with 1,998 jobs in 2021 makes up 57.7% of the group's total employment and accounts for a far greater proportion of Life Sciences in New Hampshire than it does for New England (only 14.9%) and the US (only 7.4%).
- *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals* is the second largest subsector with 406 jobs in 2021 accounting for 11.7% of jobs in the industry group. *Instruments to Control Industrial Processes* is the third largest subsector with 361 jobs in 2021 representing 10.4% of jobs in the industry group.
- The **Medical Device Manufacturing** industry group contains a handful of other small subsectors, all of which are less than 12% of the industry group.

Medical Device Manufacturing Jobs and Jobs as % of Industry Group By Industry, 2021, New Hampshire compared to New England, U.S.

		New Hampshire		New England		United States	
NAICS	Description	Jobs	% of Total	Jobs	% of Total	Jobs	% of Total
333314	Optical Instrument and Lens Mfg.	1,998	57.7%	5,467	14.9%	21,736	7.4%
334510	Electro- medical/therapeutic Apparatus Mfg.	263	7.6%	5,997	16.3%	75,125	25.6%
334513	Instruments to Control Industrial Processes	361	10.4%	6,703	18.2%	59,901	20.4%
334514	Totalizing Fluid Meter and Counting Device Mfg.	0	0.0%	159	0.4%	8,869	3.0%
334515	Instrument Mfg. to Measure & Test Electrical	406	11.7%	2,551	6.9%	37,976	13.0%
334516	Analytical Laboratory Instrument Mfg.	248	7.2%	9,821	26.7%	40,946	14.0%
334517	Irradiation Apparatus Mfg.	0	0.0%	1,753	4.8%	13,960	4.8%
334519	Other Measuring and Controlling Device Mfg.	184	5.3%	4,347	11.8%	34,535	11.8%
	Total	**3,460**	**100.0%**	**36,798**	**100.0%**	**293,048**	**100.0%**

Source: Lightcast

Job Growth

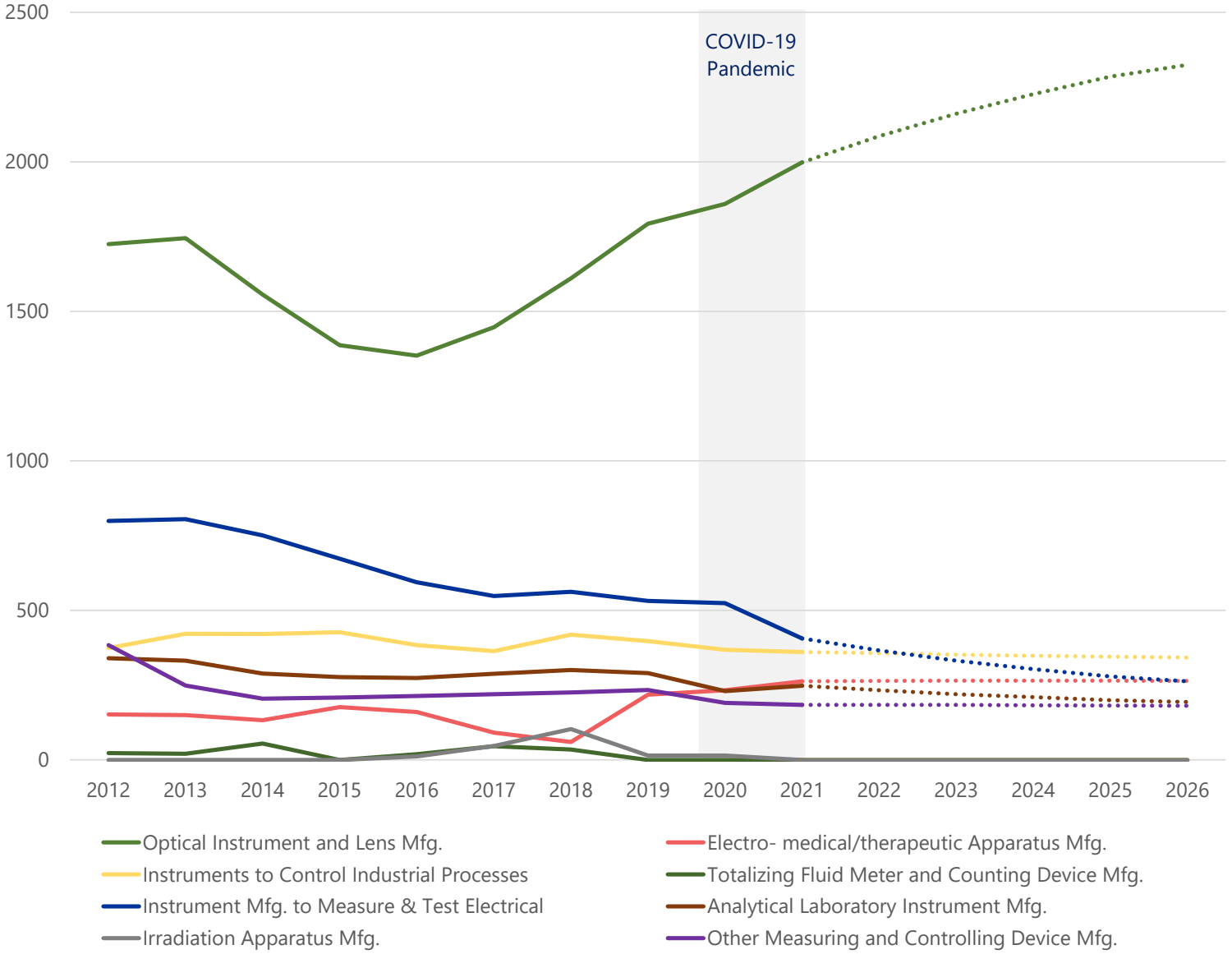
- After a few years of decline from 2012 to 2016, **Medical Device Manufacturing** in New Hampshire experienced growth through 2021 and is projected to continue growing through 2026.
- Starting in 2017 and continuing through 2021, *Optical Instrument and Lens Manufacturing* has added jobs at a rate of over 100 per year (+48% over the five-year period). It has a similarly optimistic forecast, set to climb to 2,324 jobs by 2026. Growth for New Hampshire, New England and the US is all expected to exceed 10% for this subsector through 2026.
- *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals* is the second largest industry in the industry group, but it's track record since 2012 is mixed and it lost 126 jobs during COVID-19, nearly a quarter of its employment. The outlook is slow decline.
- *Electromedical and Electrotherapeutic Apparatus Manufacturing* and *Analytical Laboratory Instrument Manufacturing*, though starting from a small base, have experienced growth in New Hampshire and are forecast to grow along with growth in New England and the US

Medical Device Manufacturing Jobs By Industry By Year, New Hampshire

										Covid		Forecast				
NAICS	Description	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
333314	Optical Instrument and Lens Mfg.	1,725	1,745	1,556	1,387	1,352	1,447	1,610	1,793	1,859	1,998	2,086	2,161	2,226	2,285	2,324
334510	Electro- medical/therapeutic Apparatus Mfg.	152	150	133	177	160	91	60	218	233	263	264	265	265	265	264
334513	Instruments to Control Industrial Processes	374	422	421	427	384	364	419	397	368	361	357	352	348	345	342
334514	Totalizing Fluid Meter and Counting Device Mfg.	23	21	55	0	19	46	35	0	0	0	0	0	0	0	0
334515	Instrument Mfg. to Measure & Test Electrical	799	805	751	673	594	548	562	532	524	406	366	332	304	279	263
334516	Analytical Laboratory Instrument Mfg.	340	332	289	277	274	288	301	290	230	248	233	220	210	200	194
334517	Irradiation Apparatus Mfg.	0	0	0	0	12	47	103	15	15	0	0	0	0	0	0
334519	Other Measuring and Controlling Device Mfg.	384	249	205	209	214	220	226	234	191	184	184	184	183	182	181
Total		**3,797**	**3,724**	**3,410**	**3,150**	**3,009**	**3,051**	**3,316**	**3,479**	**3,420**	**3,460**	**3,490**	**3,514**	**3,536**	**3,556**	**3,568**

Source: Lightcast

Medical Devices Manufacturing Jobs By Industry, New Hampshire (Lightcast Projection 2022 - 2026)



Source: Lightcast

Concentration

- New Hampshire has a strong concentration in **Medical Device Manufacturing** with a LQ of 2.62 in 2021 making it more concentrated than the US, as well as New England with an LQ of 2.28.
- The concentration for the *Optical Instrument and Lens Manufacturing* industry is more than twenty times that of the national average and almost four times that of New England.
- None of the other 6-digit industries approach that intensity, but *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals* is more than double the US and well above New England.

Medical Device Manufacturing Location Quotient By Industry, 2021, New Hampshire and New England

NAICS	Description	NH	NE
		Location Quotient	
333314	Optical Instrument and Lens Mfg.	20.41	5.12
334510	Electro- medical/therapeutic Apparatus Mfg.	0.78	1.63
334513	Instruments to Control Industrial Processes	1.34	2.28
334514	Totalizing Fluid Meter and Counting Device Mfg.	0.21	0.37
334515	Instrument Mfg. to Measure & Test Electrical	2.38	1.37
334516	Analytical Laboratory Instrument Mfg.	1.34	4.89
334517	Irradiation Apparatus Mfg.	0.15	2.56
334519	Other Measuring and Controlling Device Mfg.	1.18	2.56
	Total	**2.62**	**2.56**

Source: Lightcast

Competitiveness – Shift Share Analysis

- **Medical Device Manufacturing** in New Hampshire experienced competitive growth between 2016 and 2021 (+245 jobs). This positive competitive effect is based on growth between 2016 and 2021 and shows that this industry group is reversing past loss and gaining relative to the nation as a whole
- Jobs in *Optical Instrument and Lens Manufacturing* grew at four times the expected change. This growth exceeded the expectations based on growth in the national average and contrasted with the New England region, which has a negative competitive effect for the period (-36 jobs).
- *Electromedical and Electrotherapeutic Apparatus Manufacturing* also showed advantageous growth for New Hampshire with more than three times the jobs change that was expected.

Medical Device Manufacturing Shift Share Analysis, By Industyr, 2016 - 2021, New Hampshire, New Hampshire

NAICS	Description	Ind. Mix Effect	+	Nat'l Growth Effect	=	Expected Job Change	Actual Job Change	-	Expected Job Change	=	Competitive Effect
333314	Optical Instrument and Lens Mfg.	145		24		169	646		169		477
334510	Electro- medical/therapeutic Apparatus Mfg.	26		3		29	103		29		75
334513	Instruments to Control Industrial Processes	-16		7		-9	-23		-9		-14
334514	Totalizing Fluid Meter and Counting Device Mfg.	-3		0		-3	-19		-3		-9
334515	Instrument Mfg. to Measure & Test Electrical	-4		11		7	-188		7		-194
334516	Analytical Laboratory Instrument Mfg.	41		5		46	-26		46		-71
334517	Irradiation Apparatus Mfg.	0		0		0	-12		0		-3
334519	Other Measuring and Controlling Device Mfg.	-18		4		-14	-30		-14		-16
	Total	**171**		**54**		**225**	**451**		**225**		**245**

Source: Lightcast

Average Earnings

- **Medical Device Manufacturing** has relatively high average earnings. In 2021 in New Hampshire average annual earnings per employee in **Medical Device Manufacturing** was $111,116. This is lower than the levels in New England and the US. This is an indication that New Hampshire can compete in terms of costs to businesses, as long as they are able to attract and retain skilled workers.
- *Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals* has the highest 2021 earnings per worker in New Hampshire at $158,050 while *Instruments to Control Industrial Processes* has the lowest at $94,314.

Medical Device Manufacturing Average Earnings Per Job By Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH	NE	US
		Earnings Per Job		
333314	Optical Instrument and Lens Mfg.	$ 104,673	$ 111,324	$ 116,300
334510	Electro- medical/therapeutic Apparatus Mfg.	$ 127,449	$ 167,125	$ 152,751
334513	Instruments to Control Industrial Processes	$ 94,314	$ 125,155	$ 109,685
334514	Totalizing Fluid Meter and Counting Device Mfg.	$ -	$ 83,640	$ 97,791
334515	Instrument Mfg. to Measure & Test Electrical	$ 158,050	$ 214,456	$ 161,215
334516	Analytical Laboratory Instrument Mfg.	$ 97,573	$ 155,040	$ 138,113
334517	Irradiation Apparatus Mfg.	$ -	$ 165,594	$ 140,465
334519	Other Measuring and Controlling Device Mfg.	$ 105,396	$ 108,174	$ 126,242
	Total	**$ 111,116**	**$ 143,848**	**$ 134,923**

Source: Lightcast

Establishments

- In 2021 there were 90 business establishments in **Medical Device Manufacturing** industries in New Hampshire.
- *Optical Instruments and Lens Manufacturing* represents the greatest number of establishments within the industry group, followed by *Instruments to Control Industrial Processes*. Together they represent 49% of all establishments in New Hampshire within the industry group, which is a higher concentration than New England and the US.

Medical Device Manufacturing Establishments and Establishments as % of Industry Group by Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH Establishments	NH Establishments % of Total	NE Establishments % of Total	US Establishments % of Total
333314	Optical Instrument and Lens Mfg.	23	26%	13%	8%
334510	Electro- medical/therapeutic Apparatus Mfg.	12	13%	12%	22%
334513	Instruments to Control Industrial Processes	21	23%	25%	23%
334514	Totalizing Fluid Meter and Counting Device Mfg.	2	2%	2%	3%
334515	Instrument Mfg. to Measure & Test Electrical	14	16%	9%	14%
334516	Analytical Laboratory Instrument Mfg.	10	11%	19%	12%
334517	Irradiation Apparatus Mfg.	1	1%	4%	3%
334519	Other Measuring and Controlling Device Mfg.	7	8%	16%	15%
Total		**90**	**100%**	**100%**	**100%**

Source: Lightcast

Gross Regional Product

- In 2021 the **Medical Device Manufacturing** industry group generated $616 million towards New Hampshire's Gross Regional Product.
- *Optical Instrument and Lens Manufacturing* had the largest contribution to GRP in 2021 within the **Medical Device Manufacturing** industry group with $218 million or 35% of **Medical Device Manufacturing** in New Hampshire, a much higher percent compared to New England and the US.

Medical Device Manufacturing GRP and GRP as % of Industry Group by Industry (in $M), 2021, New Hampshire, New England and the United States

NAICS	Description	NH GRP	NH GRP % of Total	NE GRP % of Total	US GRP % of Total
333314	Optical Instrument and Lens Mfg.	$218.1	35%	5%	3%
334510	Electro- medical/therapeutic Apparatus Mfg.	$110.4	18%	26%	38%
334513	Instruments to Control Industrial Processes	$40.4	7%	8%	8%
334514	Totalizing Fluid Meter and Counting Device Mfg.	$5.2	1%	1%	5%
334515	Instrument Mfg. to Measure & Test Electrical	$112.6	18%	7%	11%
334516	Analytical Laboratory Instrument Mfg.	$70.2	11%	35%	17%
334517	Irradiation Apparatus Mfg.	$6.2	1%	8%	7%
334519	Other Measuring and Controlling Device Mfg.	$52.8	9%	10%	12%
	Total	**$616.0**	**100%**	**100%**	**100%**

Source: Lightcast

Productivity

- Productivity for **Medical Device Manufacturing**, (GRP/Job), in New Hampshire is lower compared to New England and the US. The exact difference in productively depends on the specific businesses within the industry however it can be a sign of companies that require highly specialized labor relative to the level of capital investment.

Medical Device Manufacturing Productivity by Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH	NE	US
		Productivity (GRP / Job)		
333314	Optical Instrument and Lens Mfg.	$109,161	$117,014	$122,916
334510	Electro- medical/therapeutic Apparatus Mfg.	$419,913	$579,508	$524,076
334513	Instruments to Control Industrial Processes	$111,906	$148,755	$130,250
334514	Totalizing Fluid Meter and Counting Device Mfg.	.	$526,715	$554,953
334515	Instrument Mfg. to Measure & Test Electrical	$277,290	$383,145	$292,186
334516	Analytical Laboratory Instrument Mfg.	$282,997	$467,361	$420,683
334517	Irradiation Apparatus Mfg.	.	$596,732	$500,903
334519	Other Measuring and Controlling Device Mfg.	$286,997	$304,938	$361,673
	Total	**$178,026**	**$356,945**	**$350,015**

Source: Lightcast

Sales

- In 2021 the **Medical Device Manufacturing** industry group generated $935 million in total sales in New Hampshire, of which 93% were made to out of state entities through a mix of domestic and foreign trade. All of the individual industries generate a high proportion of sales exported out of state, ranging from 74% to 95% exported out of state.
- *Optimal Instrument and Lens Manufacturing* has the highest level of sales in the **Medical Device Manufacturing** industry group, with $457 million in 2021, of which 95% are out of state.
- The higher percent of exported sales indicates a strong value-add by the industry in terms of bringing economic activity and wealth to the state.

Medical Device Manufacturing Sales by Industry (in $M), 2021, New Hampshire

NAICS	Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
333314	Optical Instrument and Lens Mfg.	$25.7	6%	$431.3	94%	$457.0
334510	Electro- medical/therapeutic Apparatus Mfg.	$15.3	13%	$104.4	87%	$119.6
334513	Instruments to Control Industrial Processes	$4.7	8%	$50.8	92%	$55.5
334514	Totalizing Fluid Meter and Counting Device Mfg.	$1.5	26%	$4.3	74%	$5.7
334515	Instrument Mfg. to Measure & Test Electrical	$12.4	8%	$138.5	92%	$150.9
334516	Analytical Laboratory Instrument Mfg.	$4.0	5%	$75.4	95%	$79.5
334517	Irradiation Apparatus Mfg.	$1.0	13%	$6.6	87%	$7.7
334519	Other Measuring and Controlling Device Mfg.	$5.6	9%	$53.6	91%	$59.2
	Total	**$70.1**	**7%**	**$865.0**	**93%**	**$935.1**

Source: Lightcast

Supply Chain Demand and Leakage

- The **Medical Device Manufacturing** industry group in New Hampshire has total purchases (demand) of $427.8 million in 2021. Of this amount, 86% was purchased from out of state sellers. All of the individual sectors except *Optical Instrument and Lens Manufacturing* (with 26%) have a high percentage of purchases met out of state.
- This creates opportunity to connect in-state sellers, to in state buyers for greater industry impact in New Hampshire. As an example, if New Hampshire was able to recapture 10% of imported purchases in **Medical Device Manufacturing** industry, it would amount to an estimated $36.6 more million in sales, and have the potential for 5 new firms and 94 new jobs.

Medical Device Manufacturing Demand by Industry (in $M), 2021, New Hampshire

NAICS	Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
333314	Optical Instrument and Lens Mfg.	$17.8	74%	$6.3	26%	$24.2
334510	Electro- medical/therapeutic Apparatus Mfg.	$15.2	9%	$155.3	91%	$170.5
334513	Instruments to Control Industrial Processes	$4.6	16%	$23.9	84%	$28.5
334514	Totalizing Fluid Meter and Counting Device Mfg.	$1.5	8%	$16.9	92%	$18.3
334515	Instrument Mfg. to Measure & Test Electrical	$12.0	26%	$34.0	74%	$46.0
334516	Analytical Laboratory Instrument Mfg.	$4.0	7%	$52.2	93%	$56.2
334517	Irradiation Apparatus Mfg.	$1.0	4%	$25.7	96%	$26.7
334519	Other Measuring and Controlling Device Mfg.	$5.5	10%	$52.1	90%	$57.6
	Total	**$61.5**	**14%**	**$366.3**	**86%**	**$427.8**

Source: Lightcast

Medical Device Manufacturing Leakage (Proposed Rate of Recapture = 10%), 2021, New Hampshire

NAICS	Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
333314	Optical Instrument and Lens Mfg.	$6.3	$0.6	$19.9	0.0	3
334510	Electro- medical/therapeutic Apparatus Mfg.	$155.3	$15.5	$10.0	1.6	34
334513	Instruments to Control Industrial Processes	$23.9	$2.4	$2.6	0.9	16
334514	Totalizing Fluid Meter and Counting Device Mfg.	$16.9	$1.7	$2.9	0.6	-
334515	Instrument Mfg. to Measure & Test Electrical	$34.0	$3.4	$10.8	0.3	9
334516	Analytical Laboratory Instrument Mfg.	$52.2	$5.2	$7.9	0.7	16
334517	Irradiation Apparatus Mfg.	$25.7	$2.6	$7.7	0.3	-
334519	Other Measuring and Controlling Device Mfg.	$52.1	$5.2	$8.5	0.6	16
	Total	**$366.3**	**$36.6**		**5.0**	**94**

Source: Lightcast

Multipliers

All of the **Medical Device Manufacturing** industries in New Hampshire have positive economic multipliers, meaning they generate more to the economy beyond their direct contribution. For example, *Optical Instrument and Lens Manufacturing* generates

- 85 additional jobs for every 100 direct
- 70 additional $ in sales for every 100 dollars generated in direct sales
- 64 additional $ in earnings for every 100 dollars in direct earnings

Medical Device Manufacturing Multipliers, 2021, New Hampshire

NAICS	Description	Multiplier Jobs	Multiplier Sales	Multiplier Earnings
333314	Optical Instrument and Lens Mfg.	1.85	1.70	1.64
334510	Electro- medical/therapeutic Apparatus Mfg.	2.25	1.67	1.71
334513	Instruments to Control Industrial Processes	1.54	1.65	1.42
334514	Totalizing Fluid Meter and Counting Device Mfg.	2.09	1.67	2.09
334515	Instrument Mfg. to Measure & Test Electrical	2.19	1.64	1.54
334516	Analytical Laboratory Instrument Mfg.	1.87	1.66	1.67
334517	Irradiation Apparatus Mfg.	2.58	1.68	1.87
334519	Other Measuring and Controlling Device Mfg.	1.87	1.65	1.61

Source: Lightcast

Research and Development Services

Industry Group

Description of Activity

This industry comprises establishments primarily engaged in (1) performing physical, chemical, and other analytical testing services, (2) conducting nanotechnology research and experimental development. Nanotechnology research and experimental development involves the study of matter at the nanoscale (i.e., a scale of about 1 to 100 nanometers), (3) conducting biotechnology research and experimental development which involves the study of the use of microorganisms and cellular and biomolecular processes to develop or alter living or non-living materials and (4) research and experimental development in the physical, engineering, and life sciences. Note, this industry analysis excludes Research and Development Services within institutions of higher education. Their contribution is covered within the section of this report on Research and Development and Innovation Performance and Opportunity.

Key Takeaways

- **Research and Development Services** is the second largest industry group in terms of employment within the Life Sciences Cluster.
- Job growth since 2012 has been strong. This increase is greater than the US through lower New England which is a regional of strength in the country. Growth is projected to continue however at slower rates.
- **Research and Development Services** is less concentrated in terms of employment in New Hampshire compared to New England and the US.

Industries

- *Testing Laboratories*
- *Research and Development in Nanotechnology*
- *Research and Development in Biotechnology (except Nanobiotechnology)*
- *Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)*

- The New Hampshire **Research and Development Services** also trails New England in other key metrics with smaller firms, lower earnings, lower productivity, and a lower level of export sales.

Opportunities to Examine

Highest Opportunities Based on New Hampshire Data Performance:

- *Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)*
  - Largest industry in industry group
  - Historic and projected growth and growth that is competitive nationally
- *Research and Development in Biotechnology (except Nanobiotechnology)*
  - Historic and projected growth and growth that is competitive nationally
  - Opportunity to reduce imports made by industry

Additional Opportunities Based on New Hampshire Data Performance:

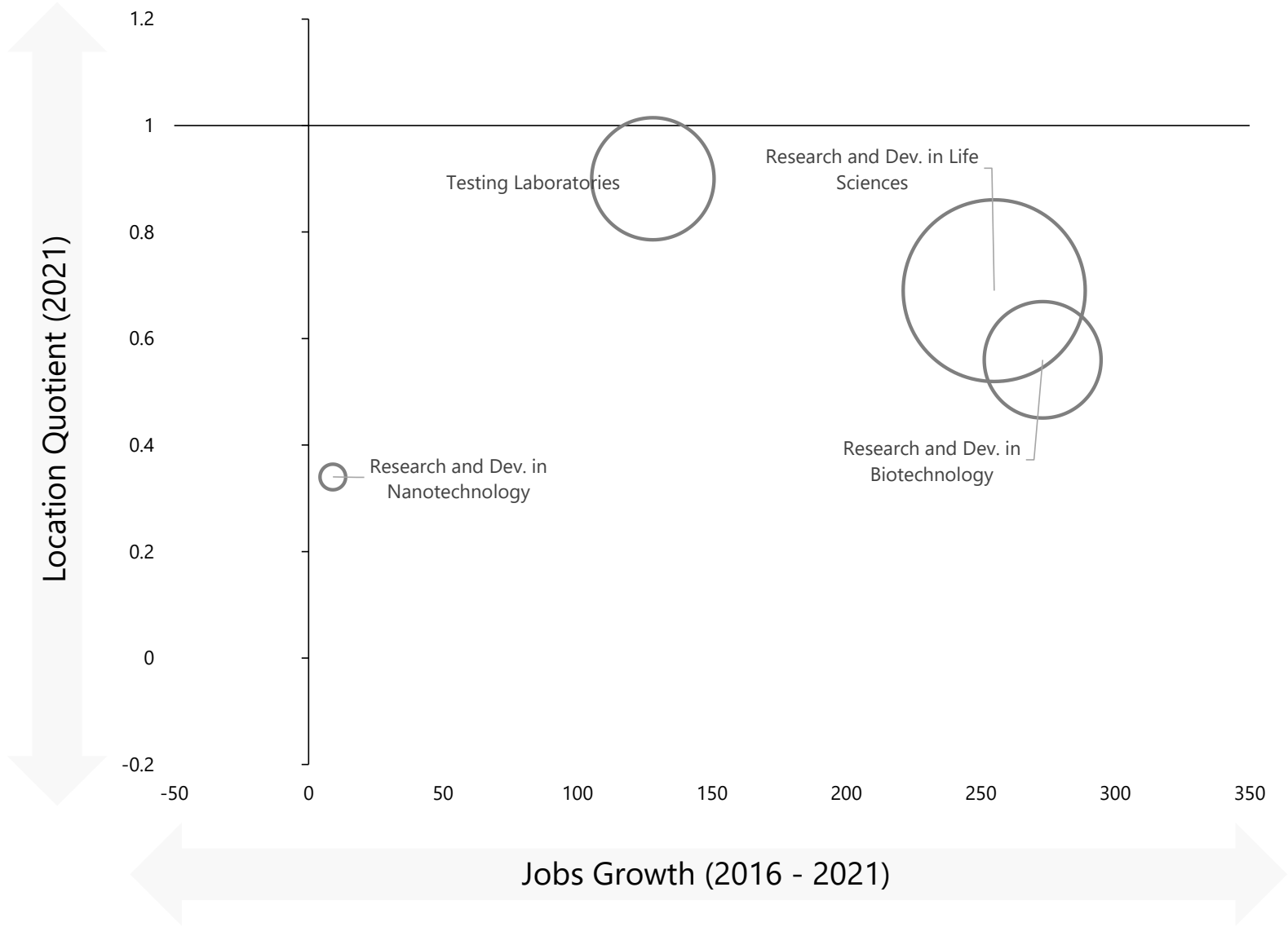
- *Testing Laboratories*
  - Second largest industry in industry group
  - Historic and projected growth and growth that is competitive nationally

Across all opportunity industries it will be important to support growth and build concentrations of services that provide connections for businesses.

Lowest Opportunities Based on New Hampshire Data Performance:

- *Research and Development in Nanotechnology*
  - Very small industry in New Hampshire
  - Historic and projected growth and growth that is competitive nationally

Research and Development Services Industries By Key Metrics (bubble size indicates 2021 jobs), New Hampshire



Data Source: Lightcast

Industry Group Overview for: Research and Development Services

Jobs: 2,959

- Data for 2021
- 26.2% of state's Life Science Jobs
- 0.4% of State's jobs (all sectors)

Job Growth: 868

- Data compares 2012 - 2021
- 2.2% of the State's change in jobs during this period

Growth Rate: 41.5%

- Data compares 2012 - 2021
- Growth underperforms New England (76.0%), but is faster than the U.S. (26.5%)

Concentration: 0.69

- Data for 2021
- Jobs are less concentrated in this industry group than would be expected for an area of this size
- Less concentrated compared to New England (2.37)

Competitive Effect: 282

- Data compares 2016 - 2021
- Local competitive factors contribute to more jobs than expected than if New Hampshire was only trending with national and industry growth

Average Earnings: $142,366

- Data for 2021
- Lower than both New England ($195,382), and the nation ($162,906)
- Higher than the State's average earnings across all industries ($82,113)

Establishments: 335

- Data for 2021
- 54.7% of state's Life Science Establishments
- 14 jobs per establishment. which is lower than that of New England (41), and the nation (32)

Gross Regional Product: $486 M

- Data for 2021
- 0.5% of state economy's total GRP
- 17.4% of state's GRP in the Life Science cluster

Productivity: $164,392

- Data for 2021
- GRP per worker
- Lower compared to New England ($273,958), and the nation ($197,383)

Total Sales: $887 M

- Data for 2021
- 66.6% of this industry group's sales occur within NH
- 33.4% of sales exported out of state

Demand: $1,322 M

- Data for 2021
- 55.8% of NH demand is met out of state, which is high compared to New England (4.6%).

Leakage: $738 M

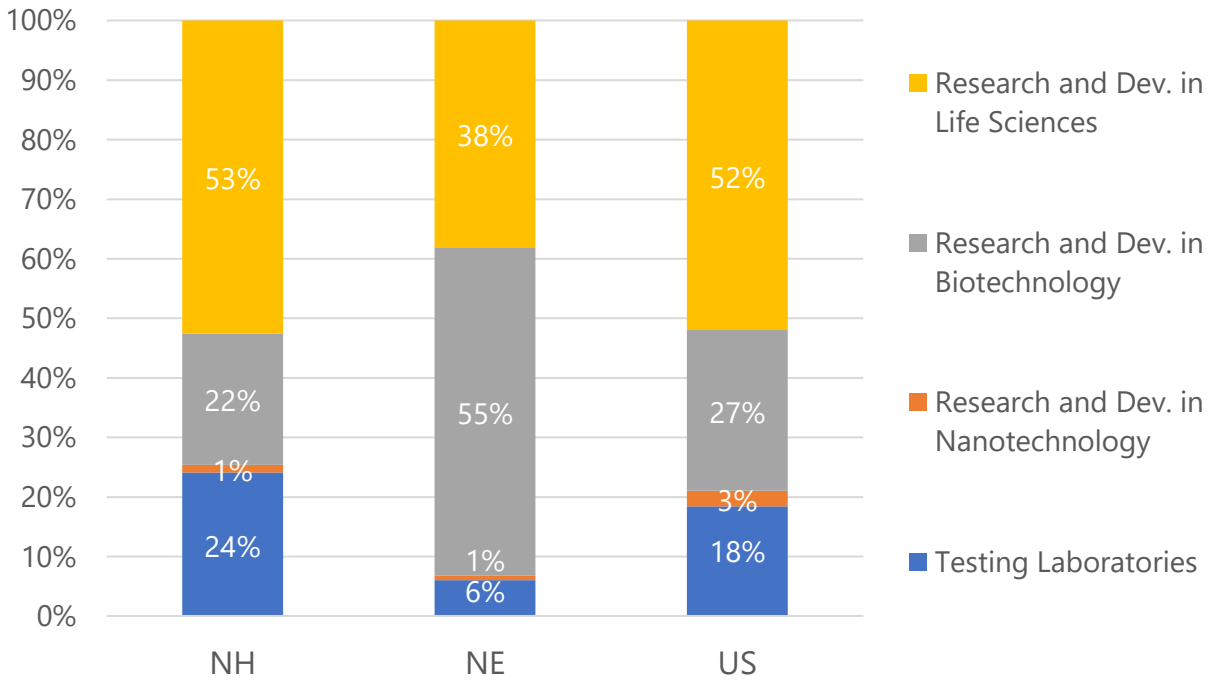
- Data for 2021
- Estimated $74 M could be recaptured by New Hampshire firms

Source: Lightcast

Employment and Industry Group Mix

- Compared to New England, New Hampshire is less represented by *Research and Development in Biotechnology* within **Research and Development Services.**
- The share of jobs for *Research and Dev. in Nanotechnology* is far lower than the national average and lower than New England.

Research and Development Services Jobs as Percent of Industry Group, 2021



Source: Lightcast

Employment

- The **Research and Development Services** industry group within Life Sciences in New Hampshire is the second largest industry group with employment in 2021 of 2,959. This contributes 26% to the Life Sciences cluster.
- The jobs for *Research and Development in Life Sciences,* at 1,555, makes up just over half of the **Research and Development Services** industry group in New Hampshire, which is similar to the US share. This exceeds the jobs percentage for the industry in New England by 15%.
- *Testing Laboratories,* with 714 jobs in New Hampshire in 2021, has a higher share than New England (quadruple the rate at 24% to 6% for New England).

Research and Development Services Jobs and Jobs as % of Industry Group, 2021, New Hampshire compared to New England, U.S.

		New Hampshire		New England		United States	
NAICS	Description	Jobs	% of Total	Jobs	% of Total	Jobs	% of Total
541380	Testing Laboratories	714	24.1%	6,702	6.0%	176,306	18.4%
541713	Research and Dev. in Nanotechnology	38	1.3%	863	0.8%	25,023	2.6%
541714	Research and Dev. in Biotechnology	652	22.0%	61,369	55.1%	257,897	27.0%
541715	Research and Dev. in Life Sciences	1,555	52.6%	42,384	38.1%	497,029	52.0%
	Total	**2,959**	**100.0%**	**111,318**	**100.0%**	**956,255**	**100.0%**

Source: Lightcast

Job Growth

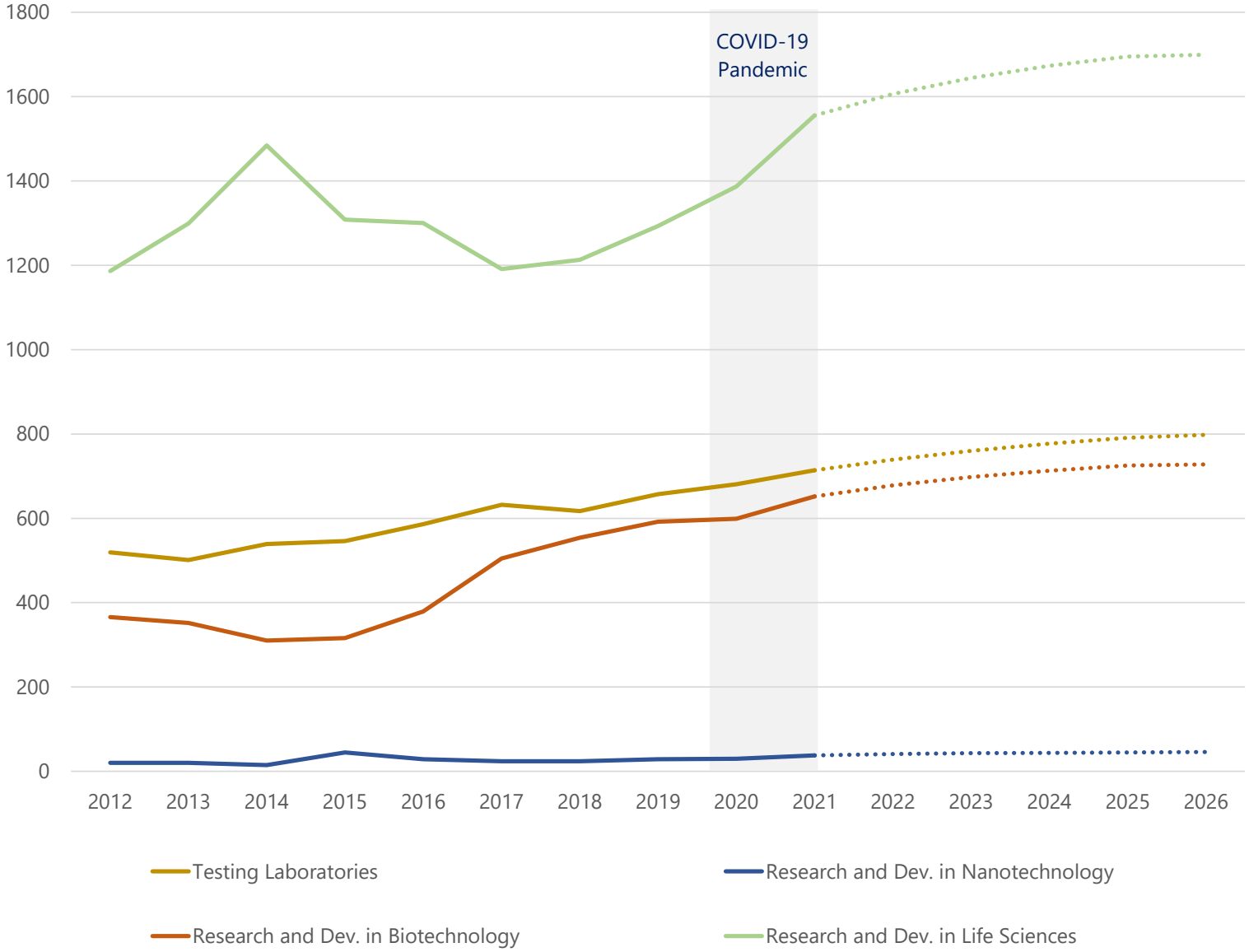
- Overall, as an industry group, **Research and Development Services** experienced modest growth in New Hampshire from 2012 to 2018. This was followed by higher growth through 2021 and growth is projected to continue through 2026.
- *Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)* has added the most jobs in the industry group since 2012 (+369) and should grow an additional 9% by 2026.
- Each subsector in R&D has seen increases in jobs of at least 30% since 2012, but *Research and Development in Nanotechnology* has grown triple that rate with expectations for job growth through 2026 (+21%) that are greater than those expected for the US (+14%)
- *Research and Development in Biotechnology (except Nanobiotechnology)* has a similar growth profile but with slightly slower rates of growth historically (+78% since 2012) and forecasted (+12%).
- *Testing Laboratories* are a subsector that have been part of the bull market for research, but the New England (-8%) and US (2%) growth outlooks are sparse.

Research and Development Services Jobs By Industry By Year, New Hampshire

										Covid		Forecast				
NAICS	Description	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
541380	Testing Laboratories	519	501	539	546	586	632	617	657	681	714	739	760	777	791	798
541713	Research and Dev. in Nanotechnology	20	20	15	45	29	24	24	29	30	38	41	43	44	45	46
541714	Research and Dev. in Biotechnology	366	352	310	316	379	505	554	592	599	652	678	698	713	725	728
541715	Research and Dev. in Life Sciences	1,186	1,299	1,484	1,308	1,300	1,191	1,213	1,293	1,387	1,555	1,606	1,644	1,673	1,695	1,699
	Total	**2,091**	**2,172**	**2,348**	**2,215**	**2,294**	**2,352**	**2,408**	**2,571**	**2,697**	**2,959**	**3,064**	**3,145**	**3,207**	**3,256**	**3,271**

Source: Lightcast

Research and Development Services Jobs By Industry, New Hampshire (Lightcast Projection 2022 - 2026)



Source: Lightcast

Concentration

- With a LQ of 0.69, New Hampshire does not have an employment concentration in **Research and Development Services** relative to the US as a whole.
- While *Testing Laboratories* comes within 10% of the US quotient for industry concentration, none of the subsectors in the **Research and Development Services** industry group have as much as the national average and they fall behind the New England quotients except for *Testing Laboratories*.

Research and Development Services Location Quotient By Industry, 2021, New Hampshire and New England

NAICS	Description	NH Location Quotient	NE Location Quotient
541380	Testing Laboratories	0.90	0.77
541713	Research and Dev. in Nanotechnology	0.34	0.70
541714	Research and Dev. in Biotechnology	0.56	4.85
541715	Research and Dev. in Life Sciences	0.69	1.74
	Total	**0.69**	**2.37**

Source: Lightcast

Competitiveness

- **Research and Development Services** has positive competitive effects for each of its subsectors; this is the only industry group where that occurs. The cumulative competitive advantage leads to an additional 282 jobs than expected compared to the US New Hampshire follows the lead of New England where 22,238 additional jobs were created in this industry group, or more than double expected based on industry trends and national jobs growth.
- The advantage sees even contribution from the three larger subsectors: *Testing Laboratories* (+100 jobs), *Research and Development in Biotechnology* (+90 jobs) and *Research and Development in the Physical, Engineering, and Life Sciences* (+83 jobs).
- Taken together, this data means that although not currently concentrated in **Research and Development Services**, New Hampshire has gained some ground relative to the US as a whole.

Research and Development Services Shift Share Analysis, 2016 - 2021, New Hampshire

NAICS	Description	Ind. Mix Effect	+	Nat'l Growth Effect	=	Expected Job Change	Actual Job Change	-	Expected Job Change	=	Competitive Effect
541380	Testing Laboratories	17		10		27	128		27		100
541713	Research and Dev. in Nanotechnology	0		1		1	9		1		9
541714	Research and Dev. in Biotechnology	176		7		183	273		183		90
541715	Research and Dev. in Life Sciences	149		23		172	255		172		83
	Total	**342**		**41**		**383**	**665**		**383**		**282**

Source: Lightcast

Average Earnings

- **Research and Development Services** has relatively high average earnings. In 2021, in New Hampshire, the average annual earnings per employee in the industry group was $149,449. This is higher than the levels in New England and the US This is an indication that New Hampshire can compete in terms of costs to businesses, as long as they are able to attract and retain skilled workers.
- *Research and Development in Biotechnology and Research and Development in Nanotechnology* have the highest 2021 earnings per worker in New Hampshire within the industry group, while *Testing Laboratories* has the lowest.

Research and Development Services Average Earnings Per Job By Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH	NE	US
		Earnings Per Job		
541380	Testing Laboratories	$ 83,769	$ 104,683	$ 97,015
541713	Research and Dev. in Nanotechnology	$ 202,618	$ 200,996	$ 150,528
541714	Research and Dev. in Biotechnology	$ 211,058	$ 291,298	$ 240,524
541715	Research and Dev. in Life Sciences	$ 138,998	$ 184,551	$ 163,557
	Total	**$ 142,366**	**$ 238,719**	**$ 171,705**

Source: Lightcast

Establishments

- In 2021, there were 335 business establishments in **Research and Development Service** industries related to Life Sciences in New Hampshire.
- *Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)* represents the greatest number of establishments within the industry group, followed by *Research and Development in Biotechnology.* Together, they represent 74% of all establishments in New Hampshire within the industry group, which is a lower concentration than New England but similar to the US
- New Hampshire is more concentrated, in *Testing Laboratories,* for establishments compared to New England.

Research and Development Services Establishments and % Establishments By 6 digit NAICS and Region, 2021

NAICS	Description	NH Payrolled Business Locations	NH Payrolled Business Locations % of Total	NE Payrolled Business Locations % of Total	US Payrolled Business Locations % of Total
541380	Testing Laboratories	71	21%	12%	22%
541713	Research and Development in Nanotechnology	15	4%	3%	5%
541714	Research and Development in Biotechnology (except Nanobiotechnology)	101	30%	42%	30%
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	148	44%	43%	43%
	Total	335	100%	100%	100%

Source: Lightcast

Gross Regional Product

- In 2021, the **Research and Development Services** industry group generated $486.4 million towards New Hampshire's Gross Regional Product.
- *Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)* had the largest contribution to GRP in 2021 within the industry group with $253.6 million or 52% of the **Research and Development Services** in New Hampshire. This was followed by *Research and Development in Biotechnology* with 158.7million or 33%.
- Relative to New England, New Hampshire's *Testing Laboratories* have a greater share of contribution to GRP at 14% of the industry group.

Research and Development Services GRP and % GRP By 6 digit NAICS and Region, 2021 (in $M)

NAICS	Description	NH GRP	NH GRP % of Total	NE GRP % of Total	US GRP % of Total
541380	Testing Laboratories	$ 66.2	14%	3%	10%
541713	Research and Development in Nanotechnology	$ 7.9	2%	1%	2%
541714	Research and Development in Biotechnology (except Nanobiotechnology)	$ 158.7	33%	67%	38%
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	$ 253.6	52%	30%	50%
	Total	$ 486.4	100%	100%	100%

Source: Lightcast

Productivity

- Productivity for **Research and Development Services**, (GRP/Job), in New Hampshire, is lower compared to New England and the US The exact difference in productivity depends on the specific business within the industry, however it can be a sign that companies require highly specialized labor relative to the level of capital investment.
- Within the industry group, productivity for *Research and Development in Biotechnology* is the highest in New Hampshire followed by *Research and Development in Nanotechnology. Research and Development in Nanotechnology* productivity is the industry that for which New Hampshire's productivity is higher than New England and the US

Research and Development Services Productivity by Industry, 2021, New Hampshire,

NAICS	Description	NH	NE	US
		Productivity (GRP / Job)		
541380	Testing Laboratories	$92,738	$117,095	$108,215
541713	Research and Dev. in Nanotechnology	$206,821	$193,692	$144,008
541714	Research and Dev. in Biotechnology	$243,450	$333,506	$277,488
541715	Research and Dev. in Life Sciences	$163,108	$214,174	$190,135
	Total	**$164,392**	**$273,958**	**$197,383**

Source: Lightcast

Sales

In 2021, the **Research and Development Services** industry group generated $590.3 million in total sales in New Hampshire, of which 33% were made to out of state entities through a mix of domestic and foreign trade. All of the individual industries within the group generate a low proportion of export sales, except for Research and development in Biotechnology.

Research and Development in Biotechnology generates 79.5 million in sales (third highest in the industry group), of which 73% is made to out of state entities

Research and Development in Life Sciences generates the highest level of sales in the industry group with 412.7 sales, however only 11% are exported the remainder is to in-state entities. Testing Laboratories generates the second highest with 82 million in sales, of which 26% is exported.

Research and Development Services Sales by Industry (in $M), 2021, New Hampshire

NAICS	Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
541380	Testing Laboratories	$82.0	74%	$29.2	26%	$111.1
541713	Research and Dev. in Nanotechnology	$16.1	94%	$1.1	6%	$17.2
541714	Research and Dev. in Biotechnology	$79.5	27%	$213.0	73%	$292.6
541715	Research and Dev. in Life Sciences	$412.7	89%	$53.2	11%	$465.9
	Total	**$590.3**	**67%**	**$296.6**	**33%**	**$886.8**

Source: Lightcast

Supply Chain Demand and Leakage

- The **Research and Development Services** industry group in New Hampshire has total purchases (demand) $583.9 million in 2021. Of this amount 56% was purchased from out of state sellers. All of the individual sectors except *Research and Development in Biotechnology* (with 85%) have less than 60% of purchases met out of state.
- This creates opportunity to connect in -state sellers, to in state buyers for greater industry impact in New Hampshire. As an example, if New Hampshire was able to recapture 10% of imported purchases in **Research and Development Services** industry, it would amount to an estimated $73.8 more million in sales, and have the potential for 26.4 new firms and 207 new jobs.

Research and Development Services Demand by Industry (in $M), 2021, New Hampshire

NAICS	Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
541380	Testing Laboratories	$80.0	71%	$32.4	29%	$112.5
541713	Research and Dev. in Nanotechnology	$14.9	53%	$13.3	47%	$28.2
541714	Research and Dev. in Biotechnology	$78.0	15%	$431.5	85%	$509.5
541715	Research and Dev. in Life Sciences	$410.9	61%	$261.0	39%	$671.9
	Total	**$583.9**	**44%**	**$738.2**	**56%**	**$1,322.1**

Source: Lightcast

Research and Development Services Leakage (Proposed Rate of Recapture = 10%), 2021, New Hampshire

NAICS	Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
541380	Testing Laboratories	$32.4	$3.2	$1.6	2.1	21
541713	Research and Dev. in Nanotechnology	$13.3	$1.3	$1.1	1.2	3
541714	Research and Dev. in Biotechnology	$431.5	$43.2	$2.9	14.9	96
541715	Research and Dev. in Life Sciences	$261.0	$26.1	$3.1	8.3	87
	Total	**$738.2**	**$73.8**	**$8.8**	**26.4**	**207**

Source: Lightcast

Multipliers

All of the **Research and Development Services** industries in New Hampshire have positive economic multipliers, meaning they generate more to the economy beyond their direct contribution. For example, *Testing Laboratories* generate

Multipliers

- 77 additional jobs for every 100 direct
- 82 additional $ in sales for every 100 dollars generated in direct sales
- 63 additional $ in earnings for every 100 dollars in direct earnings

Research and Development Services Multipliers, 2021, New Hampshire

NAICS	Description	Multiplier Jobs	Multiplier Sales	Multiplier Earnings
541380	Testing Laboratories	1.77	1.82	1.63
541713	Research and Dev. in Nanotechnology	2.64	1.77	1.65
541714	Research and Dev. in Biotechnology	2.73	1.69	1.58
541715	Research and Dev. in Life Sciences	2.21	1.75	1.64

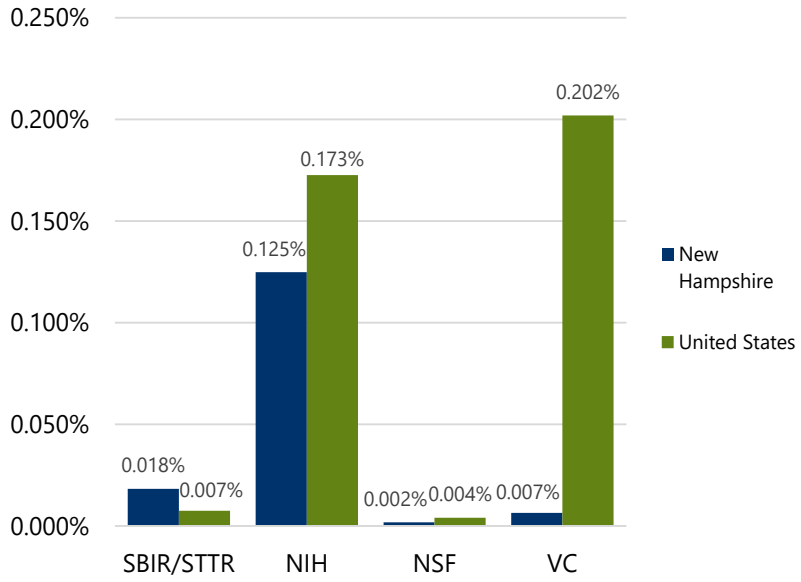
Source: Lightcast

R&D Innovation and Investment

Employment and other industry data that is tied to a company's NAICS code does not capture all of the life science related research and development occurring within a region. Life science related research and development occurs at other companies and organizations that fall outside of the traditional NAICS research and development industries. Trends in investment in research and development, both through award programs and private capital raising, help to paint a more complete picture of life science research and development activity. Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards, National Institutes of Health (NIH) awards, venture capital (VC) funding, research and development expenditure trends, and university technology transfer help to highlight this activity.

The figure to the right summarizes how New Hampshire has performed relative to the United States on life science related awards and funding in 2021.[1] To benchmark New Hampshire's performance, capital raised through SBIR/STTR awards, NIH awards, NSF awards, and VC deals is expressed as a percentage of GRP (for the state) and GDP (for the nation). On these measures New Hampshire has outperformed the United States in terms of capital received by organizations through SBIR/STTR awards but has underperformed on the other three measures. New Hampshire has most significantly underperformed the nation in terms of life sciences related VC funding. More information on the awards and capital raised, including historical performance, as well and R&D expenditures and university technology transfer are discussed in the following section.

Life Science Industry Innovation Benchmarking:
Capital Raised as a % of GRP (2021)



Source: SBA, NIH, NSF, Crunchbase

[1] At the time of writing, 2021 is the most recent year for which data is available.

Awards Received and Capital Raised

SBIR/STTR Awards

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are competitive programs that expand R&D funding opportunities for small businesses. Both programs are intended to promote entrepreneurial R&D and the commercialization of resulting innovations.

Over the last six years (2016-2021) companies in New Hampshire received 134 life science related SBIR/STTR awards, equaling over $98.9 million. Compared to the United States, New Hampshire has outperformed in receiving life science related SBIR/STTR awards; the amount awarded as a percent of GRP has consistently been higher for the state than the nation. Within the state, Creare, LLC (39 awards, $27.5 million) and Celdara Medical, LLC (22 awards, $19.5 million) were the top award recipients over this period.

Total SBIR/STTR Awards

	New Hampshire			United States		
Year	#	Amount	Award Amount % of GRP	#	Amount	Award Amount % of GRP
2016	18	$10,024,908	0.014%	1,892	$1,112,299,020	0.007%
2017	14	$11,889,587	0.016%	1,945	$1,246,583,457	0.007%
2018	25	$14,074,289	0.018%	2,079	$1,313,314,631	0.007%
2019	35	$23,374,022	0.029%	2,205	$1,404,709,957	0.007%
2020	25	$22,626,863	0.028%	2,003	$1,499,354,156	0.008%
2021	17	$16,924,369	0.018%	1,950	$1,540,621,268	0.007%
Total	**134**	**$98,914,038**		**12,074**	**$8,116,882,489**	

Source: SBA - SBIR/STTR Award Data

Note: Includes all Phase I and Phase II SBIR/STTR awards issued by the Defense Health Agency, the Department of Health and Human Services, and the National Science Foundation

New Hampshire's Top SBIR/STTR Award Recipients (2016-2021)

Organization	# of Awards	Award Amount
Creare LLC	39	$27,548,834
Celdara Medical, LLC	22	$19,520,513
Immunext, Inc.	6	$9,390,907
Cairnsurgical, Inc.	5	$6,426,487
Doseoptics LLC	6	$5,863,351
Insight Surgical Technologies LLC	4	$2,840,139
Q2I, LLC	5	$2,610,114
Rytek Medical Inc	5	$2,402,664
Reia, LLC	2	$2,196,001
Stealth Biologics LLC	4	$1,883,960

Source: SBA - SBIR/STTR Award Data

Note: Includes all Phase I and Phase II SBIR/STTR awards issued by the Defense Health Agency, the Department of Health and Human Services, and the National Science Foundation

National Institutes of Health (NIH) Awards

The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, provides critical funding for life science research. Over the five-year period from 2017-2021 organizations in New Hampshire received 1,162 NIH awards equaling nearly $572.9 million in funding. The number of awards and amount awarded to organizations in the state has remained consistent over this five-year period, and slightly underperforms the country when benchmarked using the amount awarded as a percent of gross regional product (GRP). Over 78% of funds awarded to New Hampshire's organizations were awarded to Dartmouth College.

New Hampshire's Top NIH Award Recipients (2017-2021)

Organization	# of Awards	Award Amount
Dartmouth College	895	$449,574,944
Dartmouth-Hitchcock Clinic	79	$24,808,124
University Of New Hampshire	46	$21,414,114
Celdara Medical, LLC	35	$20,016,138
Creare, LLC	16	$9,445,911
Immunext, Inc.	10	$8,478,716
Cairnsurgical, Inc.	7	$6,217,180
Doseoptics, LLC	7	$4,846,937
Simbex, LLC	4	$4,350,804
Insight Surgical Technologies, LLC	5	$2,840,139

Source: U.S Department of Health and Human Services, NIH

Total NIH Awards

	New Hampshire			United States		
Year	#	Amount	Award Amount % of GRP	#	Amount	Award Amount % of GRP
2017	234	$108,855,314	0.146%	54,128	$26,105,151,996	0.150%
2018	232	$107,354,256	0.138%	57,110	$28,051,579,467	0.153%
2019	238	$120,548,277	0.150%	59,421	$30,820,089,271	0.161%
2020	233	$120,672,167	0.150%	61,933	$34,647,343,566	0.186%
2021	225	$115,460,555	0.125%	62,996	$35,733,566,196	0.173%
Total	**1,162**	**$572,890,569**		**295,588**	**$155,357,730,496**	

Source: U.S. Department of Health and Human Services, NIH

National Science Foundation (NSF) Awards

The National Science Foundation (NSF) funds research and education in science and engineering through grants contracts, and cooperative agreements. From 2017 through 2021 organizations in New Hampshire have received 64 NSF awards equaling nearly $15.1 million. New Hampshire's award amount as a percent of GRP is similar to that of the United States. The bulk of awards were received by the University of New Hampshire and Dartmouth College, each of which received 48% and 47% of the funds, respectively.

New Hampshire's Top NSF Award Recipients (2017-2021)

Organization	# of Awards	Award Amount
University of New Hampshire	32	$7,199,000
Dartmouth College	28	$7,152,000

Source: National Science Foundation

Total NSF Awards

	New Hampshire			United States		
Year	#	Amount	Award Amount % of GRP	#	Amount	Award Amount % of GRP
2017	16	$3,281,000	0.004%	2,199	$759,373,000	0.004%
2018	12	$3,815,000	0.005%	2,071	$757,498,000	0.004%
2019	14	$4,151,000	0.005%	1,911	$795,232,000	0.004%
2020	11	$2,110,000	0.003%	1,999	$824,926,000	0.004%
2021	11	$1,739,000	0.002%	2,220	$854,543,000	0.004%
Total	**64**	**$15,096,000**		**10,400**	**$3,991,572,000**	

Source: National Science Foundation

Venture Capital Funding

Venture capital (VC) investments transform innovation into economic growth by providing funding to grow companies, and therefore grow the economy. VC provides equity investments for the purposes of new growth.

According to data from Crunchbase, life science related organizations in New Hampshire have received very little VC funding. From 2016 through 2021 there have been 11 VC deals among the state's life science related companies, with over $36.7 million being raised. New Hampshire underperforms the United States on this measure, with the capital raised as a percent of GRP being lower than it is nationally. Nationally, the number of deals and amount of capital raised by life science related activities is on the rise.

Companies that have received most of New Hampshire's VC funding include Pristine Surgical ($18.0 million), VentriFlo, Inc. ($10.0 million), and Kantum Pharma ($3.5 million).

Life Science Venture Capital Deals

	New Hampshire			United States		
Year	Number of Deals	Capital Raised	Capital Raised % of GRP	Number of Deals	Capital Raised	Capital Raised % of GRP
2016	1	$2,000,000	0.003%	732	$4,157,785,958	0.025%
2017	1	$0	0.000%	875	$5,368,767,868	0.031%
2018	0	$0	0.000%	1,063	$9,154,604,554	0.050%
2019	2	$10,000,000	0.012%	1,138	$11,081,240,506	0.058%
2020	3	$18,700,000	0.023%	1,256	$18,041,780,205	0.097%
2021	4	$6,030,522	0.007%	1,407	$40,584,674,334	0.202%
Total	**11**	**$36,730,522**		**6,471**	**$88,388,853,425**	

Source: Crunchbase, Lightcast (formerly Emsi)

Note: Life science includes the following Crunchbase industries: bioinformatics, biometrics, biopharma, biotechnology, genetics, life science, neuroscience, quantified self, pharmaceutical, medical device, health diagnostics, and electronic health record.

Research and Development Activity

Expenditures

The National Science Foundation's (NSF) *National Patterns of R&D Resources* report provides data on the levels and key trends of the performance and funding of research and experimental development in the United States. This report draws on national surveys of the R&D expenditures and funding of the organizations that perform the bulk of R&D.

According to the NSF, over the five-year period from 2015-2019 (the most recent year for which data is available) nearly $12.7 billion was spent on research and development in New Hampshire. When benchmarked as a percent of GRP, New Hampshire has generally outperformed the United States over this period. Of total R&D spending by the major sectors (industry/business, higher education, and not-for profit), in 2019 83.5% of New Hampshire's R&D expenditures were from industry/business, 16.2% from higher education, and less than 1% from not-for-profits.

New Hampshire Life Science Companies Receiving Venture Capital Funding (2016-2021)

Location	Number of Deals	Capital Raised	Capital Raised % of Total
Pristine Surgical	2	$18,000,000	49%
VentriFlo Inc	1	$10,000,000	27%
Kantum Pharma	2	$3,530,522	10%
Razor Medical Instruments	2	$2,700,000	7%
DoseOptics	1	$2,000,000	5%
Neptune	1	$500,000	1%
Deepbody	1	$0	0%
Enchi Corporation	1	$0	0%
Total	**11**	**$36,730,522**	**100%**

Source: Crunchbase

Note: Life science includes the following Crunchbase industries: bioinformatics, biometrics, biopharma, biotechnology, genetics, life science, neuroscience, quantified self, pharmaceutical, medical device, health diagnostics, and electronic health record.

Total R&D Expenditures

	New Hampshire		United States	
Year	Amount	Award Amount % of GRP	Amount	Award Amount % of GRP
2015	$2,333,244,081	3.1%	$468,865,592,145	2.9%
2016	$2,344,000,000	3.0%	$495,173,000,000	2.7%
2017	$1,845,000,000	2.3%	$528,154,000,000	2.7%
2018	$3,089,000,000	3.7%	$579,584,000,000	2.8%
2019	$3,063,000,000	3.5%	$642,005,000,000	3.0%
Total	**$12,674,244,081**		**$2,713,781,592,145**	

Source: National Science Foundation, Bureau of Economic Analysis

University Technology Transfer

Technology transfer is the process of product development and commercialization of inventions and ideas that are born in research institutions. Technology transfer occurs primarily through patents and the creation of new startup companies. AUTM's Annual Licensing Activity Survey polls U.S. universities, hospitals and other research institutions on key metrics that measure an institution's level of technology transfer. The University of New Hampshire (UNH) is the only institution in the state which contributes to the survey. Key measures of technology transfer performance include: total research expenditures, total licenses and options executed, gross license income received, invention disclosures, new patent applications, and new startups formed.

Compared to its peer group as defined by AUTM (institutions with total research expenditures between $102.8 million and $212.8 million in 2020), UNH outperforms its peers in terms of total licenses and options executed as well as invention disclosures, but underperforms in terms of new patent applications and new startups formed.

Historical Technology Transfer Performance

Institution	Total Research Expenditures	Total Licenses and Options Executed	Gross License Income Received	Invention Disclosures	New Patent Applications	New Startups Formed
2016						
University of New Hampshire	$104,462,484	197	$830,448	55	6	0
AUTM Peer Group	$138,196,953	14	$1,085,031	56	24	2
2017						
University of New Hampshire	$102,396,684	167	$860,213	70	13	0
AUTM Peer Group	$136,807,483	12	$860,213	58	29	3
2018						
University of New Hampshire	$107,954,361	159	$1,079,533	41	11	0
AUTM Peer Group	$143,395,591	14	$1,662,561	43	29	2
2019						
University of New Hampshire	$148,980,000	80	$1,050,000	47	8	1
AUTM Peer Group	$154,190,500	15	$1,233,603	47	34	1
2020						
University of New Hampshire	$156,901,000	149	$1,321,512	58	3	0
AUTM Peer Group	$157,823,000	12	$1,568,218	54	32	3
2016-2020 Total						
University of New Hampshire	**$620,694,529**	**752**	**$5,141,706**	**271**	**41**	**1**
AUTM Peer Group	**$730,413,526**	**66**	**$6,409,626**	**257**	**147**	**11**

Source: AUTM Licensing Activity Survey

Note: AUTM peer group defined by AUTM as institutions with total research expenditures between $102,823,000 and $212,823,000 in 2020. 30 institutions are in this category.

Medical Equipment and Supplies Manufacturing

Industry Group

Description of Activity

This group comprises establishments primarily engaged in manufacturing (1) medical, surgical, ophthalmic, and veterinary instruments, (2) surgical appliances and supplies, (3) dental equipment and supplies used by dental laboratories and offices and (4) specialized glass forms by melting silica sand or cullet and making pressed, blown, or shaped glass or glassware (except glass packaging containers).

Key Takeaways

- The **Medical Equipment and Supplies Manufacturing** makes up 22.7 of the Life Sciences cluster jobs with 2,565 in 2021, making it the third largest industry group.
- Since 2012 the group has added 248 jobs a change of +10.7% which bests the jobs growth for New England (-4.7%) and nationally (+2.8%).
- The **Medical Equipment and Supplies Manufacturing** group has a location quotient of 1.65, showing that jobs of this type are more concentrated in New Hampshire compared to the US and this industry concentration exceeds that of New England as well (1.42).
- In addition to jobs growth and industry concentration, the jobs in New Hampshire are more efficient and better paying. The average earnings per job and the productivity (GRP per worker) for **Medical Equipment and Supplies Manufacturing** is higher than similar jobs in New England and the US
- This industry group has the highest total sales of any in the cluster with $1,190 Million in 2021. A high share of this economic activity is brought into New Hampshire by 87.9% of sales coming from out of state.

Industries

- *Other Pressed and Blown Glass and Glassware Manufacturing*
- *Surgical and Medical Instrument Manufacturing*
- *Surgical Appliance and Supplies Manufacturing*
- *Dental Equipment and Supplies Manufacturing*
- *Ophthalmic Goods Manufacturing*
- *Dental Laboratories*

Opportunities to Examine

Highest Opportunities Based on New Hampshire Data Performance:

- *Surgical and Medical Instrument Manufacturing*
  - Largest sector in Industry group
  - Historic and projected growth and growth that is competitive nationally
  - High Employment concentration similar to New England and higher than US
  - High average earnings
  - High productivity
  - High exported sales

- *Surgical Appliance and Supplies Manufacturing*
  - Second largest sector in industry group
  - Historic declines however growth projected
  - High employment concentration above New England and higher than US
  - High average earnings
  - High exported sales
  - Opportunity to reduce imports made by industry

Lowest Opportunities Based on New Hampshire Data Performance:

- *Ophthalmic Goods Manufacturing*
  - Very small presence in New Hampshire
  - Historic growth though declines projected

- *Dental Equipment and Supplies Manufacturing*
  - Very small presence in New Hampshire though has experienced some growth

- *Dental Laboratories*
  - Small presence in New Hampshire
  - Experienced declines

Medical Equipment and Supplies Manufacturing Industries By Key Metrics (bubble size indicates 2021 jobs), New Hampshire

Data Source: Lightcast

Industry Group Overview for: Medical Equipment and Supplies Manufacturing

Jobs: 2,565

- Data for 2021
- 22.7% of state's Life Science Jobs
- 0.3% of State's jobs (all sectors)

Job Growth: 248

- Data compares 2012 - 2021
- 0.6% of the State's change in jobs during this period

Growth Rate: 10.7%

- Data compares 2012 - 2021
- Growth greater than both New England (-4.7%), and the U.S. (2.8%)

Concentration: 1.65

- Data for 2021
- Jobs are more concentrated in this industry group than would be expected for an area of this size
- More concentrated compared to New England (1.42)

Competitive Effect: -115

- Data compares 2016 - 2021
- Local competitive factors contribute to fewer jobs than expected than if New Hampshire was only trending with national and industry growth

Average Earnings: $149,449

- Data for 2021
- Greater than both New England ($101,312), and the nation ($98,732)
- Higher than the State's average earnings across all industries ($82,113)

Establishments: 75

- Data for 2021
- 12.3% of state's Life Science Establishments
- 32 jobs per establishment. which is just below that of New England (34), but higher the nation (26)

Gross Regional Product: $759 M

- Data for 2021
- 0.8% of state economy's total GRP
- 27.1% of state's GRP in the Life Science cluster

Productivity: $295,742

- Data for 2021
- GRP per worker
- Higher compared to New England ($259,142), and the nation ($228,147)

Total Sales: $1,190 M

- Data for 2021
- 12.1% of this industry group's sales occur within NH
- 87.9% of sales exported out of state

Demand: $511 M

- Data for 2021
- 72.5% of NH demand is met out of state, which is high compared to New England (42.9%).

Leakage: $371 M

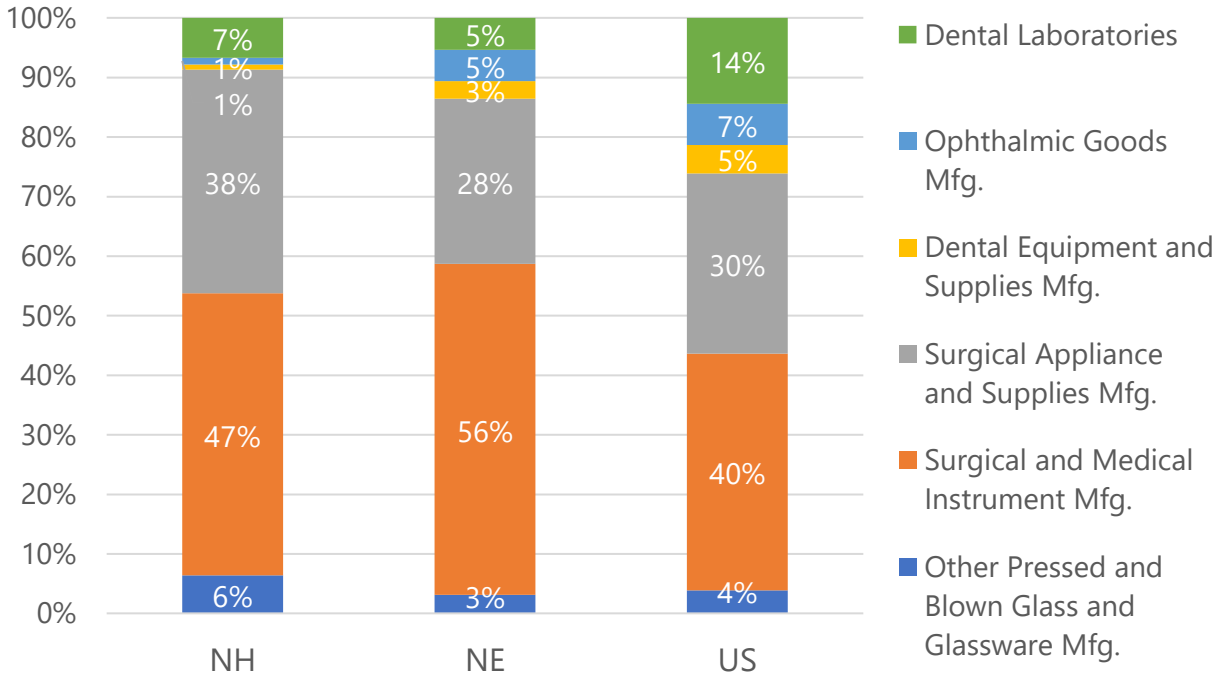
- Data for 2021
- Estimated $37 M could be recaptured by New Hampshire firms

Source: Lightcast

Employment and Industry Group Mix

- *Surgical and Medical Instrument Manufacturing* and *Surgical Appliance and Supplies Manufacturing* jobs make up 85% of this industry group's employment in New Hampshire. This allocation within *Medical Equipment and Supplies Manufacturing* is similar to New England and the US.
- *Other Pressed and Blown Glass and Glassware Manufacturing* is a distant third in terms of size of jobs within the industry group but has a larger share than the same subsectors in New England and nationally.

Medical Equipment and Supplies Manufacturing Jobs as Percent of Industry Group, 2021



Source: Lightcast

Employment

- **Medical Equipment and Supplies** is the third largest industry group with employment in 2021 of 2,565. This contributes 22.7 % to the Life Sciences cluster.
- The jobs for *Surgical and Medical Instrument Manufacturing*, reaching about 1,215, make up about half of the **Medical Equipment and Supplies Manufacturing** industry group in New Hampshire, which exceeds the share of jobs in this industry at the national level but is smaller than the share of jobs in this industry in New England, about 55.6%.
- The second largest industry in the **Medical Equipment and Supplies Manufacturing** industry group is *Surgical Appliance and Supplies Manufacturing*. The 964 jobs in the industry make up 37.6% of the industry group, which is a larger share compared to New England and the United States.
- *Other Pressed and Blown Glass and Glassware Manufacturing* comprises 164 jobs and about 6.4% of the **Medical Equipment Supplies Manufacturing** industry group, which is over double the share of jobs in New England.

Medical Equipment and Supplies Manufacturing Jobs and Jobs as % of Industry Group, 2021, New Hampshire compared to New England, U.S.

		New Hampshire		New England		United States	
NAICS	Description	Jobs	% of Total	Jobs	% of Total	Jobs	% of Total
327212	Other Pressed and Blown Glass and Glassware Mfg.	164	6.4%	753	3.1%	13,390	3.9%
339112	Surgical and Medical Instrument Mfg.	1,215	47.4%	13,397	55.6%	137,132	39.8%
339113	Surgical Appliance and Supplies Mfg.	964	37.6%	6,685	27.7%	104,310	30.3%
339114	Dental Equipment and Supplies Mfg.	22	0.9%	717	3.0%	16,391	4.8%
339115	Ophthalmic Goods Mfg.	29	1.1%	1,273	5.3%	23,802	6.9%
339116	Dental Laboratories	171	6.7%	1,281	5.3%	49,766	14.4%
	Total	**2,565**	**22.7%**	**24,106**	**11.7%**	**344,791**	**14.8%**

Source: Lightcast

Job Growth

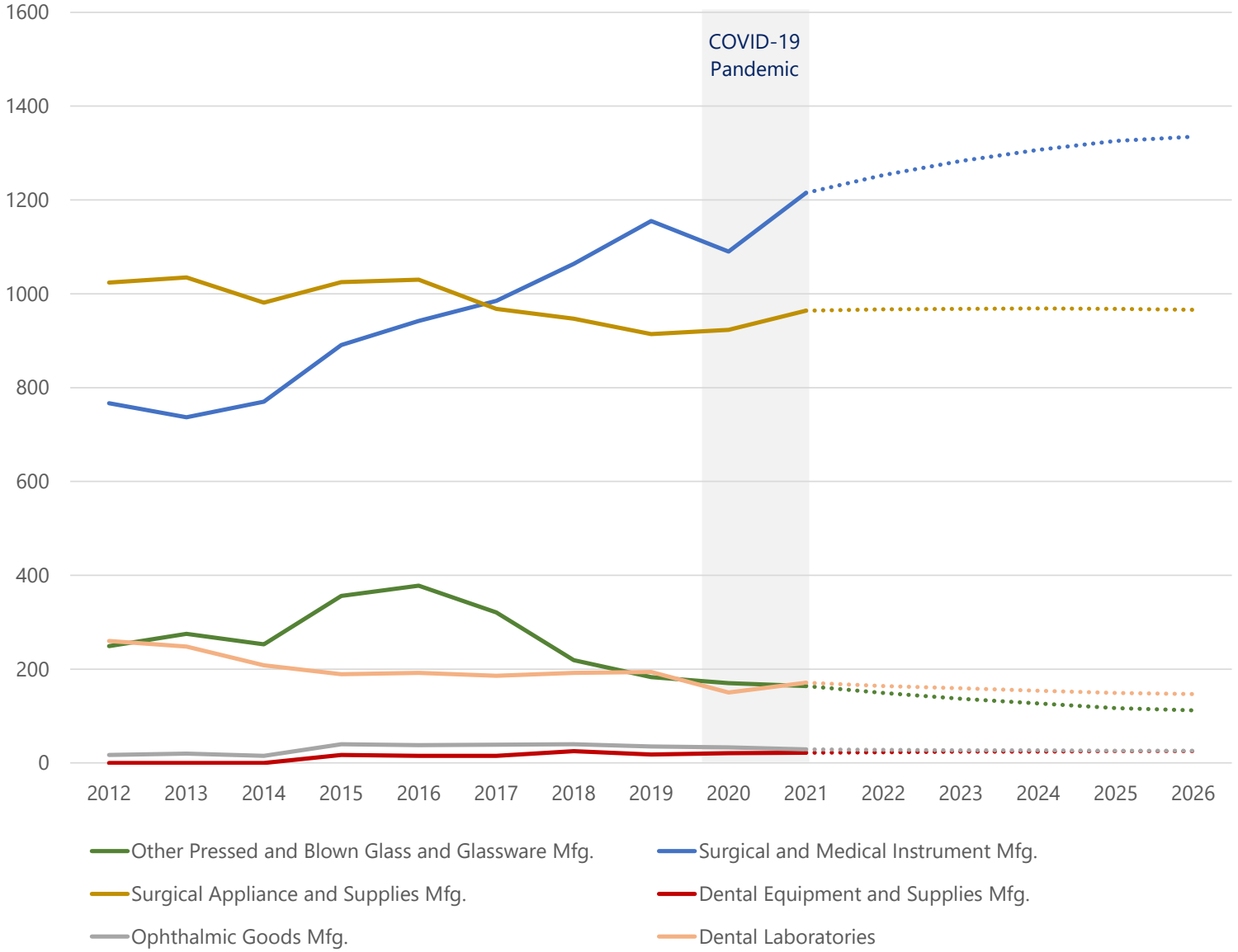
- The **Medical Equipment and Supplies** industry group experienced small levels up's and down's in terms of annual employment between 2012 and 2021, but is projected to grow through 2026.
- *The Surgical and Medical Instrument Manufacturing*, the largest subsector was stymied by COVID-19 in 2020 but recovered in 2021. This caps a nearly decade long run of growth with the addition of 448 jobs since 2012 and expected 10% additional growth through 2026. The national growth expectation is more modest at 6% and New England's outlook is negative (-6%).
- The next largest subsector is *Surgical Appliance and Supplies Manufacturing* which lost 60 jobs since 2012 and has a static growth forecast, in spite of growth and forecasted growth for New England and at the national level.
- *Dental Equipment and Supplies Manufacturing* is growing in New England and is expected to have a medium sized national growth rate through 2026, but it has a minute presence in New Hampshire with almost no job growth since its inception in 2015.

Medical Equipment and Supplies Manufacturing Jobs By Industry By Year, New Hampshire

										Covid		Forecast				
NAICS	Description	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
327212	Other Pressed and Blown Glass and Glassware Mfg.	249	275	253	356	378	321	219	183	170	164	149	137	127	117	112
339112	Surgical and Medical Instrument Mfg.	767	737	770	891	942	985	1,064	1,155	1,090	1,215	1,253	1,283	1,307	1,326	1,335
339113	Surgical Appliance and Supplies Mfg.	1,024	1,035	981	1,025	1,030	968	947	914	923	964	967	968	969	968	966
339114	Dental Equipment and Supplies Mfg.	0	0	0	17	15	15	25	18	21	22	23	24	24	25	25
339115	Ophthalmic Goods Mfg.	17	20	15	40	38	39	40	35	33	29	28	27	27	26	26
339116	Dental Laboratories	260	248	208	189	192	186	192	194	150	171	164	159	154	149	147
	Total	**2,317**	**2,315**	**2,227**	**2,518**	**2,595**	**2,514**	**2,487**	**2,499**	**2,387**	**2,565**	**2,584**	**2,598**	**2,608**	**2,611**	**2,611**

Source: Lightcast

Medical Equipment and Supplies Manufacturing Jobs By Industry, New Hampshire (Lightcast Projection 2022 - 2026)



Source: Lightcast

Concentration

- Overall, the **Medical Equipment and Supplies Manufacturing** industry group in more concentrated in employment in New Hampshire relative to the US as a whole and New England.
- There are three industries that stand out in **Medical Equipment and Supplies Manufacturing**: *Other Pressed and Blown Glass and Glassware Manufacturing* and *Surgical Appliance and Supplies Manufacturing* which exceed the concentration of both New England and the US and lastly, *Surgical and Medical Instrument Manufacturing* which is greater than the US by almost double, but slightly below the New England quotient.

Medical Equipment and Supplies Manufacturing Location Quotient By Industry, 2021, New Hampshire and New England

NAICS	Description	NH	NE
		Location Quotient	
327212	Other Pressed and Blown Glass and Glassware Mfg.	2.72	1.15
339112	Surgical and Medical Instrument Mfg.	1.97	1.99
339113	Surgical Appliance and Supplies Mfg.	2.05	1.31
339114	Dental Equipment and Supplies Mfg.	0.29	0.89
339115	Ophthalmic Goods Mfg.	0.27	1.09
339116	Dental Laboratories	0.76	0.52
	Total	**1.65**	**1.42**

Source: Lightcast

Competitiveness

- **Medical Equipment and Supplies Manufacturing** has experienced less competitive employment growth (relative to the nation) between 2016 and 2021.
- Within the industry group, *Surgical and Medical Instrument Manufacturing* has a competitive effect of 150 jobs for the five-year period which outpaces the national expectation by approximately double. The national trend within the industry shows growth, but this is significantly underperformed New England by losing jobs in this subsector during the period.
- None of the other **Medical Equipment and Supplies Manufacturing** industries significantly overachieve and *Other Pressed and Blown Glass and Glassware Manufacturing* and *Surgical Appliance and Supplies Manufacturing* have seen job loss and negative competitive effect since 2016.

Medical Equipment and Supplies Manufacturing Shift Share Analysis, 2016 - 2021, New Hampshire

NAICS	Description	Ind. Mix Effect	+	Nat'l Growth Effect	=	Expected Job Change	Actual Job Change	-	Expected Job Change	=	Competitive Effect
327212	Other Pressed and Blown Glass and Glassware Mfg.	-69		7		-62	-214		-62		-152
339112	Surgical and Medical Instrument Mfg.	107		17		124	273		124		150
339113	Surgical Appliance and Supplies Mfg.	12		18		30	-66		30		-97
339114	Dental Equipment and Supplies Mfg.	0		0		0	7		0		7
339115	Ophthalmic Goods Mfg.	-5		1		-4	-9		-4		-5
339116	Dental Laboratories	-6		3		-3	-21		-3		-18
	Total	**39**		**46**		**85**	**-30**		**85**		**-115**

Source: Lightcast

Average Earnings

- **Medical Equipment and Supplies Manufacturing** has relatively high average earnings. In 2021 in New Hampshire average annual earnings per employee in the industry group was $149,449. This is higher than the levels in New England and the US.
- Within this industry group *Surgical and Medical Instrument Manufacturing* has the highest average earnings per jobs at $205,119 and is considerably higher than both New England and the US. *Other Pressed and Blown Glass and Glassware Manufacturing* also has considerably higher average annual wages in New Hampshire compared to New England and the US.

Medical Equipment and Supplies Manufacturing Average Earnings Per Job By Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH	NE	US
		Earnings Per Job		
327212	Other Pressed and Blown Glass and Glassware Mfg.	$ 106,111	$ 78,346	$ 79,340
339112	Surgical and Medical Instrument Mfg.	$ 205,119	$ 144,658	$ 128,970
339113	Surgical Appliance and Supplies Mfg.	$ 102,127	$ 108,679	$ 113,671
339114	Dental Equipment and Supplies Mfg.	$ 117,225	$ 106,203	$ 99,600
339115	Ophthalmic Goods Mfg.	$ 75,114	$ 89,448	$ 101,880
339116	Dental Laboratories	$ 78,990	$ 80,540	$ 68,932
	Total	**$ 149,449**	**$ 125,142**	**$ 110,482**

Source: Lightcast

Establishments

- In 2021 there were 75 business establishments in **Medical Equipment and Supplies Manufacturing** industries in New Hampshire
- *Surgical and Medical Instrument Manufacturing* represents the largest number of establishments within the industry group, with 75 establishments representing 37% of all establishment s within the industry group. This is followed by *Surgical Appliance and Supplies Manufacturing* with 16 establishments representing 21 %. Together they account for more than 50% of establishments within the industry group.

Medical Equipment and Supplies Manufacturing Establishments and % Establishments By 6 digit NAICS and Region, 2021

NAICS	Description	NH Payrolled Business Locations	NH Payrolled Business Locations % of Total	NE Payrolled Business Locations % of Total	US Payrolled Business Locations % of Total
327212	Other Pressed and Blown Glass and Glassware Manufacturing	6	8%	7%	3%
339112	Surgical and Medical Instrument Manufacturing	28	37%	27%	22%
339113	Surgical Appliance and Supplies Manufacturing	16	21%	27%	25%
339114	Dental Equipment and Supplies Manufacturing	5	7%	5%	5%
339115	Ophthalmic Goods Manufacturing	3	4%	4%	5%
339116	Dental Laboratories	17	23%	31%	40%
	Total	75	100%	100%	100%

Source: Lightcast

Gross Regional Product

- In 2021 the **Medical Equipment and Supplies Manufacturing** industry group generated $758.6 million towards New Hampshire's Gross Regional Product.
- *Surgical and Medical Instrument Manufacturing* represented 62% of GRP within this industry group with a contribution of $468.4 million. This was followed by *Surgical Appliance and Supplies Manufacturing* with GRP valued at $229.5 million or 30% of the industry groups GRP. Together these two industries represented more than 90% of GRP in the industry group. This concentration is similar to New England and considerably higher than the US.

Medical Equipment and Supplies Manufacturing GRP and % GRP By 6 digit NAICS and Region, 2021 (in $M)

NAICS	Description		NH GRP	NH GRP % of Total	NE GRP % of Total	US GRP % of Total
327212	Other Pressed and Blown Glass and Glassware Manufacturing	$	37.0	5%	2%	3%
339112	Surgical and Medical Instrument Manufacturing	$	468.4	62%	61%	44%
339113	Surgical Appliance and Supplies Manufacturing	$	229.5	30%	28%	37%
339114	Dental Equipment and Supplies Manufacturing	$	4.5	1%	2%	4%
339115	Ophthalmic Goods Manufacturing	$	4.9	1%	4%	7%
339116	Dental Laboratories	$	14.2	2%	2%	5%
	Total	$	758.6	100%	100%	100%

Source: Lightcast

Productivity

- Productivity for **Medical Equipment and Supplies Manufacturing**, (GRP/Job), in New Hampshire is lower compared to New England and the US. The exact difference in productively depends on the specific businesses within the industry however it can be a sign of companies that require highly specialized labor relative to the level of capital investment.
- Within the industry group, productivity for *Surgical and Medical Instrument Manufacturing* is the highest in New Hampshire followed by *Surgical Appliance and Supplies Manufacturing*.
- *Surgical and Medical Instrument Manufacturing*, *Other Pressed and Blown Glass and Glassware Manufacturing*, and *Dental Equipment and Supplies Manufacturing* all have productivity levels that exceed New England and the US.

Medical Equipment and Supplies Manufacturing Productivity by Industry, 2021, New

NAICS	Description	NH	NE	US
		Productivity (GRP / Job)		
327212	Other Pressed and Blown Glass and Glassware Mfg.	$225,900	$176,584	$182,574
339112	Surgical and Medical Instrument Mfg.	$385,480	$285,289	$253,062
339113	Surgical Appliance and Supplies Mfg.	$238,080	$265,080	$277,699
339114	Dental Equipment and Supplies Mfg.	$206,340	$197,920	$186,359
339115	Ophthalmic Goods Mfg.	$168,638	$209,859	$245,492
339116	Dental Laboratories	$83,237	$86,486	$73,364
	Total	**$178,026**	**$356,945**	**$350,015**

Source: Lightcast

Sales

- In 2021 the **Medical Equipment and Supplies Manufacturing** group generated $1.2 billion in total sales in New Hampshire, of which 88% were made to out of state entities through a mix of domestic and foreign trade. All of the individual industries within the group generate a high proportion of export sales
- *Surgical and Medical Instrument Manufacturing* generates the highest level of sales in the industry group with $715.4 million sales, of which 91% are exported sales. This is followed by *Surgical Appliance and Supplies Manufacturing* with $361 million in sales, and 87% which are exported sales.

Medical Equipment and Supplies Manufacturing Sales by Industry (in $M), 2021, New Hampshire

NAICS	Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
327212	Other Pressed and Blown Glass and Glassware	$21.0	29%	$50.4	71%	$71.4
339112	Surgical and Medical Instrument Mfg.	$61.8	9%	$653.5	91%	$715.4
339113	Surgical Appliance and Supplies Mfg.	$47.4	13%	$313.6	87%	$361.0
339114	Dental Equipment and Supplies Mfg.	$2.2	26%	$6.3	74%	$8.5
339115	Ophthalmic Goods Mfg.	$2.3	32%	$5.0	68%	$7.4
339116	Dental Laboratories	$8.9	33%	$17.8	67%	$26.8
	Total	**$143.7**	**12%**	**$1,046.7**	**88%**	**$1,190.4**

Source: Lightcast

Supply Chain Demand and Leakage

The **Medical Equipment and Supplies Manufacturing** industry group in New Hampshire had total purchases (demand) $511.4 million in 2021. Of this amount 72% was purchased from out of state sellers. All of the individual sectors except *Other Pressed and Blown Glass and Glassware* (with 27%) have more than 60% of purchases met out of state.

This creates opportunity to connect in-state sellers, to in state buyers for greater industry impact in New Hampshire. As an example, if New Hampshire was able to recapture 10% of imported purchases in the Medical Equipment and Supplies Manufacturing industry, it would amount to an estimated $37.1 million more in sales and have the potential for about 6 new firms and 102 new jobs.

Medical Equipment and Supplies Manufacturing Demand by Industry (in $M), 2021, New Hampshire

NAICS	Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
327212	Other Pressed and Blown Glass and Glassware	$20.0	73%	$7.4	27%	$27.4
339112	Surgical and Medical Instrument Mfg.	$60.7	33%	$124.7	67%	$185.4
339113	Surgical Appliance and Supplies Mfg.	$46.9	23%	$153.4	77%	$200.2
339114	Dental Equipment and Supplies Mfg.	$2.1	11%	$18.1	89%	$20.2
339115	Ophthalmic Goods Mfg.	$2.3	6%	$39.7	94%	$42.0
339116	Dental Laboratories	$8.7	24%	$27.5	76%	$36.2
	Total	**$140.7**	**28%**	**$370.7**	**72%**	**$511.4**

Source: Lightcast

Medical Equipment and Supplies Manufacturing Leakage (Proposed Rate of Recapture = 10%), 2021, New Hampshire

NAICS	Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
327212	Other Pressed and Blown Glass and Glassware	$7.4	$0.7	$11.9	0.1	2
339112	Surgical and Medical Instrument Mfg.	$124.7	$12.5	$25.5	0.5	21
339113	Surgical Appliance and Supplies Mfg.	$153.4	$15.3	$22.6	0.7	41
339114	Dental Equipment and Supplies Mfg.	$18.1	$1.8	$1.7	1.1	5
339115	Ophthalmic Goods Mfg.	$39.7	$4.0	$2.5	1.6	16
339116	Dental Laboratories	$27.5	$2.8	$1.6	1.7	18
	Total	**$370.7**	**$37.1**	**$65.7**	**5.7**	**102**

Source: Lightcast

Multipliers

All of the **Medical Equipment and Supplies Manufacturing** industries in New Hampshire have positive economic multipliers, meaning they generate more to the economy beyond their direct contribution. For example, *Surgical and Medical Instrument Manufacturing* generates

- 186 additional jobs for every 100 direct
- 64additional $ in sales for every 100 dollars generated in direct sales
- 64additional $ in earnings for every 100 dollars in direct earnings

Medical Equipment and Supplies Manufacturing Multipliers, 2021, New Hampshire

NAICS	Description	Multiplier Jobs	Multiplier Sales	Multiplier Earnings
327212	Other Pressed and Blown Glass and Glassware Mfg.	2.36	1.70	1.97
339112	Surgical and Medical Instrument Mfg.	2.86	1.64	1.64
339113	Surgical Appliance and Supplies Mfg.	2.15	1.66	1.83
339114	Dental Equipment and Supplies Mfg.	2.12	1.58	1.69
339115	Ophthalmic Goods Mfg.	1.80	1.67	1.77
339116	Dental Laboratories	1.59	1.66	1.53

Source: Lightcast

Pharmaceutical and Medicine Manufacturing
Industry Group

Industries

- *Medicinal and Botanical Manufacturing*
- *Pharmaceutical Preparation Manufacturing*
- *In-Vitro Diagnostic Substance Manufacturing*

Description of Activity

This group comprises establishments primarily engaged in manufacturing (1) uncompounded medicinal chemicals (generally for use by pharmaceutical preparation manufacturers), (2) uncompounded botanicals, (3) in-vitro diagnostic substances and pharmaceuticals intended for internal and external consumption in dose forms, (4) in-vitro (i.e., not taken internally) diagnostic substances, such as chemical, biological, or radioactive substances, and (5) substances are used for diagnostic tests that are performed in test tubes, petri dishes, machines, and other diagnostic test-type devices. vaccines, toxoids, blood fractions, and culture media of plant or animal origin.

Key Takeaways

- Although the second smallest part of the Life Sciences cluster in terms of employment, the **Pharmaceutical and Medicine Manufacturing** industry group has seen substantial growth since 2012 and growth is nationally competitive.
- It has a similar industry concentration compared with New England and higher than the US.
- This group exhibits high-value activity compared to others in Life Sciences with the largest ratio of GRP to worker (productivity).
- **Pharmaceutical and Medicine Manufacturing** has high levels of export sales
- The small level of establishments creates industry risk in New Hampshire so strategies to support and attract will be needed.

Opportunities to Examine

Highest Opportunities Based on New Hampshire Data Performance:

- *Biological Product (except Diagnostic) Manufacturing*
  - Largest sector in Industry group
  - Historic and projected growth
  - High employment concentration above New England and higher than US
  - High exported sales

Additional Opportunities Based on New Hampshire Data Performance:

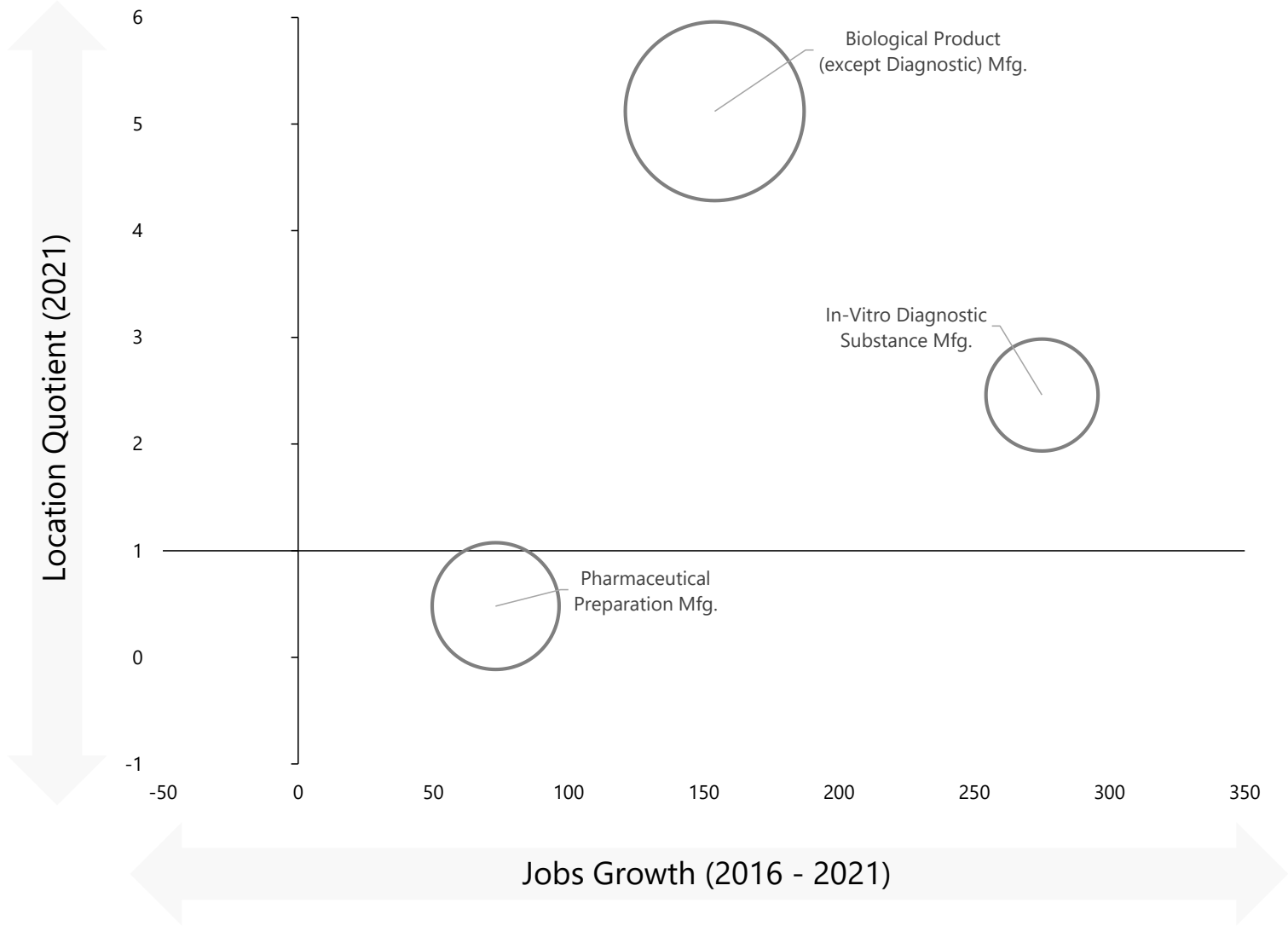
- *Pharmaceutical Preparation Manufacturing*
  - Second largest sector in industry group
  - Slow historic and projected growth (however growing)
  - Opportunity to reduce imports made by industry

- *In-Vitro Diagnostic Substance Manufacturing*
  - Historic and projected growth since 2016
  - High employment concentration above New England and higher than US
  - High exported sales
  - Very few establishments and therefore must be nurtured and diversified

Lowest Opportunities Based on New Hampshire Data Performance:

- *Medicinal and Botanical Manufacturing*
  - Little to no presence in New Hampshire

Pharmaceutical and Medicine Manufacturing Industries By Key Metrics (bubble size indicates 2021 jobs), New Hampshire



Data Source: Lightcast

Industry Group Overview for: Pharmaceutical and Medicine Manufacturing

Jobs: 1,802

- Data for 2021
- 16.0% of state's Life Science Jobs
- 0.2% of State's jobs (all sectors)

Job Growth: 738

- Data compares 2012 - 2021
- 1.9% of the State's change in jobs during this period

Growth Rate: 69.4%

- Data compares 2012 - 2021
- Growth greater than both New England (-0.9%), and the U.S. (23.3%)

Concentration: 1.19

- Data for 2021
- Jobs are more concentrated in this industry group than would be expected for an area of this size
- More concentrated compared to New England (1.19)

Competitive Effect: 197

- Data compares 2016 - 2021
- Local competitive factors contribute to more jobs than expected than if New Hampshire was only trending with national and industry growth

Average Earnings: $130,676

- Data for 2021
- Lower than both New England ($191,966), and the nation ($155,634)
- Higher than the State's average earnings across all industries ($82,113)

Establishments: 18

- Data for 2021
- 2.9% of state's Life Science Establishments
- 225 jobs per establishment. which is higher than that of New England (124), and the nation (112)

Gross Regional Product: $867 M

- Data for 2021
- 0.9% of state economy's total GRP
- 31.0% of state's GRP in the Life Science cluster

Productivity: $481,356

- Data for 2021
- GRP per worker
- Lower compared to New England ($571,016), and the nation ($485,699)

Total Sales: $1,176 M

- Data for 2021
- 17.5% of this industry group's sales occur within NH
- 82.5% of sales exported out of state

Demand: $1,014 M

- Data for 2021
- 80.2% of NH demand is met out of state, which is high compared to New England (43.0%).

Leakage: $813 M

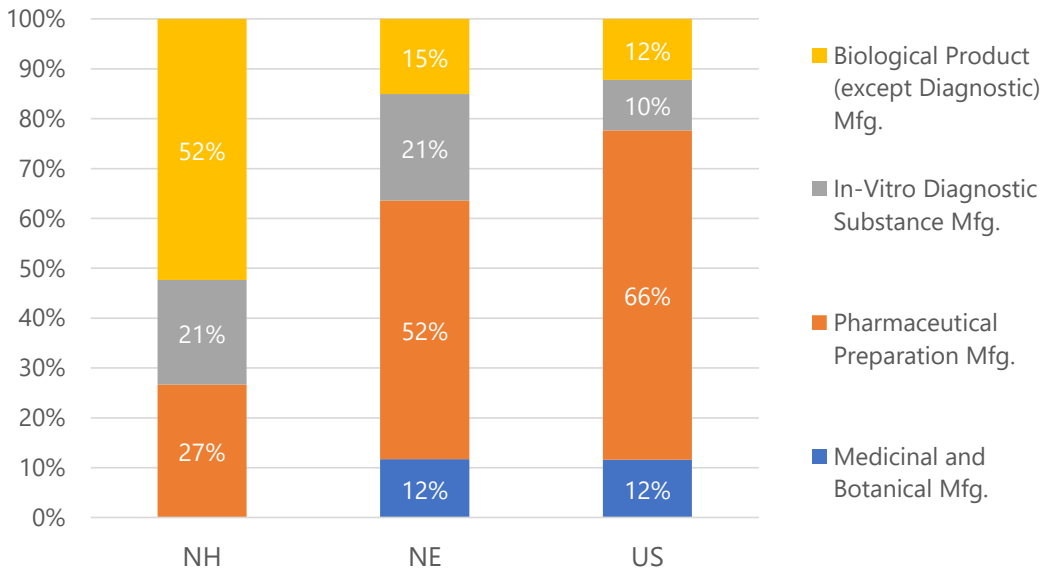
- Data for 2021
- Estimated $81 M could be recaptured by New Hampshire firms

Source: Lightcast

Employment and Industry Group Mix

- **Pharmaceutical and Medicine Manufacturing** is the second smallest of the industry groups by employment with 1,802 jobs in 2021. It represents 16% of employment in Life Sciences in New Hampshire. Though second smallest of the five industry groups it is still more than three times the size of **Medical and Diagnostic Laboratories**.
- *Biological Product (except Diagnostic) Manufacturing* makes up more than half of the jobs in the industry group (943 jobs or 52%) and contributes a larger share to the Life Sciences cluster than similar industries in New England and the US (8.4% vs 1.4% for New England and 1.8% for the US).

Pharmaceutical and Medicine Manufacturing Jobs as Percent of Industry Group, 2021



Source: Lightcast

Pharmaceutical and Medicine Manufacturing Jobs and Jobs as % of Industry Group, 2021, New Hampshire compared to New England, U.S.

		New Hampshire		New England		United States	
NAICS	Description	Jobs	% of Total	Jobs	% of Total	Jobs	% of Total
325411	Medicinal and Botanical Mfg.	0	0.0%	2,289	11.7%	38,884	11.6%
325412	Pharmaceutical Preparation Mfg.	481	26.7%	10,129	51.9%	221,602	66.1%
325413	In-Vitro Diagnostic Substance Mfg.	378	21.0%	4,178	21.4%	34,063	10.2%
325414	Biological Product (except Diagnostic) Mfg.	943	52.3%	2,936	15.0%	40,916	12.2%
	Total	**1,802**	**100.0%**	**19,532**	**100.0%**	**335,465**	**100.0%**

Source: Lightcast

Job Growth

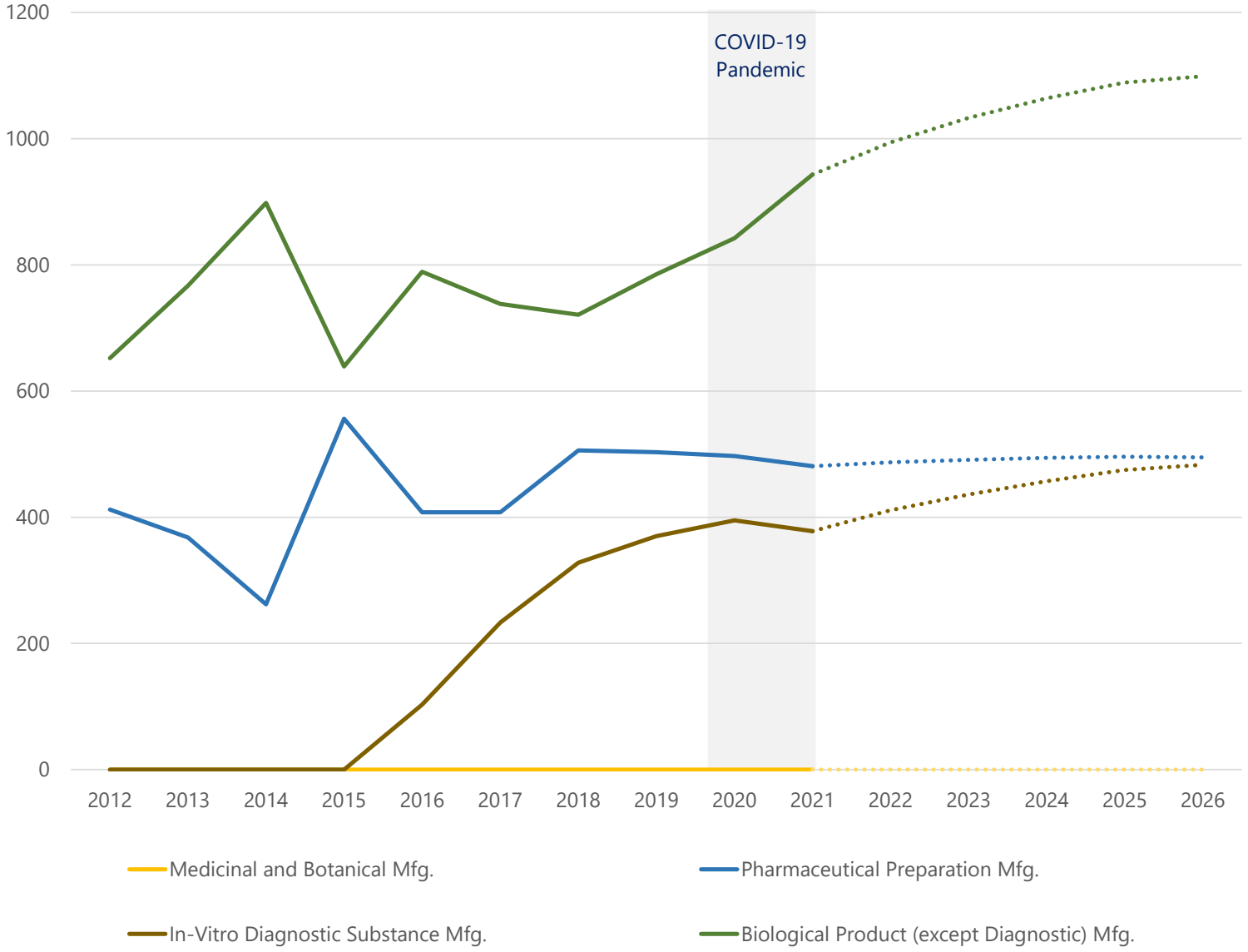
- The **Pharmaceutical and Medicine Manufacturing** industry group experienced has experienced continued growth from 2012-2021 and is projected to continue growing through 2026.
- *In-Vitro Diagnostic Substance Manufacturing* has grown continuously since the subsector started in New Hampshire in 2016. It's projected to nearly catch up to Pharmaceutical Preparation Manufacturing by 2026.
- *Biological Product (except Diagnostic) Manufacturing* went through ups and downs, but strong growth in 2019 and through the pandemic period has it secure as the largest subsector in the industry group and also with the most aggressive growth forecast.
- Both *Biological Product (except Diagnostic) Manufacturing* (+51%) and *In-Vitro Diagnostic Substance Manufacturing* (+76%) are supported by strong national growth trends during the period 2012-2021.
- *Medicinal and Botanical Manufacturing* has the highest national growth rate of any subsector in the Life Sciences cluster, but lacks the regulatory environment to operate in New Hampshire.

Pharmaceutical and Medicine Manufacturing Jobs By Industry By Year, New Hampshire

										Covid		Forecast				
NAICS	Description	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
325411	Medicinal and Botanical Mfg.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
325412	Pharmaceutical Preparation Mfg.	412	368	262	556	408	408	506	503	497	481	487	491	494	496	495
325413	In-Vitro Diagnostic Substance Mfg.	0	0	0	0	103	233	328	370	395	378	411	436	457	475	483
325414	Biological Product (except Diagnostic) Mfg.	652	767	898	639	789	738	721	785	842	943	994	1,033	1,064	1,089	1,099
	Total	**1,064**	**1,135**	**1,160**	**1,195**	**1,300**	**1,379**	**1,555**	**1,658**	**1,734**	**1,802**	**1,892**	**1,960**	**2,015**	**2,060**	**2,077**

Source: Lightcast

Pharmaceutical and Medicine Manufacturing Jobs By Industry, New Hampshire (Lightcast Projection 2022 - 2026)



Source: Lightcast

Concentration

- **Pharmaceutical and Medicine Manufacturing** employment is slightly more concentrated in New Hampshire compared to the US as a whole and equal to the concentration in New England.
- *Biological Product (except Diagnostic) Manufacturing* is more concentrated than the US by a factor of five and triple New England's industry concentration.
- *The In-Vitro Diagnostic Substance Manufacturing* subsector has a high location quotient compared to the national average, but still lags slightly behind New England's.

Pharmaceutical and Medicine Manufacturing Location Quotient By Industry, 2021, New Hampshire and New England

NAICS	Description	NH	NE
		Location Quotient	
325411	Medicinal and Botanical Mfg.	0.00	1.20
325412	Pharmaceutical Preparation Mfg.	0.48	0.93
325413	In-Vitro Diagnostic Substance Mfg.	2.46	2.50
325414	Biological Product (except Diagnostic) Mfg.	5.12	1.46
	Total	**1.19**	**1.19**

Source: Lightcast

Competitiveness

- Based on 2016-2021 employment data, **Pharmaceutical Manufacturing** in New Hampshire experienced competitive jobs growth with 197 jobs attributable to competitive growth.
- The competitive effect for *In-Vitro Diagnostic Substance Manufacturing* of 239 jobs comprises a significant portion of the total job change in the subsector in the last five years and signals a strong local advantage.
- This effect is present for *Pharmaceutical Preparation Manufacturing* as well where New Hampshire saw nearly double the expected jobs change during the period.

Pharmaceutical and Medicine Manufacturing Shift Share Analysis, By 6 digit NAICS and Region, 2016 - 2021

NAICS	Description	Ind. Mix Effect	+	Nat'l Growth Effect	=	Expected Job Change	Actual Job Change	-	Expected Job Change	=	Competitive Effect
325411	Medicinal and Botanical Manufacturing	0		0		0	0		0		0
325412	Pharmaceutical Preparation Manufacturing	30		7		37	73		37		35
325413	In-Vitro Diagnostic Substance Manufacturing	33		2		35	275		35		239
325414	Biological Product (except Diagnostic) Manufacturing	217		14		231	154		231		-77
	Total	280		23		303	502		303		197

Source: Lightcast

Average Earnings

- **Pharmaceutical and Medicine Manufacturing** industry group has relatively high earnings in New Hampshire per job compared to all industries, though on par with other Life Sciences industries. In 2021, average annual earnings per job in New Hampshire in this industry group were $130,676. This was lower than both New England and the US.
- Earnings per job for *Biological Product (except Diagnostic) Manufacturing* are the highest within the **Pharmaceutical and Medicine Manufacturing** industry group in New Hampshire with $146,354. However, this compensation lags the New England and US earnings figures.

Pharmaceutical and Medicine Manufacturing Average Earnings Per Job By Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH	NE	US
		Earnings Per Job		
325411	Medicinal and Botanical Mfg.	$ -	$ 241,292	$ 145,042
325412	Pharmaceutical Preparation Mfg.	$ 102,603	$ 201,665	$ 173,410
325413	In-Vitro Diagnostic Substance Mfg.	$ 127,286	$ 125,447	$ 153,588
325414	Biological Product (except Diagnostic) Mfg.	$ 146,354	$ 199,460	$ 150,494
Total		**$ 130,676**	**$ 189,674**	**$ 165,314**

Source: Lightcast

Establishments

- In 2021 there were 18 business establishments in **Pharmaceutical and Medicine Manufacturing** industries in New Hampshire.
- *Pharmaceutical Preparation Manufacturing* represents the largest number of establishments within the industry group, with 14 establishments representing 78% of all establishments within the industry group. This is followed by *Biological Product Manufacturing* with 3 establishments representing 17 %. Together they account for more than 94% of establishments within the industry group.
- Compared to New England and the US establishment mix, New Hampshire is more highly concentrated in *Pharmaceutical Preparation Manufacturing*.

Pharmaceutical and Medicine Manufacturing Establishments and % Establishments By 6 digit NAICS and Region, 2021

NAICS	Description	NH Payrolled Business Locations	NH Payrolled Business Locations % of Total	NE Payrolled Business Locations % of Total	US Payrolled Business Locations % of Total
325411	Medicinal and Botanical Manufacturing	0	0%	22%	20%
325412	Pharmaceutical Preparation Manufacturing	14	78%	53%	64%
325413	In-Vitro Diagnostic Substance Manufacturing	1	6%	13%	7%
325414	Biological Product (except Diagnostic) Manufacturing	3	17%	12%	9%
	Total	18	100%	100%	100%

Source: Lightcast

Gross Regional Product

- In 2021 the **Pharmaceutical and Medicine Manufacturing** industry group generated $867.4 million towards New Hampshire's Gross Regional Product.
- *Biological Product Manufacturing* represented 70% of GRP within this industry group with a contribution of $611.2.4 million. The remaining 30% of GRP contrition was split between *Pharmaceutical Preparation Manufacturing*, and *In-Vitro Diagnostic Substance Manufacturing*.
- Compared to New England and the US with regards to GRP contribution, New Hampshire is more concentrated in *Biological Product Manufacturing*.

Pharmaceutical and Medicine Manufacturing GRP and % GRP By 6 digit NAICS and Region, 2021 (in $M)

NAICS	Description	NH GRP	NH GRP % of Total	NE GRP % of Total	US GRP % of Total
325411	Medicinal and Botanical Manufacturing	$ -	0%	13%	9%
325412	Pharmaceutical Preparation Manufacturing	$ 127.5	15%	49%	64%
325413	In-Vitro Diagnostic Substance Manufacturing	$ 128.6	15%	13%	9%
325414	Biological Product (except Diagnostic) Manufacturing	$ 611.2	70%	25%	19%
	Total	$ 867.4	100%	100%	100%

Source: Lightcast

Productivity

- Productivity for **Pharmaceutical and Medicine Manufacturing**, (GRP/Job), in New Hampshire is lower compared to New England and the US. The exact difference in productively depends on the specific businesses within the industry however it can be a sign of companies that require highly specialized labor relative to the level of capital investment.
- Within the industry group, productivity for *Biological Product Manufacturing* is the highest in New Hampshire followed by *In-Vitro Diagnostic Manufacturing.*

Pharmaceutical and Medicine Manufacturing Productivity by Industry, 2021, New

NAICS	Description	NH	NE	US
		Productivity (GRP / Job)		
325411	Medicinal and Botanical Mfg.	.	$633,886	$361,012
325412	Pharmaceutical Preparation Mfg.	$265,161	$540,823	$467,390
325413	In-Vitro Diagnostic Substance Mfg.	$340,265	$350,503	$437,877
325414	Biological Product (except Diagnostic) Mfg.	$648,187	$939,961	$743,173
	Total	**$481,356**	**$571,016**	**$485,699**

Source: Lightcast

Sales

- In 2021 the **Pharmaceutical and Medicine Manufacturing** group generated $1.2 billion in total sales in New Hampshire, of which 83% were made to out of state entities through a mix of domestic and foreign trade. All of the individual industries within the group generate a high proportion of export sales.
- *Biological Product Manufacturing* generates the highest level of sales in the industry group with $804.2 million sales, of which 88% are exported sales. *In-Vitro Diagnostic Substance Manufacturing* is the second largest with $192.2 in sales of which 84% is exported sales. *Pharmaceutical Preparation manufacturing* with $179.2 million in sales is the third largest in the industry group but has a much lower % of sales exported at 67%.

Pharmaceutical and Medicine Manufacturing Sales by Industry (in $M), 2021, New Hampshire

NAICS	Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
325411	Medicinal and Botanical Mfg.	$0.0	.	$0.0	.	$0.0
325412	Pharmaceutical Preparation Mfg.	$76.9	43%	$102.3	57%	$179.2
325413	In-Vitro Diagnostic Substance Mfg.	$31.7	16%	$160.5	84%	$192.2
325414	Biological Product (except Diagnostic) Mfg.	$97.0	12%	$707.2	88%	$804.2
	Total	**$205.6**	**17%**	**$970.0**	**83%**	**$1,175.6**

Source: Lightcast

Demand

- The **Pharmaceutical and Medicine Manufacturing** industry group in New Hampshire had total purchases (demand) of just over $1 billion in New Hampshire in 2021. Of this amount 80% was purchased from out of state sellers.
- The **Pharmaceutical and Medicine Manufacturing** group had $813.3 million in demand for goods met by imports from outside the state in 2021. If 10% of this demand could be recaptured by local firms (instead of 'leaking' out of the economy) it would increase those sales in the state by $81.3 million. Given the annual sales of firms at the industry level the **Pharmaceutical and Medicine Manufacturing** group could support an additional 4.8 establishments. Not only would this recapture represent new sales and firm activity in the state, given the average firm size in New Hampshire, but this would also create 183 jobs.
- The *Pharmaceutical Preparation Manufacturing* industry would produce the largest gains from potential recaptured demand with $60.3 M leading to supporting over 4 establishments and 162 jobs.
- The remaining industries in this group don't have enough concentration to have recapture dynamics lead to firm creation.

Pharmaceutical and Medicine Manufacturing Demand by Industry (in $M), 2021, New Hampshire

NAICS	Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
325411	Medicinal and Botanical Mfg.	$0.0	0%	$77.0	100%	$77.0
325412	Pharmaceutical Preparation Mfg.	$76.8	11%	$602.8	89%	$679.6
325413	In-Vitro Diagnostic Substance Mfg.	$29.8	31%	$65.9	69%	$95.7
325414	Biological Product (except Diagnostic) Mfg.	$94.2	58%	$67.7	42%	$161.9
	Total	**$200.9**	**20%**	**$813.3**	**80%**	**$1,014.2**

Source: Lightcast

Pharmaceutical and Medicine Manufacturing Leakage (Proposed Rate of Recapture = 10%), 2021, New Hampshire

NAICS	Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
325411	Medicinal and Botanical Mfg.	$77.0	$7.7			
325412	Pharmaceutical Preparation Mfg.	$602.8	$60.3	$12.8	4.7	162
325413	In-Vitro Diagnostic Substance Mfg.	$65.9	$6.6	$192.2	0.0	13
325414	Biological Product (except Diagnostic) Mfg.	$67.7	$6.8	$268.1	0.0	8
	Total	**$813.3**	**$81.3**	**$473.0**	**4.8**	**183**

Source: Lightcast

Multipliers

All of the **Pharmaceutical and Medicine Manufacturing** industries in New Hampshire have positive economic multipliers, meaning they generate more to the economy beyond their direct contribution. For example, *In-Vitro Diagnostic Substance Manufacturing* generate:

- 162 additional jobs for every 100 direct
- 73 additional $ in sales for every 100 dollars generated in direct sales
- 96 additional $ in earnings for every 100 dollars in direct earnings

Pharmaceutical and Medicine Manufacturing Multipliers, 2021, New Hampshire

NAICS	Description	Multiplier Jobs	Multiplier Sales	Multiplier Earnings
325411	Medicinal and Botanical Mfg.	-	1.00	-
325412	Pharmaceutical Preparation Mfg.	2.06	1.63	1.75
325413	In-Vitro Diagnostic Substance Mfg.	2.62	1.73	1.96
325414	Biological Product (except Diagnostic) Mfg.	3.27	1.68	2.15

Source: Lightcast

Medical and Diagnostic Laboratories

Industry Group

Description of Activity

This industry group comprises establishments known as medical laboratories primarily engaged in providing analytic or diagnostic services, including body fluid analysis, generally to the medical profession or to the patient on referral from a health practitioner and collecting and storing blood and organs.

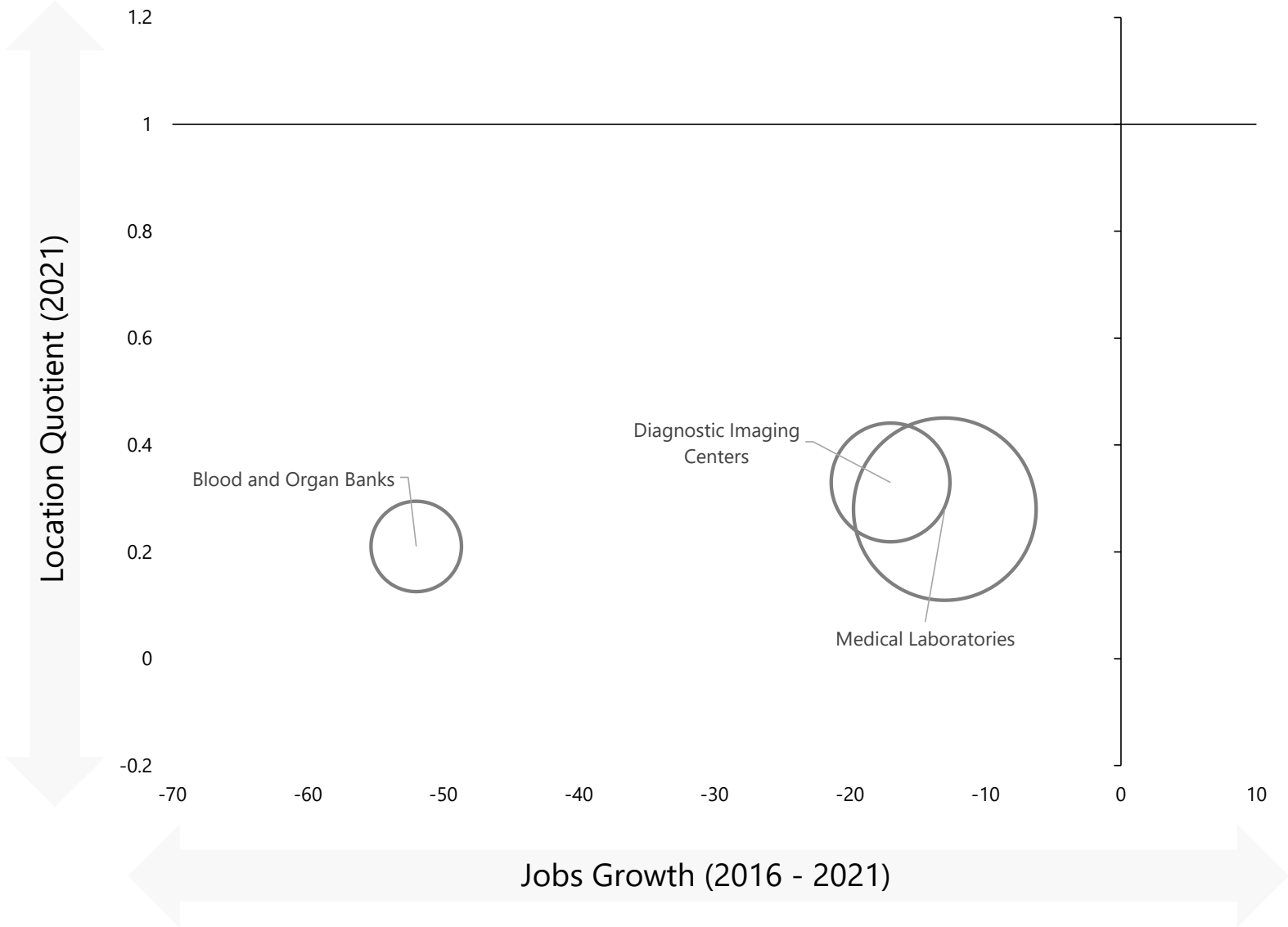
Key Takeaways

- **Medical and Diagnostic Laboratories** is the smallest of the five industry groups that form the Life Sciences cluster in New Hampshire.
- The industry group saw a decline of since 2012, while growth was occurring in New England and the US.
- The typical firm in this industry group is at the low end of small business in jobs per establishment.
- Activity for this group is almost exclusively local to the state with 95.1% of sales occurring in New Hampshire.
- In terms of specific industries within the industry group, based on industry size and performance, this group has low opportunities.

Industries

- *Medical Laboratories*
- *Diagnostic Imaging Centers*
- *Blood and Organ Banks*

Medical and Diagnostic Laboratories Industries By Key Metrics (bubble size indicates 2021 jobs), New Hampshire



Data Source: Lightcast

Industry Group Overview for: Medical and Diagnostic Laboratories

Jobs: 504

- Data for 2021
- 4.5% of state's Life Science Jobs
- 0.1% of State's jobs (all sectors)

Job Growth: -33

- Data compares 2012 - 2021
- -0.1% of the State's change in jobs during this period

Growth Rate: -6.1%

- Data compares 2012 - 2021
- Growth lags both New England (11.2%), and the U.S. (22.4%)

Concentration: 0.28

- Data for 2021
- Jobs are less concentrated in this industry group than would be expected for an area of this size
- Less concentrated compared to New England (0.76)

Competitive Effect: -168

- Data compares 2016 - 2021
- Local competitive factors contribute to fewer jobs than expected than if New Hampshire was only trending with national and industry growth

Average Earnings: $104,622

- Data for 2021
- Greater than both New England ($92,427), and the nation ($84,786)
- Higher than the State's average earnings across all industries ($82,113)

Establishments: 94

- Data for 2021
- 15.4% of state's Life Science Establishments
- 7 jobs per establishment. which is fewer than that of New England (19), and the nation (22)

Gross Regional Product: $70 M

- Data for 2021
- 0.1% of state economy's total GRP
- 2.5% of state's GRP in the Life Science cluster

Productivity: $137,951

- Data for 2021
- GRP per worker
- Higher compared to New England ($120,643), and the nation ($113,643)

Total Sales: $129 M

- Data for 2021
- 95.1% of this industry group's sales occur within NH
- 4.9% of sales exported out of state

Demand: $412 M

- Data for 2021
- 72.0% of NH demand is met out of state, which is high compared to New England (33.3%).

Leakage: $297 M

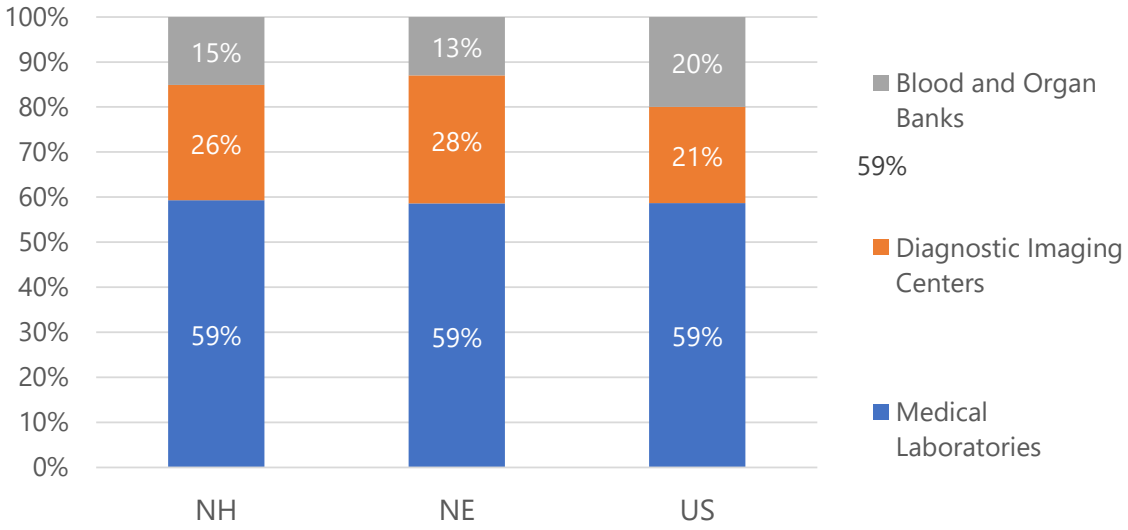
- Data for 2021
- Estimated $30 M could be recaptured by New Hampshire firms

Source: Lightcast

Employment and Industry Group Mix

- The **Medical and Diagnostic Laboratories** is the smallest industry group in the Life Sciences cluster with 504 jobs in 2021 in New Hampshire.
- *Medical Laboratories* make up the largest share of the industry group in New Hampshire with 299 jobs, representing of the industry group. This is followed by *Diagnostic Imaging Centers* with 129 jobs representing 26% of jobs in the industry group.
- The mix of jobs by individual sector within this industry group is similar to that of New England and the US.

Medical and Diagnostic Laboratories Jobs as Percent of Industry Group, 2021



Source: Lightcast

Medical and Diagnostic Laboratories Jobs and Jobs as % of Industry Group, 2021, New Hampshire compared to New England, U.S.

		New Hampshire		New England		United States	
NAICS	Description	Jobs	% of Total	Jobs	% of Total	Jobs	% of Total
621511	Medical Laboratories	299	59.3%	8,782	58.6%	236,871	58.7%
621512	Diagnostic Imaging Centers	129	25.6%	4,257	28.4%	86,059	21.3%
621991	Blood and Organ Banks	76	15.1%	1,947	13.0%	80,713	20.0%
	Total	**504**	**100.0%**	**14,986**	**100.0%**	**403,643**	**100.0%**

Source: Lightcast

Job Growth

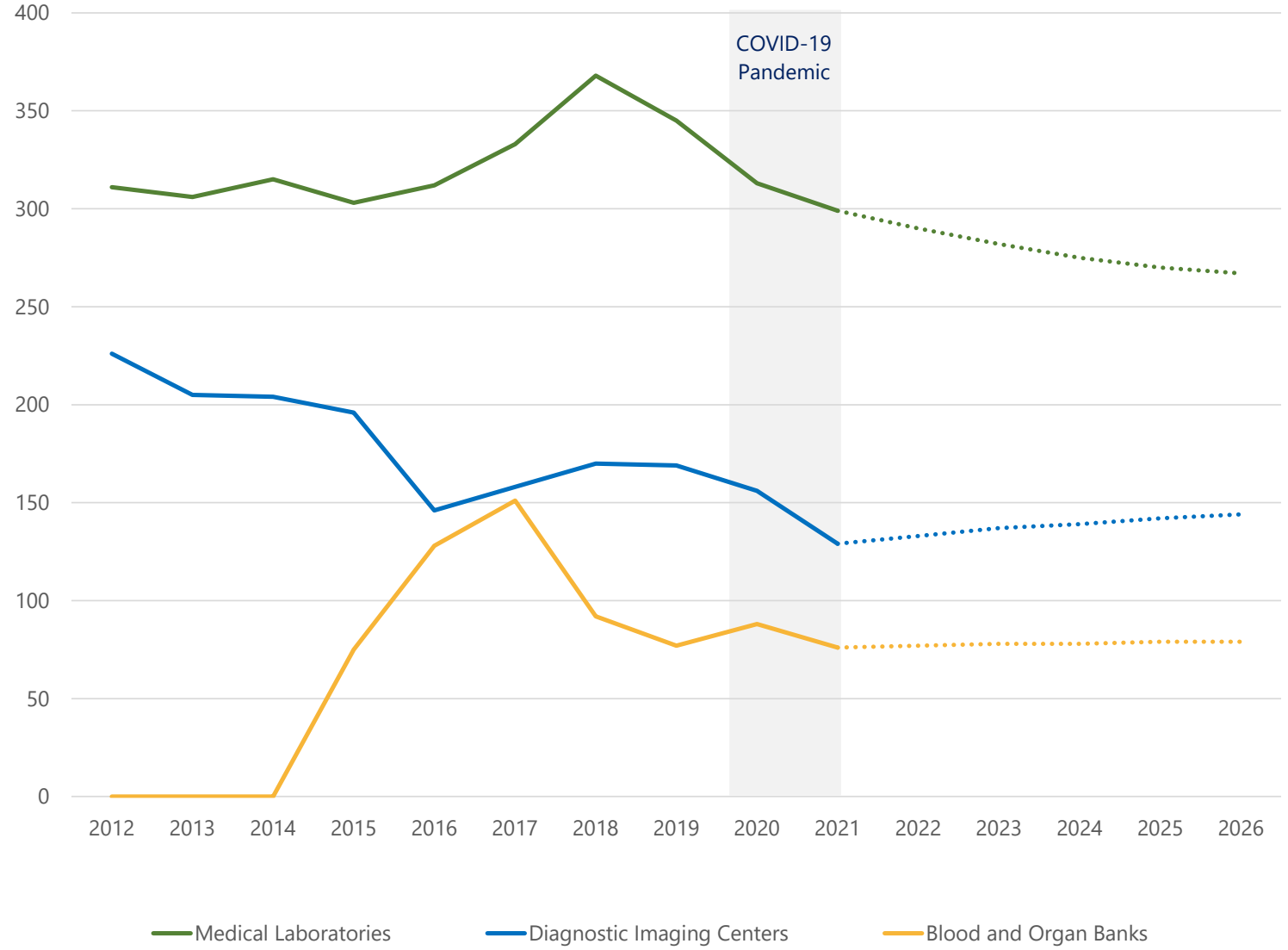
- **The Medical and Diagnostic Laboratories** industry group has the most aggressive national growth forecast of all the groups, but it doesn't yet have a large presence in New Hampshire. This challenge is further complicated by none of the subsectors having significantly increased their job levels during this period. Even with expanding New England (+6%) and US (+13%) job trends, the industry group is not expected to enlarge its presence in the state going forward (-3% through 2026).
- The *Diagnostic Imaging Centers* industry is expected to make a comeback, adding 15 jobs by 2026. But this would still be down 36% since 2012.

Medical and Diagnostic Laboratories Jobs By Industry By Year, New Hampshire

										Covid		Forecast				
NAICS	Description	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
621511	Medical Laboratories	311	306	315	303	312	333	368	345	313	299	290	282	275	270	267
621512	Diagnostic Imaging Centers	226	205	204	196	146	158	170	169	156	129	133	137	139	142	144
621991	Blood and Organ Banks	0	0	0	75	128	151	92	77	88	76	77	78	78	79	79
	Total	**537**	**511**	**519**	**574**	**586**	**642**	**630**	**591**	**557**	**504**	**500**	**497**	**492**	**491**	**490**

Source: Lightcast

Medical and Diagnostic Laboratories Jobs By Industry, New Hampshire (Lightcast Projection 2022 - 2026)



Source: Lightcast

Concentration

- **Medical and Diagnostic Laboratories** lags far behind the US with each industry less than even a third of the national concentration of jobs, and below each quotient for New England as well.

Medical and Diagnostic Laboratories Location Quotient By Industry, 2021, New Hampshire and New England

NAICS	Description	NH	NE
		Location Quotient	
621511	Medical Laboratories	0.28	0.76
621512	Diagnostic Imaging Centers	0.33	1.01
621991	Blood and Organ Banks	0.21	0.49
	Total	**0.28**	**0.76**

Source: Lightcast

Competitiveness

- **Medical and Diagnostic Laboratories** is the smallest industry group, which has seen negative growth since 2016. Each industry within the industry group also saw job losses even though industry and national trends indicated there should have been job growth.

Medical and Diagnostic Laboratories Shift Share Analysis, 2016 - 2021, New Hampshire

NAICS	Description	Ind. Mix Effect	+	Nat'l Growth Effect	=	Expected Job Change	Actual Job Change	-	Expected Job Change	=	Competitive Effect
621511	Medical Laboratories	45		6		51	-13		51		-63
621512	Diagnostic Imaging Centers	16		3		19	-17		19		-36
621991	Blood and Organ Banks	15		2		17	-52		17		-69
	Total	**76**		**11**		**87**	**-82**		**87**		**-168**

Source: Lightcast

Average Earnings

- **Medical and Diagnostic Laboratories** have lower earnings per jobs than the other Life Sciences industry groups. In 2021, average annual earnings per job in New Hampshire in this industry group were $104,6622. This was higher than both New England and the US, but lower than Life Sciences in New Hampshire.
- Earnings per job for *Diagnostic Imaging Centers* are the highest within the industry group in New Hampshire $108,287.

Medical and Diagnostic Laboratories Average Earnings Per Job By Industry, 2021, New Hampshire, New England and the United States

NAICS	Description	NH	NE	US
		Earnings Per Job		
621511	Medical Laboratories	$ 106,546	$ 94,025	$ 97,518
621512	Diagnostic Imaging Centers	$ 108,287	$ 104,283	$ 89,776
621991	Blood and Organ Banks	$ 90,830	$ 78,972	$ 67,064
	Total	**$ 104,622**	**$ 94,983**	**$ 89,778**

Source: Lightcast

Establishments

- In 2021 there were 94 business establishments in **Medical and Diagnostic Laboratories** industries in New Hampshire. The distribution of establishments buy industry is similar in New Hampshire to that of New England and the US.
- *Medical Laboratories* represents the largest number of establishments within the industry group, with 73 establishments representing 78% of all establishments within the industry group.

Medical and Diagnostic Laboratories Establishments and % Establishments By 6 digit NAICS and Region, 2021

NAICS	Description	NH Payrolled Business Locations	NH Payrolled Business Locations % of Total	NE Payrolled Business Locations % of Total	US Payrolled Business Locations % of Total
621511	Medical Laboratories	73	78%	66%	68%
621512	Diagnostic Imaging Centers	12	13%	27%	24%
621991	Blood and Organ Banks	9	10%	6%	8%
	Total	94	100%	100%	100%

Source: Lightcast

Gross Regional Product

- In 2021, the **Medical and Diagnostic Laboratories** industry group generated $69.5 million towards New Hampshire's Gross Regional Product.
- *Medical Laboratories* represented 68% of GRP within this industry group with a contribution of $47.0 million. This was followed by *Diagnostic Imaging Centers* with GRP valued at $7.4 million or 25% of the industry groups GRP. Together these two industries represented more than 93% of GRP in the industry group. This concentration is similar to New England and considerably higher than the US.

Medical and Diagnostic Laboratories GRP and % GRP By 6 digit NAICS and Region, 2021 (in $M)

NAICS	Description	NH GRP	NH GRP % of Total	NE GRP % of Total	US GRP % of Total
621511	Medical Laboratories	$ 47.0	68%	64%	71%
621512	Diagnostic Imaging Centers	$ 17.4	25%	30%	21%
621991	Blood and Organ Banks	$ 5.2	7%	6%	8%
	Total	$ 69.5	100%	100%	100%

Source: Lightcast

Productivity

- Productivity for **Medical and Diagnostic Laboratories**, (GRP/Job), in New Hampshire at $137,951 is higher compared to New England and the US. The exact difference in productivity depends on the specific businesses within the industry however, it can be a sign of companies that require highly specialized labor relative to the level of capital investment. Productivity is higher in New Hampshire compared to New England and the US for each of the industry sectors within this industry group.

Medical and Diagnostic Laboratories Productivity by Industry, 2021, New Hampshire,

NAICS	Description	NH	NE	US
		Productivity (GRP / Job)		
621511	Medical Laboratories	$157,215	$131,885	$136,891
621512	Diagnostic Imaging Centers	$134,509	$126,810	$111,370
621991	Blood and Organ Banks	$68,004	$56,456	$47,841
	Total	**$137,951**	**$120,643**	**$113,643**

Source: Lightcast

Sales

- In 2021, **Medical and Diagnostic** sales generated $128.7 million in total sales in New Hampshire, of which 5% were made to out of state entities through a mix of domestic and foreign trade. All of the individual industries within the group generate a low proportion of export sales as services in this industry are localized.
- *Medical Laboratories* generates the highest level of sales in the industry group with $76.8 million sales, of which 9% are exported sales. This is followed by *Diagnostic Imaging Centers* with $33.7.1 million in sales, 1% which are exported sales.

Medical and Diagnostic Laboratories Sales by Industry (in $M), 2021, New Hampshire

NAICS	Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
621511	Medical Laboratories	$76.8	93%	$5.5	9%	$82.3
621512	Diagnostic Imaging Centers	$33.7	99%	$0.3	1%	$34.1
621991	Blood and Organ Banks	$11.9	96%	$0.4	4%	$12.4
	Total	**$122.4**	**95%**	**$6.3**	**5%**	**$128.7**

Source: Lightcast

Demand

- The **Medical and Diagnostic Laboratories** industry group in New Hampshire has total purchases (demand) of $412.2 million in 2021. Of this amount, 72% was purchased from out of state sellers.
- All of the individual industries have more than half of their purchases from out of state.
- The **Medical and Diagnostic Laboratories** group had $296.8 million in demand for New Hampshire met by imports from outside the state in 2021. If 10% of this demand could be recaptured by local firms it would increase those sales in the state by $29.7 million. Given the annual sales of firms at the industry level the **Medical and Diagnostic Laboratories** group could support an additional 22 establishments. Not only would this recapture represent new sales and firm activity in the state, given the average firm size in New Hampshire, this would also create 116 jobs.
- The *Medical Laboratories* industry would produce the largest gains from potential recaptured demand with $20.9 M leading to supporting over 18 establishments and 76 jobs.

Medical and Diagnostic Laboratories Demand by Industry (in $M), 2021, New Hampshire

NAICS	Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
621511	Medical Laboratories	$75.1	26%	$209.1	74%	$284.2
621512	Diagnostic Imaging Centers	$30.3	34%	$58.4	66%	$88.6
621991	Blood and Organ Banks	$10.1	26%	$29.3	74%	$39.4
	Total	**$115.4**	**28%**	**$296.8**	**72%**	**$412.2**

Source: Lightcast

Medical and Diagnostic Laboratories Leakage (Proposed Rate of Recapture = 10%), 2021, New Hampshire

NAICS	Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
621511	Medical Laboratories	$209.1	$20.9	$1.1	18.5	76
621512	Diagnostic Imaging Centers	$58.4	$5.8	$2.8	2.1	22
621991	Blood and Organ Banks	$29.3	$2.9	$1.4	2.1	18
	Total	**$296.8**	**$29.7**	**.**	**22.7**	**116**

Source: Lightcast

Multipliers

All of the **Medical and Diagnostic Laboratories** industries in New Hampshire have positive economic multipliers, meaning they generate more to the economy beyond their direct contribution. For example, Blood and Organ Banks generate

- 69 additional jobs for every 100 direct
- 73 additional $ in sales for every 100 dollars generated in direct sales
- 65 additional $ in earnings for every 100 dollars in direct earnings

Medical and Diagnostic Laboratories Multipliers, 2021, New Hampshire

NAICS	Description	Multiplier Jobs	Multiplier Sales	Multiplier Earnings
621511	Medical Laboratories	1.94	1.73	1.65
621512	Diagnostic Imaging Centers	1.95	1.70	1.63
621991	Blood and Organ Banks	1.69	1.75	1.52

Source: Lightcast

Glossary

Average Earnings Per Job (Industry)

Also called "average earnings per worker," average earnings is the result of total pre-tax industry earnings divided by same-year industry employment. Earnings are defined as labor-related personal income—that is, income from work. Income from stock dividends or interest, rents, Social Security and other non-work sources are not included. Average earnings is the sum of wages and salaries, and supplements.

Demand (I-O)

Demand is an estimate of the amount of goods and services required by a region. The value is calculated using industry purchases across the nation, measured in terms of sales. Industry wages, taxes, and other values added payments are indirectly part of the demand through the production of the supplying industry. It is not possible to know the proportions into which demand should be broken out into categories such as wages, taxes, etc., but it is assumed that demand includes those categories.

Exports (I-O)

Exports show the amount of money that is spent by industries located outside the region in exchange for goods or services produced by an industry located in the region. Exports can be either foreign or domestic. An example of foreign exports would be a business in Toronto purchasing consulting services from a consulting firm in New York in exchange for dollars. An example of domestic exports would be a firm in Maryland selling a software product to a firm in Alabama—the Maryland firm has exported its product to Alabama in exchange for dollars. Both the consulting and software examples are considered exports, because a good or service is leaving the region, and dollars are entering the region in exchange. The exports figure does not directly include wages of employees in the industry from which goods or services were purchased. Money entering the region in exchange for goods and services exported out of the region will likely be indirectly used to pay employees (regardless of where the employee lives), but the exports figure is agnostic of what the industry producing the good or service will do with the money.

Gross Regional Product (GRP)

Gross Regional Product (GRP) is simply GDP for the region of study. More commonly, GRP is GDP for any region smaller than the United States, such as a state or metro. GRP measures the final market value of all goods and services produced in the region of study. GRP is the sum of total industry earnings, taxes on production & imports, and profits, less subsidies (GRP = earnings + TPI + profits – subsidies).

Imports (I-O)

Imports show the amount of money that is spent by all industries located in the region in exchange for goods or services produced by an industry located outside the region. Money leaves the region, and a good or service is brought into the region and consumed. Imports can be foreign or domestic. An example of foreign imports would be a firm in New York paying money for consulting services from a firm in Toronto. An example of domestic imports would be the same firm in New York purchasing consulting services from a firm in Alabama. The imports figure does not directly include wages of employees in the industry from which goods or services were purchased. Money used to purchase imported goods and services will likely be indirectly used to pay employees of the industry from which the good or service was purchased (regardless of where the employee lives), but the imports figure is agnostic of what the industry producing the good or service will do with the money.

Location Quotient

Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region "unique." For example, if the leather products manufacturing industry accounts for 10% of jobs in an area but 1% of jobs nationally, then the area's leather-producing industry has an LQ of 10. So in the area, leather manufacturing accounts for a larger than average "share" of total jobs—the share is ten times larger than normal.

North American Industry Classification System (NAICS)

The North American Industry Classification System (NAICS) is the standard federal system for classifying business establishments. Each establishment is assigned a six-digit code and category title, organizing them primarily by similar production processes into five levels: sectors, subsectors, industry groups, industries, and national industries (national industries are specific to one or more of

the United States, Canada, and Mexico). Codes are hierarchical: less detailed categories are derived by removing digits from the end of more detailed codes.

Example

- 23: Construction (sector)
- 236: Construction of Buildings (subsector)
- 2362: Nonresidential Building Construction (Industry Group)
- 23622: Commercial and Institutional Building Construction (industry)
- 236220: Commercial and Institutional Building Construction (national industry which in this case is identical to its parent industry)

The NAICS classification is updated every five years to better reflect economic realities.

Shift Share

Used in both industry and occupation contexts, Shift Share is a standard method of regional economic analysis that helps identify whether job change in an industry/occupation in a region is due to national factors–the "rising tide lifts all boats" phenomenon–or whether it is due to factors within the region of study itself.

An industry/occupation could be growing/declining in a region because of one or several of the following factors:

- Growth Effect, the overall growth/decline of the entire national economy
- Industry/Occupation Mix Effect, the growth/decline of the industry/occupation in question at a national level
- Competitive Effect, growth/decline that cannot be explained completely by national trends and therefore highlights something unique about the region of study. The most important of the three is Competitive Effect, which identifies region-specific factors as being responsible for the growth/decline of the industry/occupation in question.

Expected Change shows the expected growth/decline for the industry/occupation in region in question given the National Growth Effect and the Industry/Occupation Mix Effect. The Competitive Effect is the leftover effect (if any) that cannot be explained by the National Growth Effect and Industry/Occupation Mix Effects as shown in the Expected Change metric.

Sales (I-O)

In input-output modeling, Sales is an industry's total annual sales (gross receipts), both to other industries and to consumers as well. Sales is representative of all four Classes of Worker. For the Retail (44), Wholesale (42), and Transportation (48) sectors, sales are only inclusive of the respective margin.

Standard Occupation Classification (SOC)

The Standard Occupational Classification (SOC) system is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one of about 775 detailed occupations according to their occupational definition. To facilitate classification, detailed occupations are combined to form about 450 broad occupations, about 95 minor groups, and 23 major groups. Detailed occupations in the SOC with similar job duties, and in some cases skills, education, and/or training, are grouped together.

The SOC system uses hyphenated codes to divide occupations into four levels: major groups, minor groups, broad occupations, and detailed occupations.

- 29-0000: Healthcare practitioners and technical occupations (major group)
- 29-1000: Health diagnosing and treating practitioners (minor group)
- 29-1020: Dentists (broad occupation)
- 29-1021: Dentists, general (detailed occupation)

The SOC classification system was updated in 2010, and the update to the 2018 classification is currently happening across various government LMI datasets.

Life Sciences Cluster 6 Digit NAICS Descriptions

NAICS Code	Full Description	Short Description
325411	Medicinal and Botanical Manufacturing	Medicinal and Botanical Mfg.
325412	Pharmaceutical Preparation Manufacturing	Pharmaceutical Preparation Mfg.
325413	In-Vitro Diagnostic Substance Manufacturing	In-Vitro Diagnostic Substance Mfg.
325414	Biological Product (except Diagnostic) Manufacturing	Biological Product (except Diagnostic) Mfg.
327212	Other Pressed and Blown Glass and Glassware Manufacturing	Other Pressed and Blown Glass and Glassware Mfg.
333314	Optical Instrument and Lens Manufacturing	Optical Instrument and Lens Mfg.
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	Electro- medical/therapeutic Apparatus Mfg.
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process	Instruments to Control Industrial Processes
334514	Totalizing Fluid Meter and Counting Device Manufacturing	Totalizing Fluid Meter and Counting Device Mfg.
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	Instrument Mfg. to Measure & Test Electrical
334516	Analytical Laboratory Instrument Manufacturing	Analytical Laboratory Instrument Mfg.
334517	Irradiation Apparatus Manufacturing	Irradiation Apparatus Mfg.
334519	Other Measuring and Controlling Device Manufacturing	Other Measuring and Controlling Device Mfg.
339112	Surgical and Medical Instrument Manufacturing	Surgical and Medical Instrument Mfg.
339113	Surgical Appliance and Supplies Manufacturing	Surgical Appliance and Supplies Mfg.
339114	Dental Equipment and Supplies Manufacturing	Dental Equipment and Supplies Mfg.
339115	Ophthalmic Goods Manufacturing	Ophthalmic Goods Mfg.
339116	Dental Laboratories	Dental Laboratories
541380	Testing Laboratories	Testing Laboratories
541713	Research and Development in Nanotechnology	Research and Dev. in Nanotechnology
541714	Research and Development in Biotechnology (except Nanobiotechnology)	Research and Dev. in Biotechnology
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and	Research and Dev. in Life Sciences
621511	Medical Laboratories	Medical Laboratories
621512	Diagnostic Imaging Centers	Diagnostic Imaging Centers
621991	Blood and Organ Banks	Blood and Organ Banks

Source: Census & Camoin

New Hampshire Life Sciences Industry Strategy

Situational Assessment II

Supply Chain, Workforce, Competitive Analysis

Supply Chain

Supply chain analysis provides details on who industries are buying from and selling to. This section provides market insights into opportunities to increase sales by expanding the geographic reach of the industry, identifying additional industries and companies to sell to, and tightening supply chain leakage by selling more products and services within the state through business-to-business efforts.

Supply (sell to/sales)

In 2021, Life Sciences generated $1.1 billion in total sales in New Hampshire. 73.8% of those sales were made to out of state entities through a mix of domestic and foreign trade. All the industry groups generated a high proportion of sales exported out of state, except for **Medical and Diagnostic Laboratories** and **Research and Development Services**. Both of these industry groups primarily service in-state entities. The higher percent of exported sales indicates a strong value-add by the industry in terms of bringing economic activity and wealth to the state.

Medical Equipment and Supplies Manufacturing had the highest level of sales among the Life Science industry groups in New Hampshire with $1.19 billion followed by **Pharmaceutical and Medicine Manufacturing** with $1.17 billion. In terms of exported sales, **Medical Device Manufacturing** has the largest percent of sales exported out of state with 92.5%. **Medical Equipment and Supplies Manufacturing**, (87.9%) and **Pharmaceutical and Medicine Manufacturing** (82.5%) also high levels of sales exported out of state.

Life Sciences Cluster Sales (in $M), 2021, New Hampshire

Description	In-Region Sales	% In-Region Sales	Exported Sales	% Exported Sales	Total Sales
Medical Device Manufacturing	$70	7.5%	$865	92.5%	$935
Medical Equipment and Supplies Manufacturing	$144	12.1%	$1,047	87.9%	$1,190
Research and Development Services	$590	66.6%	$297	33.4%	$887
Pharmaceutical and Medicine Manufacturing	$206	17.5%	$970	82.5%	$1,176
Medical and Diagnostic Laboratories	$122	95.1%	$6	4.9%	$129
Total	**$1,132**	**26.2%**	**$3,185**	**73.8%**	**$4,317**

Source: Lightcast

Diving deeper into who the Life Science industry in New Hampshire is selling to reveals that the Federal Government, Civilian, Excluding Postal Service entities are the largest purchasers within New Hampshire followed by Biological Product (except Diagnostic) Manufacturing, General Medical and Surgical Hospitals, and Offices of Physicians (except Mental Health Specialists).

Top 10 Industries New Hampshire's Life Science Industry Sells to in New Hampshire, 2021

NAICS	Sales to	Total In-Region Sales
901199	Federal Government, Civilian, Excluding Postal Service	$43,635,024
325414	Biological Product (except Diagnostic) Manufacturing	$34,702,575
622110	General Medical and Surgical Hospitals	$31,215,308
621111	Offices of Physicians (except Mental Health Specialists)	$25,317,697
333314	Optical Instrument and Lens Manufacturing	$10,228,364
901200	Federal Government, Military	$9,641,013
621210	Offices of Dentists	$9,431,387
325413	In-Vitro Diagnostic Substance Manufacturing	$8,198,843
621420	Outpatient Mental Health and Substance Abuse Centers	$7,665,394
339112	Surgical and Medical Instrument Manufacturing	$7,624,616

Source: Lightcast

An examination of sales data for each Life Science industry group in New Hampshire reveals similar trends with a few exceptions. Tables for each of the industry groups can be found on the following pages.

Medical Device Manufacturing – sells to other device and equipment manufacturers both within Life Sciences and external to Life Sciences (pictured right).

Medical Equipment and Supplies Manufacturing – sells to other equipment and supplies manufacturers as well as research institutions, and medical service providers.

Research and Development Services – primarily sells to entities within state and to other research entities including federal government and historical research centers.

Pharmaceutical and Medicine Manufacturing – sells a significant amount to other Pharmaceutical and Medicine Manufacturers in addition to sales to medical and health service entities.

Medical and Diagnostic Laboratories – Primarily sells to in-state entities within health services.

Top 10 Industries New Hampshire's Medical Device Manufacturing Industry Group Sells to in New Hampshire, 2021

NAICS	Sales to	Total In-Region Sales
3333	Commercial and Service Industry Machinery Manufacturing	$9,428,840
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	$4,578,933
3391	Medical Equipment and Supplies Manufacturing	$2,562,316
6211	Offices of Physicians	$1,231,533
3359	Other Electrical Equipment and Component Manufacturing	$1,161,005
3344	Semiconductor and Other Electronic Component Manufacturing	$846,212
9012	Federal Government, Military	$705,898
5511	Management of Companies and Enterprises	$684,752
5413	Architectural, Engineering, and Related Services	$543,732
3335	Metalworking Machinery Manufacturing	$502,418

Source: Lightcast

Top 10 Industries New Hampshire's Medical Equipment and Supplies Manufacturing Industry Group Sells to in New Hampshire, 2021

NAICS	Sales to	Total In-Region Sales
6221	General Medical and Surgical Hospitals	$13,902,420
3391	Medical Equipment and Supplies Manufacturing	$9,231,164
6212	Offices of Dentists	$7,472,050
3359	Other Electrical Equipment and Component Manufacturing	$5,705,791
6211	Offices of Physicians	$4,779,121
3121	Beverage Manufacturing	$3,021,618
3272	Glass and Glass Product Manufacturing	$2,131,281
6214	Outpatient Care Centers	$1,410,562
9029	State Government, Excluding Education and Hospitals	$1,166,563
5419	Other Professional, Scientific, and Technical Services	$1,127,785

Source: Lightcast

Top 10 Industries New Hampshire's Pharmaceutical and Medicine Manufacturing Industry Group Sells to in New Hampshire, 2021

NAICS	Sales to	Total In-Region Sales
3254	Pharmaceutical and Medicine Manufacturing	$44,432,605
6221	General Medical and Surgical Hospitals	$9,220,112
6213	Offices of Other Health Practitioners	$7,898,210
6214	Outpatient Care Centers	$5,356,242
6215	Medical and Diagnostic Laboratories	$2,873,189
6211	Offices of Physicians	$2,659,220
6231	Nursing Care Facilities (Skilled Nursing Facilities)	$1,918,547
6212	Offices of Dentists	$1,770,261
5419	Other Professional, Scientific, and Technical Services	$1,462,261
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	$1,186,923

Source: Lightcast

Top 10 Industries New Hampshire's Research and Development Industry Group Sells to in New Hampshire, 2021

NAICS	Sales to	Total In-Region Sales
9011	Federal Government, Civilian	$42,364,592
9012	Federal Government, Military	$8,139,406
5311	Lessors of Real Estate	$4,929,925
9036	Education and Hospitals (Local Government)	$4,598,753
2382	Building Equipment Contractors	$3,665,439
5413	Architectural, Engineering, and Related Services	$3,256,499
9039	Local Government, Excluding Education and Hospitals	$2,806,898
5417	Scientific Research and Development Services	$2,782,665
5313	Activities Related to Real Estate	$2,505,147
2383	Building Finishing Contractors	$2,159,300

Source: Lightcast

Top 10 Industries New Hampshire's Medical and Diagnostic Laboratories Industry Group Sells to in New Hampshire, 2021

NAICS	Sales to	Total In-Region Sales
6211	Offices of Physicians	$17,498,485
6214	Outpatient Care Centers	$7,586,992
6221	General Medical and Surgical Hospitals	$7,359,315
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	$385,734
5419	Other Professional, Scientific, and Technical Services	$212,055
6219	Other Ambulatory Health Care Services	$204,113
6222	Psychiatric and Substance Abuse Hospitals	$120,242
5511	Management of Companies and Enterprises	$105,163
9039	Local Government, Excluding Education and Hospitals	$71,085
9029	State Government, Excluding Education and Hospitals	$42,322

Source: Lightcast

Demand (buy from/inputs/purchases)

Life Sciences in New Hampshire had total purchases (in other words, demand) of $1.1 billion in 2021. Of this amount, 70.1% was purchased from out of state sellers. All the industry groups except **Research and Development Services** (with 55.8%) have a high percentage of purchases met out of state. This creates opportunity to connect in-state sellers, to in-state buyers for greater industry impact in New Hampshire. As an example, if New Hampshire was able to recapture 10% of imported purchases in Life Sciences, it would amount to an estimated $259 more million in sales, and have the potential for 57 new firms and 703 new jobs.

Life Sciences Cluster Demand (in $M), 2021, New Hampshire

Description	Demand met In-Region	% Demand met In-Region	Demand met by Imports	% Demand met by Imports	Total Demand
Medical Device Manufacturing	$62	14.4%	$366	85.6%	$428
Medical Equipment and Supplies Manufacturing	$141	27.5%	$371	72.5%	$511
Research and Development Services	$584	44.2%	$738	55.8%	$1,322
Pharmaceutical and Medicine Manufacturing	$201	19.8%	$813	80.2%	$1,014
Medical and Diagnostic Laboratories	$115	28.0%	$297	72.0%	$412
Total	**$1,102**	**29.9%**	**$2,585**	**70.1%**	**$3,688**

Source: Lightcast

Looking more deeply at purchases by New Hampshire Life Science industry groups indicates that the largest number of purchases are made from Drugs and Druggists' Sundries Merchant Wholesalers; and Biological Product (except Diagnostic) Manufacturing. Other sectors from which significant purchases are made include information technology related, professional and technical consulting services, and administrative and management services.[2]

Life Sciences Cluster Leakage (Proposed Recapture=10%), 2021, New Hampshire

Description	Demand met by Imports (in $M)	Recaptured Demand (in $M)	Avg. Sales / Establishment (in $M)	New Firms From Recaptured Demand	New Jobs From Recaptured Demand
Medical Device Manufacturing	$366	$37	$10	4	136
Medical Equipment and Supplies Manufacturing	$371	$37	$16	2	80
Research and Development Services	$738	$74	$3	28	246
Pharmaceutical and Medicine Manufacturing	$813	$81	$65	1	125
Medical and Diagnostic Laboratories	$297	$30	$1	22	116
Total	**$2,585**	**$259**	**.**	**57**	**703**

Source: Lightcast

[2] This excludes purchases made from corporate, subsidiary, and regional managing (for which specific sector data is not available).

Of the purchases made by New Hampshire Life Science entities the highest percentages of imported purchases (purchased from out of state suppliers) are by Internet Publishing and Broadcasting and Web Search Portals; Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers; Computer and Computer Peripheral Equipment and Software Merchant Wholesalers; Drugs and Druggists' Sundries Merchant Wholesalers; Offices of Lawyers. New Hampshire may be able to work with industry groups to expand opportunities to have these goods and services produced and purchased within the State.

Top 10 Industries New Hampshire's Life Science Industry Purchases From, 2021

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
551114	Corporate, Subsidiary, and Regional Managing Offices	$92,057,309	89.4%	$10,932,509	10.6%	$102,989,818
424210	Drugs and Druggists' Sundries Merchant Wholesalers	$19,132,376	24.2%	$59,917,441	75.8%	$79,049,817
325414	Biological Product (except Diagnostic) Manufacturing	$43,808,743	90.0%	$4,845,467	10.0%	$48,654,210
541110	Offices of Lawyers	$18,045,398	47.6%	$19,851,286	52.4%	$37,896,684
541611	Administrative Management and General Management Consulting Services	$24,259,486	84.7%	$4,382,149	15.3%	$28,641,635
519130	Internet Publishing and Broadcasting and Web Search Portals	$6,228,624	24.3%	$19,395,015	75.7%	$25,623,638
561320	Temporary Help Services	$19,229,281	78.0%	$5,437,707	22.0%	$24,666,988
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	$8,736,061	42.0%	$12,063,968	58.0%	$20,800,029
541990	All Other Professional, Scientific, and Technical Services	$18,295,184	92.6%	$1,458,636	7.4%	$19,753,820
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	$5,274,585	26.9%	$14,307,797	73.1%	$19,582,382

Source: Lightcast

Tables for each of the industry groups can be found on the following pages. An examination of purchasing data for each Life Science industry group in New Hampshire reveals:

Medical Device Manufacturing – the largest number of purchases comes from other Machinery and Equipment Manufacturers including those outside of life science industries; Plastic Product Manufacturers, and Warehousing and Wholesalers (pictured to the right)

Medical Equipment and Supplies Manufacturing – high levels of purchases from Professional and Commercial Equipment and Supplies Merchant Wholesalers; Plastics Resins, and Rubber Product Manufacturing; and Machine Manufacturers. This latter category is an area of opportunity for the Life Sciences industry in New Hampshire to work more closely with machine, metals, and advanced manufacturers in the State.

Top 10 Industries New Hampshire's Medical Device Manufacturing Industry Group Purchases From, 2021

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
5511	Management of Companies and Enterprises	$40,012,440	86.8%	$6,062,980	13.2%	$46,075,419
3333	Commercial and Service Industry Machinery Manufacturing	$9,419,176	68.1%	$4,403,615	31.9%	$13,822,791
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	$3,251,378	28.4%	$8,196,976	71.6%	$11,448,354
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	$3,380,480	31.2%	$7,448,278	68.8%	$10,828,757
3344	Semiconductor and Other Electronic Component Manufacturing	$4,586,380	47.4%	$5,093,180	52.6%	$9,679,560
5411	Legal Services	$4,157,131	48.6%	$4,395,124	51.4%	$8,552,255
4931	Warehousing and Storage	$3,482,882	41.9%	$4,823,732	58.1%	$8,306,614
3261	Plastics Product Manufacturing	$1,165,294	17.6%	$5,467,783	82.4%	$6,633,077
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	$1,538,021	25.4%	$4,516,198	74.6%	$6,054,218
5191	Other Information Services	$597,019	10.1%	$5,321,913	89.9%	$5,918,933

Source: Lightcast

Research and Development Services – primarily buys from other professional, management, and technical services, large percentages of which are from in-state entities.

Pharmaceutical and Medicine Manufacturing – largest number of purchases from Drugs and Druggists' Sundries Merchant Wholesalers and Pharmaceutical and Medicine Manufacturing as well as Basic Chemical Manufacturing and Professional and Technical services.

Medical and Diagnostic Laboratories – largest number of purchases from Pharmaceutical and Medicine Manufacturing; Drugs and Druggists' Sundries Merchant Wholesalers; Management, Scientific, and Technical Consulting Services; and Basic Chemical Manufacturing.

In terms of new opportunities to grow industries related to but outside of Life Sciences within New Hampshire, Advanced Manufacturing including machines and equipment offers a strong fit for New Hampshire given its manufacturing base.

Top 10 Industries New Hampshire's Medical Equipment and Supplies Manufacturing Industry Group Purchases From, 2021

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	$11,820,632	33.1%	$23,862,359	66.9%	$35,682,991
3261	Plastics Product Manufacturing	$6,314,470	22.6%	$21,619,726	77.4%	$27,934,195
3391	Medical Equipment and Supplies Manufacturing	$9,185,932	36.2%	$16,216,610	63.8%	$25,402,541
5511	Management of Companies and Enterprises	$16,496,469	84.8%	$2,967,754	15.2%	$19,464,224
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing	$2,758,704	19.3%	$11,539,362	80.7%	$14,298,065
5411	Legal Services	$5,893,808	59.7%	$3,985,202	40.3%	$9,879,011
3222	Converted Paper Product Manufacturing	$846,455	11.1%	$6,753,050	88.9%	$7,599,506
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	$3,706,117	49.2%	$3,828,778	50.8%	$7,534,895
3311	Iron and Steel Mills and Ferroalloy Manufacturing	$52,374	0.7%	$7,338,507	99.3%	$7,390,881
5416	Management, Scientific, and Technical Consulting Services	$5,129,871	72.7%	$1,928,274	27.3%	$7,058,145

Source: Lightcast

Top 10 Industries New Hampshire's Research and Development Industry Group Purchases From, 2021

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
5416	Management, Scientific, and Technical Consulting Services	$27,345,990	79.4%	$7,110,723	20.6%	$34,456,714
5613	Employment Services	$13,341,105	67.3%	$6,474,812	32.7%	$19,815,916
5311	Lessors of Real Estate	$12,636,907	76.4%	$3,913,805	23.6%	$16,550,712
5511	Management of Companies and Enterprises	$13,097,943	81.0%	$3,064,088	19.0%	$16,162,032
5191	Other Information Services	$5,124,417	33.8%	$10,035,987	66.2%	$15,160,404
5411	Legal Services	$5,754,109	47.4%	$6,383,664	52.6%	$12,137,772
5419	Other Professional, Scientific, and Technical Services	$10,691,341	88.2%	$1,429,700	11.8%	$12,121,040
5313	Activities Related to Real Estate	$6,288,717	61.7%	$3,902,917	38.3%	$10,191,634
5413	Architectural, Engineering, and Related Services	$8,312,001	83.5%	$1,645,628	16.5%	$9,957,629
5415	Computer Systems Design and Related Services	$6,150,322	72.7%	$2,309,781	27.3%	$8,460,103

Source: Lightcast

Top 10 Industries New Hampshire's Pharmaceutical and Medicine Manufacturing Industry Group Purchases From, 2021

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
4242	Drugs and Druggists' Sundries Merchant Wholesalers	$18,026,518	24.5%	$55,648,433	75.5%	$73,674,951
3254	Pharmaceutical and Medicine Manufacturing	$44,432,605	79.1%	$11,764,305	20.9%	$56,196,911
5511	Management of Companies and Enterprises	$20,834,613	88.2%	$2,793,589	11.8%	$23,628,202
5411	Legal Services	$2,927,137	35.4%	$5,333,709	64.6%	$8,260,846
5416	Management, Scientific, and Technical Consulting Services	$7,111,295	94.3%	$432,316	5.7%	$7,543,611
5613	Employment Services	$4,731,523	91.1%	$462,354	8.9%	$5,193,877
5311	Lessors of Real Estate	$3,569,912	75.3%	$1,172,874	24.7%	$4,742,786
3251	Basic Chemical Manufacturing	$51,027	1.2%	$4,197,101	98.8%	$4,248,128
5419	Other Professional, Scientific, and Technical Services	$3,230,021	92.9%	$246,871	7.1%	$3,476,892
5313	Activities Related to Real Estate	$2,361,843	80.6%	$568,788	19.4%	$2,930,631

Source: Lightcast

Top 10 Industries New Hampshire's Medical and Diagnostic Laboratories Industry Group Purchases From, 2021

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
3254	Pharmaceutical and Medicine Manufacturing	$2,876,277	52.4%	$2,609,214	47.6%	$5,485,492
4242	Drugs and Druggists' Sundries Merchant Wholesalers	$830,623	22.9%	$2,791,521	77.1%	$3,622,144
5416	Management, Scientific, and Technical Consulting Services	$2,939,341	81.7%	$656,647	18.3%	$3,595,988
5511	Management of Companies and Enterprises	$2,723,286	86.6%	$422,916	13.4%	$3,146,202
3251	Basic Chemical Manufacturing	$87,263	3.7%	$2,287,394	96.3%	$2,374,658
5613	Employment Services	$1,441,711	95.6%	$66,175	4.4%	$1,507,886
5311	Lessors of Real Estate	$919,464	81.9%	$203,125	18.1%	$1,122,588
5411	Legal Services	$542,848	61.4%	$340,563	38.6%	$883,411
5173	Wired and Wireless Telecommunications Carriers	$471,695	60.5%	$307,993	39.5%	$779,687
5313	Activities Related to Real Estate	$537,254	77.8%	$152,944	22.2%	$690,199

Source: Lightcast

Workforce Analysis

There are 334 occupations that work in the Life Sciences industries; however, only 155 of those occupations had more than 10 employees in 2021. This analysis includes only the 155 occupations with at least 10 employees in 2021, which altogether account for 10,750 jobs and 95.2% of the employment in Life Sciences.

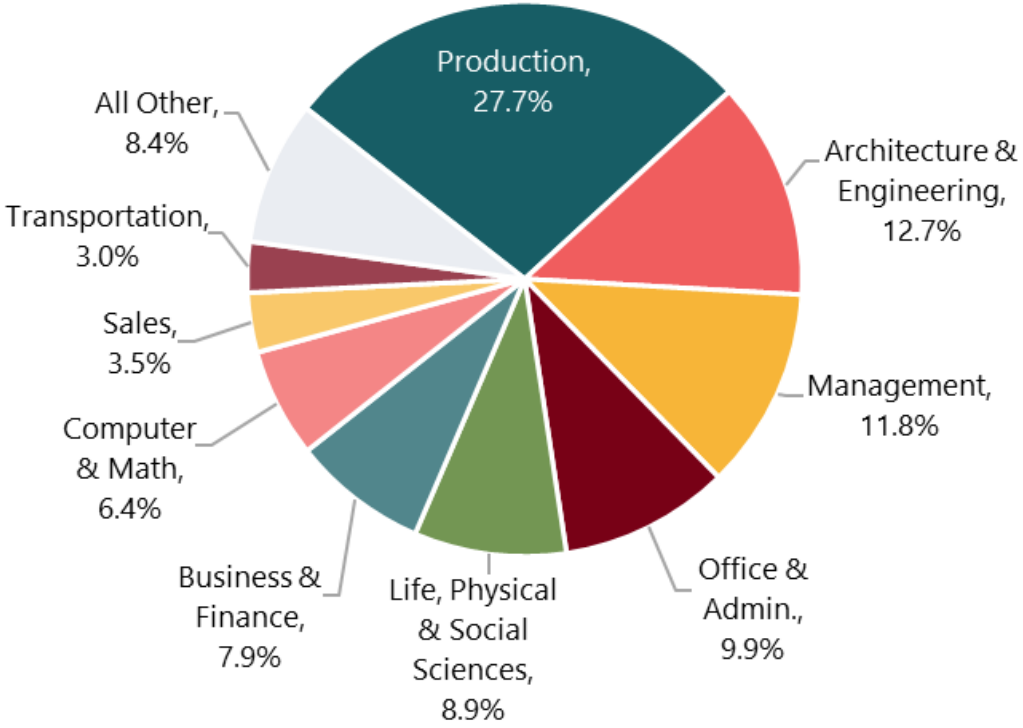
Key Takeaways

- New Hampshire's Life Sciences cluster is more concentrated in Manufacturing and less concentrated in the Research Sciences compared with New England and the nation. This provides a good fit for a manufacturing intensive Life Sciences including pharmaceutical and medicine, medical equipment and devices, and medical supplies.
- Skill levels:
  - High skill workers account for nearly 46% of the jobs in the cluster and have the fastest growth rate of all categories at 23% between 2016 and 2021.
  - Only 12% of occupations are middle skill, which may make it hard to retain workers.
  - 42% of workers are low skill, a category which is also growing rapidly at 14.9% between 2016 and 2021. This provides opportunity for entry-level workers; however, upskilling and career pathways are needed to attract and retain the workforce for future workforce needs.
  - Low and middle skill occupations have a higher likelihood that all or a portion of the job may become automated over time.
- The top occupations that overlap in terms of size, growth, and/or concentration are *Miscellaneous Assemblers and Fabricators*, *General and Operations Managers*, *Industrial Engineers*, *Electrical Engineers*, *First-Line Supervisors of Production and Operating Workers*, and *Inspectors, Testers, Sorters, Samplers, and Weighers, Electrical, Electronic, and Electromechanical Assemblers*. These have been growing, are currently import to the industries, and will need to be a focus in the coming years.
- Among the top occupations by size, growth, and concentration, there is overlap in the following specialized skills: Hand Tools, Agile Methodology, New Product Development, Auditing, Calipers, Marketing, Merchandising, Project Management, and Soldering.
- The State is producing an adequate pipeline of workers to meet average annual openings among the largest Life Sciences occupations.

Occupational Mix

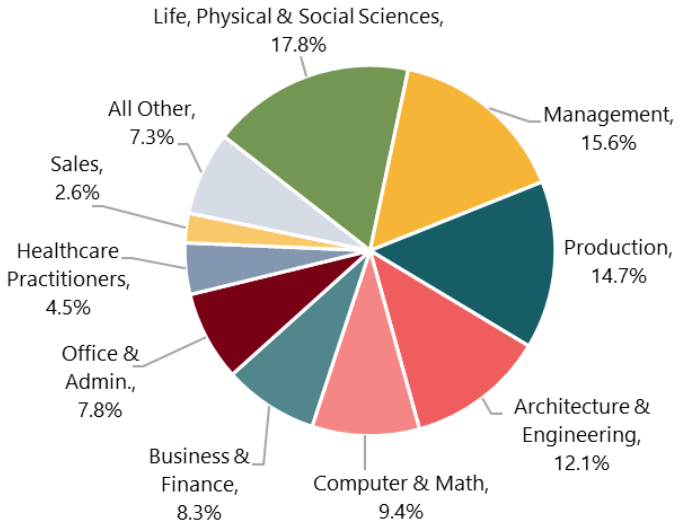
The New Hampshire Life Science industry is primarily comprised of Production occupations, followed by Architecture and Engineering, and Management. New Hampshire's Life Sciences cluster is more concentrated in Manufacturing and less concentrated in the Research Sciences compared with New England and the nation: Production workers account for 27.7% of jobs compared to 17.8% in New England and 17.9% in the nation, while Life, Physical, and Social Sciences workers account for only 8.9% of jobs compared to 17.8% in New England and 12.8% in the nation.

New Hampshire Life Sciences Occuaptions, 2021

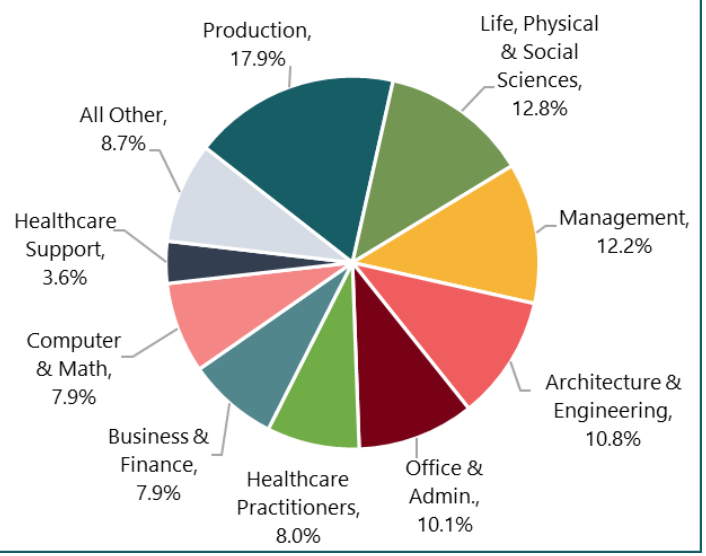


Source: Lightcast

New England Life Sciences Occuaptions, 2021



US Life Sciences Occuaptions, 2021



Life Sciences Staffing Pattern

There are 155 occupations with over 10 employees in the staffing patterns for Life Sciences. The top 20 occupations in the Life Sciences' cluster staffing pattern are shown below. Together, these occupations account for 4,716 (43.9%) of the jobs in the cluster.

New Hampshire Life Sciences Staffing Pattern, 2021

SOC	Description	Employed in Life Sciences Cluster	Share of Jobs in Cluster	2016 - 2021		2021 - 2026		Median Hourly Earnings	Skill Level (1)
				Change	Rate	Change	Rate		
51-2098	Miscellaneous Assemblers and Fabricators	659	6.1%	167	33.9%	(11)	-1.6%	$17.84	Low
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	437	4.1%	62	16.4%	(4)	-0.8%	$22.77	Low
11-1021	General and Operations Managers	335	3.1%	115	51.9%	25	7.3%	$47.09	High
15-1252	Software Developers	286	2.7%	15	5.5%	29	10.3%	$51.21	High
17-2112	Industrial Engineers	281	2.6%	54	24.0%	29	10.2%	$46.82	High
51-1011	First-Line Supervisors of Production and Operating Workers	274	2.5%	81	42.0%	24	8.9%	$31.93	Low
17-2141	Mechanical Engineers	273	2.5%	(32)	-10.4%	21	7.6%	$46.83	High
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	241	2.2%	(80)	-24.9%	(10)	-4.2%	$18.33	Low
17-2071	Electrical Engineers	216	2.0%	31	16.6%	1	0.3%	$52.16	High
11-9041	Architectural and Engineering Managers	180	1.7%	27	17.3%	9	4.8%	$78.42	High
43-9061	Office Clerks, General	169	1.6%	5	2.9%	2	1.0%	$19.21	Low
51-9161	Computer Numerically Controlled Tool Operators	165	1.5%	(3)	-1.7%	(2)	-0.9%	$23.09	Low
51-9111	Packaging and Filling Machine Operators and Tenders	165	1.5%	40	31.6%	28	16.9%	$18.22	Low
43-4051	Customer Service Representatives	165	1.5%	47	40.1%	1	0.7%	$18.22	Low
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	153	1.4%	68	79.7%	13	8.5%	$30.28	Low
43-5071	Shipping, Receiving, and Inventory Clerks	151	1.4%	65	74.5%	5	3.1%	$18.14	Low
19-4021	Biological Technicians	151	1.4%	(23)	-13.4%	17	11.0%	$23.15	High
11-3021	Computer and Information Systems Managers	144	1.3%	75	110.0%	8	5.4%	$63.19	High
13-1082	Project Management Specialists	138	1.3%	70	101.8%	8	5.7%	$39.46	High
31-9097	Phlebotomists	133	1.2%	(29)	-17.9%	1	0.9%	$18.40	Middle
Total across the entire staffing pattern		**10,750**	**(2)**	**1,629**	**17.9%**	**688**	**6.4%**	**$31.84**	**(3)**

Source: Lightcast

(1) Low Skill = High school diploma or equivalent or no formal educational credential, no work experience, and/or short-term or moderate-term on-the-job training
Middle Skill = Postsecondary non-degree award, some college but no degree, Associate's degree, long-term on-the-job training, and/or 5+ years of work experience
High Skill = Bachelor's degree or higher

(2) The total does not match total employment reported in the industry analysis due to the omission of occupations with fewer than 10 employees.

(3) Weighted average across the staffing pattern

The top 20 occupations in the Life Sciences cluster are shown below distributed by industry group. These 20 occupations account for a significant portion (37% - 58%) of the employment for most industry groups, with the exception of **Medical and Diagnostic Laboratories** (7%), which is also an outlier in its narrow staffing pattern of only 10 occupations (compared to 49 – 76 occupations for the other industry groups).

New Hampshire Life Sciences Staffing Pattern with Industry Group Shares, 2021

5 Digit SOC	Description	Employed in Life Sciences Cluster	Share of Jobs in Cluster	Share by Life Sciences Industry Group				
				Pharmaceutical & Medicine Mfg.	Research & Development Services	Medical & Diagnostic Laboratories	Medical Device Mfg.	Medical Equipment & Supplies Mfg.
51-2098	Miscellaneous Assemblers and Fabricators	659	6.1%	2.2%	.	.	47.5%	49.4%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	437	4.1%	26.7%	23.4%	.	23.2%	26.6%
11-1021	General and Operations Managers	335	3.1%	14.7%	35.6%	.	27.9%	19.2%
15-1252	Software Developers	286	2.7%	.	42.2%	.	50.2%	4.1%
17-2112	Industrial Engineers	281	2.6%	17.2%	15.1%	.	36.7%	31.2%
51-1011	First-Line Supervisors of Production and Operating Workers	274	2.5%	28.1%	6.5%	.	35.0%	30.5%
17-2141	Mechanical Engineers	273	2.5%	4.1%	31.1%	.	50.5%	14.3%
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	241	2.2%	.	.	.	85.3%	12.3%
17-2071	Electrical Engineers	216	2.0%	.	30.9%	.	55.8%	13.3%
11-9041	Architectural and Engineering Managers	180	1.7%	10.9%	34.4%	.	39.8%	14.9%
43-9061	Office Clerks, General	169	1.6%	10.7%	31.2%	.	24.3%	28.7%
51-9161	Computer Numerically Controlled Tool Operators	165	1.5%	.	.	.	37.4%	58.5%
51-9111	Packaging and Filling Machine Operators and Tenders	165	1.5%	84.8%	.	.	.	11.2%
43-4051	Customer Service Representatives	165	1.5%	15.8%	8.8%	14.6%	32.4%	28.3%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	153	1.4%	11.7%	.	.	54.4%	28.9%
43-5071	Shipping, Receiving, and Inventory Clerks	151	1.4%	20.9%	7.1%	.	41.1%	29.6%
19-4021	Biological Technicians	151	1.4%	28.4%	69.7%	.	.	.
11-3021	Computer and Information Systems Managers	144	1.3%	12.5%	46.9%	.	32.7%	8.0%
13-1082	Project Management Specialists	138	1.3%	13.3%	53.1%	.	24.0%	8.8%
31-9097	Phlebotomists	133	1.2%	.	.	97.6%	.	.
The top occupations as a share of total jobs		**43.9%**		**43.7%**	**37.3%**	**7.0%**	**58.3%**	**52.6%**
Total employment across the entire staffing pattern		**10,750 (1)**		**1,487**	**2,520**	**341**	**3,033**	**2,158**
Total number of occupations		**155**		**49**	**76**	**10**	**67**	**59**

Source: Lightcast

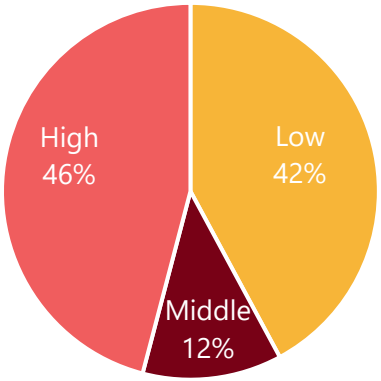
(1) The total does not match total employment reported in the industry analysis due to the omission of occupations with fewer than 10 employees.

Occupations by Skill Level

Life Sciences' occupations are shown below by skill level. High and low skilled occupations account for nearly equal proportions of workers, while middle skilled occupations form a relatively small portion of the Life Sciences occupations. High skilled occupations are growing rapidly and have significantly higher earnings than low or middle skilled ones. There is also greater variety of high skill occupations.

Across the entire economy, the workers that form the staffing pattern for Life Sciences are commuting out of New Hampshire for work. Low skilled occupations have the highest turnover rates, are more likely to have all or a portion of the job automated and have significantly more average annual openings due to growth, retirements, and workers exiting the occupation. The Life Sciences cluster must compete across the entire economy for its workers, particularly those that are less industry specific.

Life Sciences Occupations by Skill Level



Source: Lightcast

New Hampshire Life Sciences Occupations by Skill Level, 2021

Skill Level	Occupations	Share	Jobs	Share	2016 - 2021 Change	2016 - 2021 Rate	2021 - 2026 Change	2021 - 2026 Rate	Median Hourly Earnings (4)	Net Commuters (5)	Turnover Rate (4)(5)	Avg. Annual Openings (5)	Automation Index (4)(5)(6)
Low (1)	55	35.5%	4,529	42.1%	588	14.9%	187	4.1%	$21.43	(7,577)	51.7%	27,638	108
Middle (2)	28	18.1%	1,286	12.0%	117	10.0%	73	5.6%	$26.07	(2,312)	38.6%	5,059	102
High (3)	72	46.5%	4,935	45.9%	923	23.0%	429	8.7%	$46.49	(14,610)	30.1%	14,033	85
TOTAL	**155**	**100.0%**	**10,750**	**100.0%**	**1,629**	**17.9%**	**688**	**6.4%**	**$31.84**	**(24,499)**	**38.2%**	**46,730**	**92**

Source: Lightcast

(1) Low Skill = High school diploma or equivalent or no formal educational credential, no work experience, and/or short-term or moderate-term on-the-job training

(2) Middle Skill = Postsecondary non-degree award, some college but no degree, Associate's degree, long-term on-the-job training, and/or 5+ years of work experience

(3) High Skill = Bachelor's degree or higher

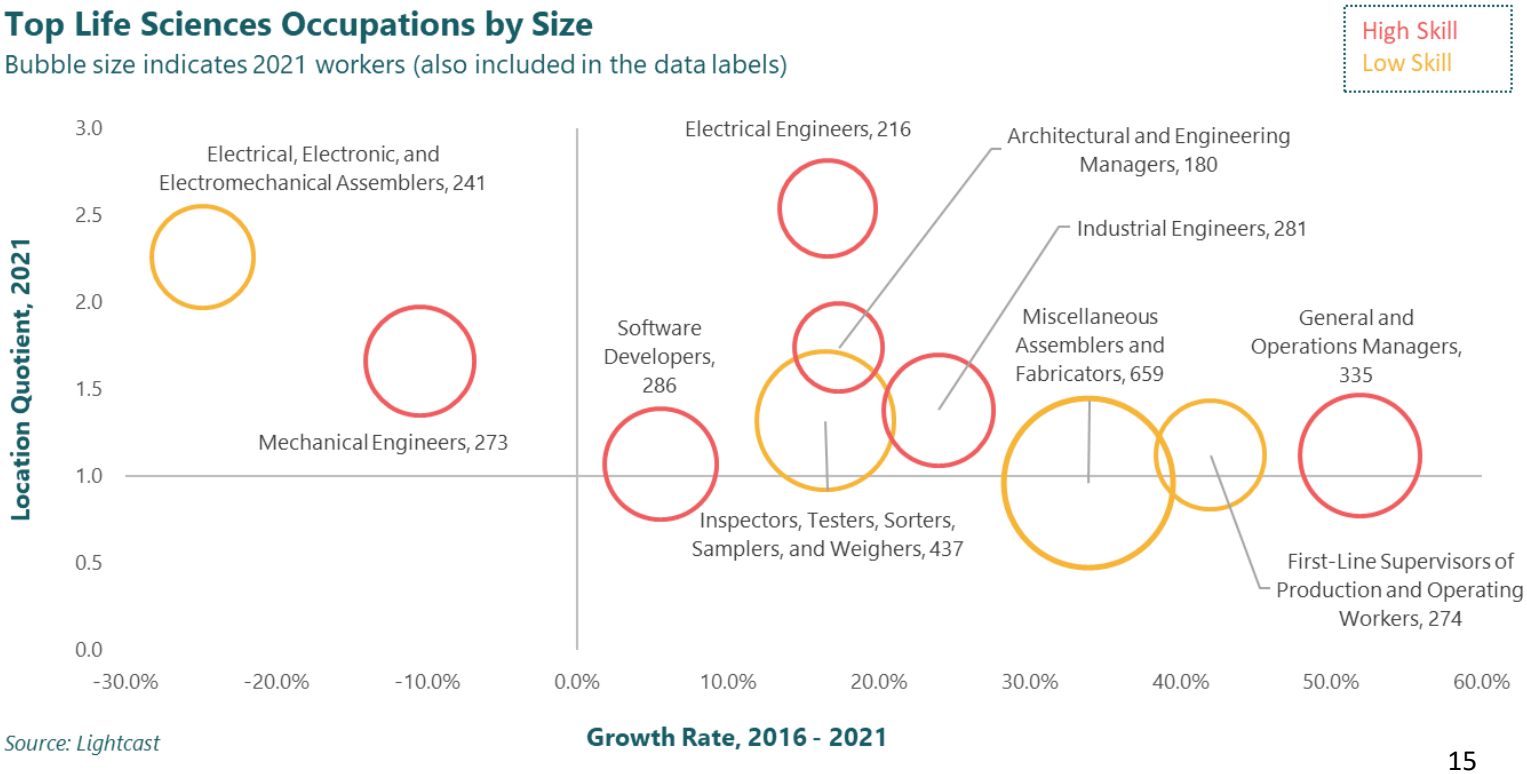
(4) Weighted average based on employment

(5) Data is for the the occupation across all industries (i.e. data is not just for these occupations within the Life Sciences cluster)

(6) The automation index scale has a base of 100. A score above 100 indicates a higher-than-average risk of automation.

Top Occupations by Size

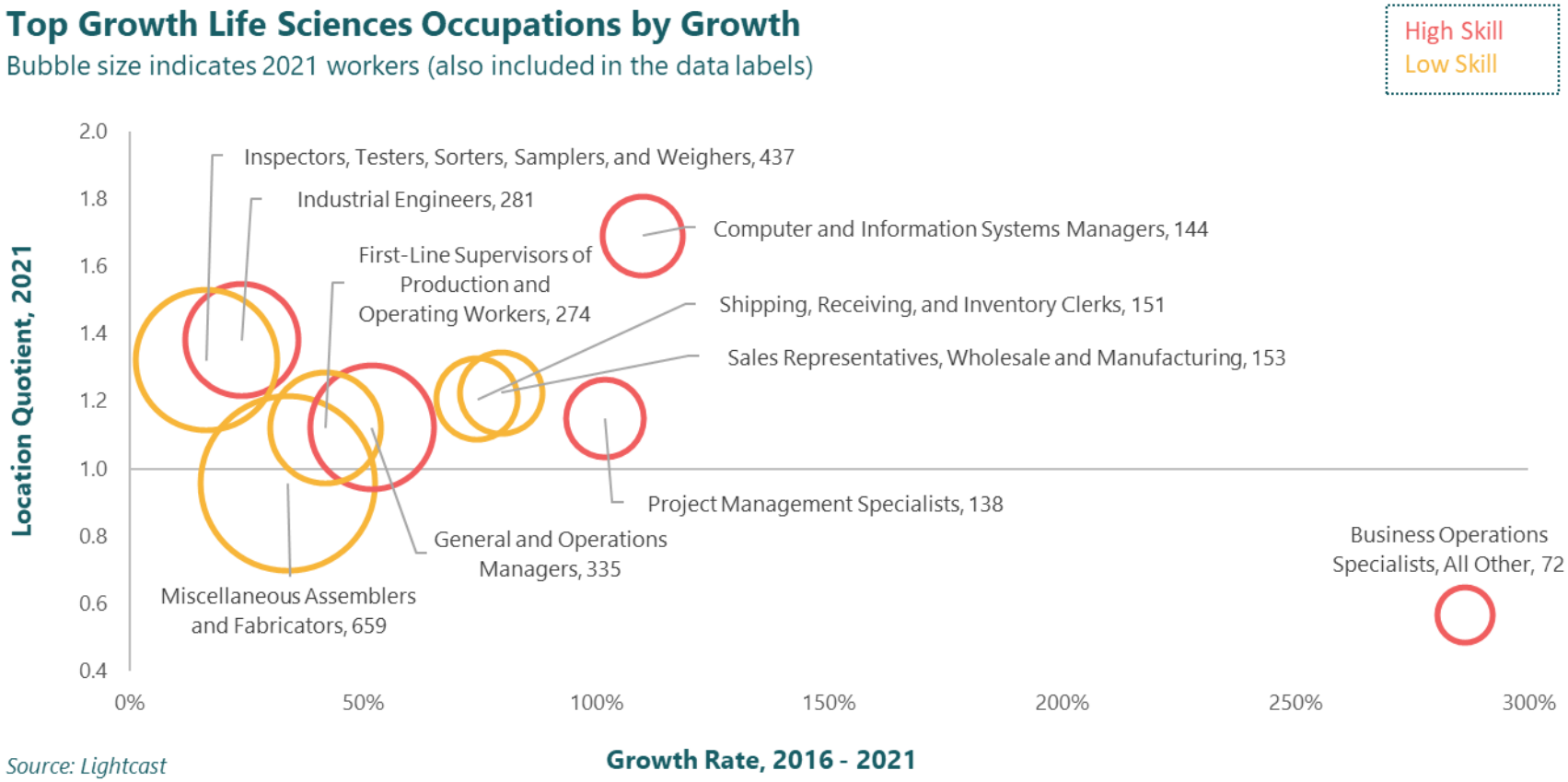
The 10 largest occupations in terms of jobs are plotted below by size (bubble), growth rate, and location quotient. High skill occupations are color-coded in pink and low skill occupations are yellow. None of the top occupations are middle skill jobs. These 10 occupations account for 28.1% of the workers in the Life Sciences cluster. All the top employment occupations fall within the 3 largest occupation groups- Production, Architecture and Engineering, and Management. The largest occupations are *Miscellaneous Assemblers and Fabricators* (659 workers), *Inspectors, Testers, Sorters, Samplers, and Weighers* (437), and *General and Operations Managers* (335). Most of the top occupations are growing, led by *General and Operations Managers* (with an increase of 115 jobs between 2016 and 2021 for a growth rate of 51.9%), *First-Line Supervisors of Production and Operating Workers* (81 jobs; 42.0%), and *Miscellaneous Assemblers and Fabricators* (167 jobs; 33.9%). Overall, the top occupations are slightly more concentrated in New Hampshire than the nation, led by *Electrical Engineers* (LQ = 2.5) and *Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers* (2.3).



Source: Lightcast

Top Occupations by Growth

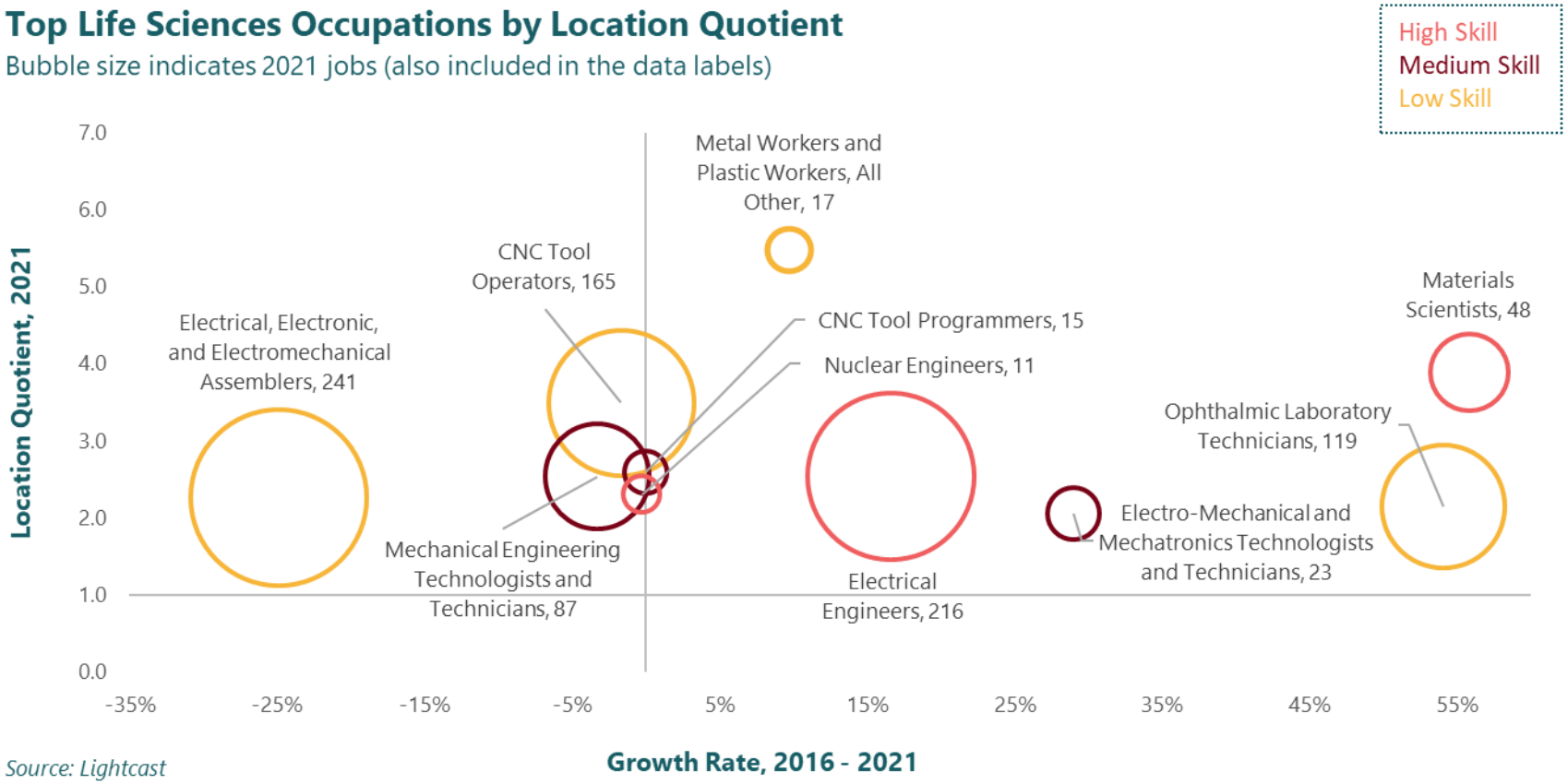
The 10 occupations that added the most workers (in terms of jobs rather than growth rate) between 2016 and 2021 are plotted below by number of jobs added, growth rate, and size (bubble). High skill occupations are color-coded in pink and low skill occupations are yellow. None of the top growth occupations are middle skill jobs. The top growth occupations are more dispersed among occupation groups than are the top occupations by size. The occupations that added the most workers include *Miscellaneous Assemblers and Fabricators* (167 jobs added for a growth rate of 33.9%), *General and Operations Managers* (115 jobs; 51.9% growth), and *First-Line Supervisors of Production and Operating Workers* (81; 42.0%). The occupations with the fastest growth rates include *Business Operations Specialists, All Other* (286.4% growth with 53 added jobs), *Computer and Information Systems Managers* (110.0%; 75), and *Project Management Specialists* (101.8%; 70).



Source: Lightcast

Top Occupations by Concentration *(Location Quotient)*

The 10 occupations with the highest concentrations in 2021 are plotted below by location quotient, growth rate, and size (bubble). High skill occupations are color-coded in pink, middle skill occupations in maroon, and low skill occupations in yellow. The most concentrated occupations are split between high, middle, and low skill jobs. The occupations with the highest concentration levels include *Metal Workers and Plastic Workers, All Other* (LQ = 5.5), *Materials Scientists* (3.9), and *Computer Numerically Controlled (CNC) Operators* (3.5).



Source: Lightcast

In-Demand Skills

The top 5 in-demand specialized skills, common skills, and qualifications for Life Sciences' occupations (based on job postings from November 2018 through November 2022) are shown below.

Specialized Skills	Common Skills	Qualifications
▪ Accounting	▪ Communications	▪ Security Clearances
▪ Auditing	▪ Customer Service	▪ Project Management Professional Certification
▪ Marketing	▪ Management	▪ Association of Chartered Certified Accountants
▪ Agile Methodology	▪ Sales	▪ Six Sigma Green Belt Certification
▪ Computer Science	▪ Operations	▪ American Society for Clinical Pathology Certification

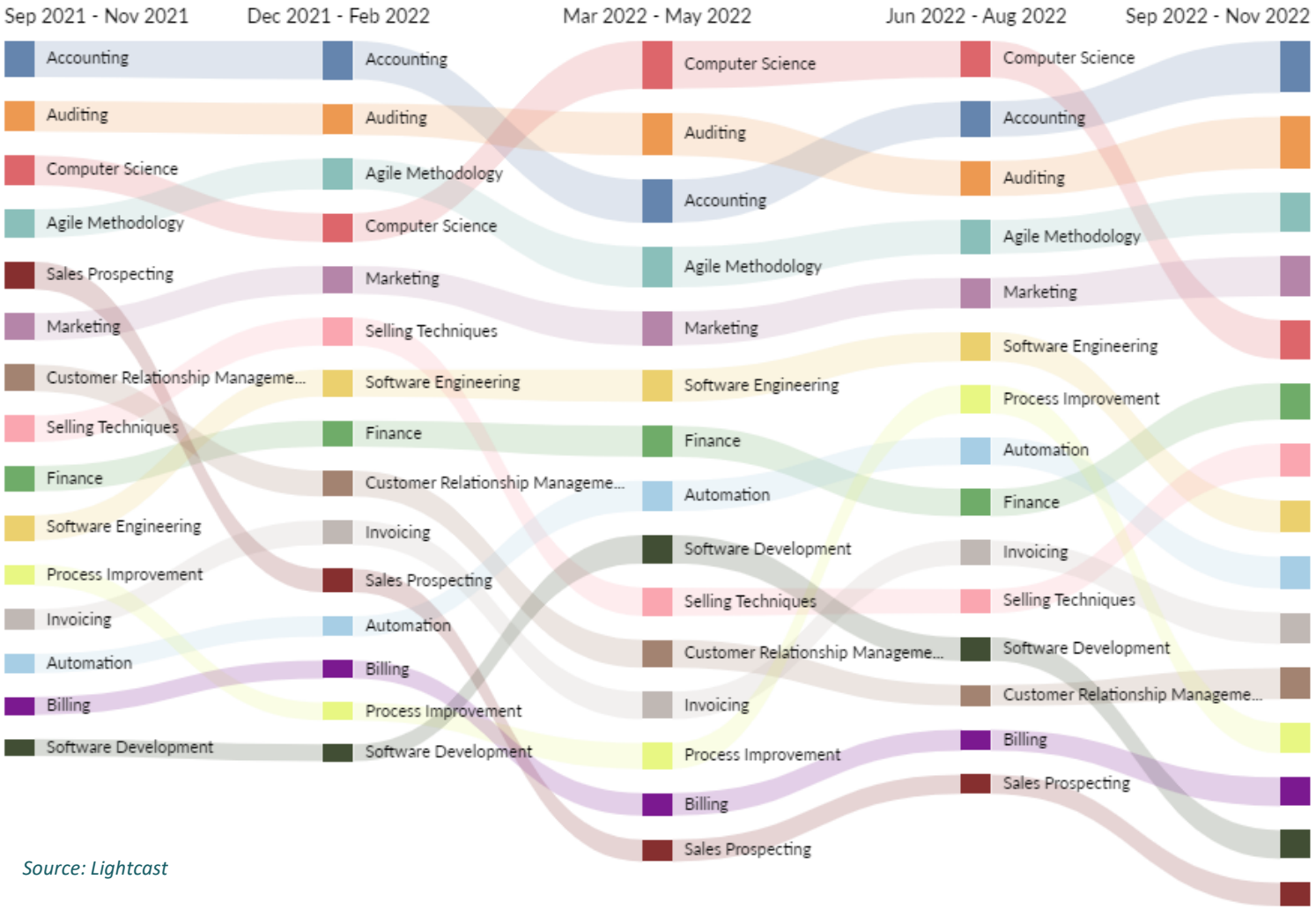
Source: Lightcast

Among the top occupations by size, growth, and concentration, there is overlap in the following specialized skills:

- Hand Tools (5 occupations have this in their top 5 specialized skills)
- Agile Methodology (3)
- New Product Development (4)
- Auditing (3)
- Calipers (3)
- Marketing (3)
- Merchandising (3)
- Project Management (3)
- Soldering (3)

The top 15 in-demand skills for Life Sciences' occupations with at least 100 jobs in 2021 – and the change in employer demand for those skills over the past year – are shown below. Demand for Accounting, Auditing, Agile Methodology, and Marketing has been fairly consistent since September 2021, while demand for Computer Science has decreased recently. Demand for Sales Prospecting, Customer Relationship Management, Selling Techniques has been volatile over this period.

In-Demand Specialized Skills for Life Sciences



Source: Lightcast

Top Occupation Completions by Institution

The training pipelines for the 20 largest occupations are shown below. The average number of completions at the State's higher education institutions is providing more than enough workers to cover the number of average annual openings among occupations that require formal training.[3] Most of the occupations that require only a high school diploma do have training programs available in the State; however, the presence of gaps among these occupations is not a concern as a program completion is not typically required to enter the occupation.

Training Pipeline for New Hampshire's Top 20 Life Sciences Occupations

SOC	Occupation	Educational Requirements	Active Programs (2021)	Average Annual Openings (2016 - 2021)	-	Average Annual Completions (2011 - 2021)	=	Gap
43-9061	Office Clerks, General	High school diploma or equivalent	19	2,268		59		2,209
11-1021	General and Operations Managers	Bachelor's degree	137	1,954		7,713		(5,759)
43-4051	Customer Service Representatives	High school diploma or equivalent	70	1,876		6,267		(4,391)
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	High school diploma or equivalent	73	850		6,313		(5,463)
51-2098	Miscellaneous Assemblers and Fabricators	High school diploma or equivalent	0	809		0		809
15-1252	Software Developers	Bachelor's degree	57	773		1,257		(483)
13-1082	Project Management Specialists	Bachelor's degree	157	641		7,652		(7,012)
43-5071	Shipping, Receiving, and Inventory Clerks	High school diploma or equivalent	2	623		2		620
11-3021	Computer and Information Systems Managers	Bachelor's degree	95	562		6,195		(5,632)
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	High school diploma or equivalent	4	514		42		472
51-1011	First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	6	393		268		124
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	High school diploma or equivalent	4	383		29		355
51-9161	Computer Numerically Controlled Tool Operators	High school diploma or equivalent	7	356		54		301
17-2141	Mechanical Engineers	Bachelor's degree	11	209		296		(87)
17-2071	Electrical Engineers	Bachelor's degree	6	200		207		(7)
17-2112	Industrial Engineers	Bachelor's degree	7	186		173		13
11-9041	Architectural and Engineering Managers	Bachelor's degree	47	143		778		(635)
51-9111	Packaging and Filling Machine Operators and Tenders	High school diploma or equivalent	0	142		0		142
31-9097	Phlebotomists	Postsecondary nondegree award	5	95		43		51
19-4021	Biological Technicians	Bachelor's degree	26	70		432		(362)

Source Lightcast

[3] For most occupations there are academic fields that "directly prepare" students for that occupation. Active Programs counts the number of relevant academic fields that had some (>0) average annual completions at postsecondary institutions in New Hampshire. Average Annual Completions is the average of the number of certificates and degrees awarded each year in the relevant fields by NH postsecondary institutions from 2011 through 2021.

Competitive Benchmarking

Introduction

To provide context for understanding the relative size and performance of New Hampshire Life Sciences economy, Camoin Associates conducted a benchmark competitiveness assessment. The assessment compares New Hampshire to other Northeast states as well as compares select metros within the Northeast region.

States assessed include:

- Maine
- Vermont
- Massachusetts
- Connecticut
- Rhode Island
- New York

Metros assessed include:

- Albany-Schenectady-Troy, NY
- Berlin, NH
- Boston-Cambridge-Newton, MA-NH
- Concord, NH
- Corning, NY
- Keene, NH
- Laconia, NH
- Lebanon, NH-VT
- Manchester-Nashua, NH
- New Haven-Milford, CT
- New York-Newark-Jersey City, NY-NJ-PA
- Portland-South Portland, ME
- Providence-Warwick, RI-MA
- Rockingham County and Strafford County NH[4]
- Syracuse, NY
- Worcester, MA-CT

The assessment considers multiple variables relevant to the Life Science economy within the categories of:

- Employment, Earnings, and Occupations
- Innovation (state-level data only)
- Real Estate

[4] Note that Rockingham and Strafford County were analyzed as their own region, independent from the Boston-Cambridge-Newton MSA

Data was utilized from a variety of sources and when appropriate normalized to account for differences in geographic size.

Findings

Employment, Earnings, Occupations, and Output

Relative to its size, New Hampshire ranks very well in terms of Life Sciences' employment. Out of the seven northeast states that were examined, New Hampshire ranks:

- 1st in percent of job growth between 2016 and 2021
- 1st in job growth that is considered competitive (above expectations based on national and regional job growth factors)
- This employment growth has led to an above average concentration in Life Science jobs (Location Quotient) and points to likely future gains as well
- This growth is also associated with positive rankings in occupations within science, technology, engineering, and mathematics (STEM) where New Hampshire ranks 2nd, only behind Massachusetts
- In terms of economic output, New Hampshire Life Sciences is in the middle of the pack ranking 4th in terms of average earnings per job, and 3rd in terms of contribution to Gross Regional product (GRP)
- New Hampshire ranks 2nd in terms of percent of sales exported out of state, indicating its value-add within the larger region

At the regional level:

- In addition to the Boston-Cambridge-Newton region, which includes parts of New Hampshire, Manchester-Nashua, NH, Lebanon, NH-VT, Keene, NH, and Rockingham County + Strafford County, NH all contributed to growth.
- Earnings per job and contribution to Gross Regional Product (GRP) are above average relative to all regions for Boston-Cambridge-Newton, Manchester-Nashua; and Lebanon.
- STEM occupation rank above average in Boston-Cambridge-Newton, Manchester-Nashua; and Rockingham and Stafford Counties.
- Within New Hampshire, the cities of Manchester, Keene, and Lebanon have above average concentrations in Life Sciences jobs.

Rankings by Industry Employment Characteristics

Geography	2016 - 2021 % Change - All Industries	Rank	2021 Jobs - Life Sciences	Rank	2016 - 2021 % Change - Life Sciences	Rank	2021 Location Quotient - Life Sciences	Rank	2021 Competitive Effect- Life Sciences	Rank
New York-Newark-Jersey City, NY-NJ-PA	-2.0%	9	2,857,412	1	5.4%	4	1.06	9	-45,753	16
Boston-Cambridge-Newton, MA-NH	-0.5%	6	997,417	2	5.6%	3	1.23	2	-12,126	14
Albany-Schenectady-Troy, NY	-4.7%	13	119,202	6	-1.6%	12	0.97	13	-9,258	13
Providence-Warwick, RI-MA	-1.9%	8	224,126	3	-1.5%	11	1.08	8	-14,699	15
Worcester, MA-CT	0.3%	3	140,970	4	2.7%	7	1.21	3	-2,838	10
New Haven-Milford, CT	0.0%	4	126,596	5	0.9%	9	1.10	7	-5,480	11
Syracuse, NY	-5.3%	15	81,724	8	-3.3%	14	0.98	12	-7,212	12
Portland-South Portland, ME	2.9%	1	99,311	7	9.5%	1	1.11	6	3,691	1
Manchester-Nashua, NH	-0.3%	5	74,685	9	3.7%	6	1.20	4	-981	7
Corning, NY	-6.6%	16	13,792	13	-2.5%	13	1.38	1	-1,073	8
Lebanon, NH-VT	-1.4%	7	34,425	11	2.1%	8	1.12	5	-822	6
Keene, NH	-3.8%	11	9,904	14	4.9%	5	1.06	10	147	3
Concord, NH	-4.7%	12	21,183	12	-4.2%	15	0.92	14	-2,036	9
Laconia, NH	-2.4%	10	6,057	15	-4.7%	16	0.80	16	-573	5
Berlin, NH	-5.3%	14	2,997	16	0.8%	10	0.89	15	-109	4
Rockingham County + Strafford County NH	0.5%	2	64,134	10	8.0%	2	1.03	11	1,677	2
Maine	1.5%	1	203,464	5	5.0%	2	1.04	7	-176	2
Vermont	-4.6%	7	105,084	7	-0.3%	7	1.10	3	-5,697	3
Massachusetts	-0.5%	3	1,297,213	2	4.1%	3	1.20	1	-29,644	6
Connecticut	-3.4%	6	557,610	3	0.1%	6	1.12	2	-29,520	5
Rhode Island	-1.7%	4	154,394	6	0.4%	5	1.06	5	-7,577	4
New Hampshire	0.7%	2	217,020	4	5.4%	1	1.07	4	584	1
New York	-3.1%	5	2,863,254	1	3.7%	4	1.05	6	-77,705	7
United States	1.9%		45,181,219		5.6%		1.00		0	

Source: Lightcast

Ranking by Output and Occupation Characteristics

Geography	2021 Avg. Earnings Per Job - Life Sciences	Rank	2021 GRP - Life Sciences % of Total	Rank	2021 Sales - Life Sciences % Out of Region	Rank	2021 Total STEM Occupations % of all Occupations	Rank
New York-Newark-Jersey City, NY-NJ-PA	$102,664	2	24%	14	34%	16	5%	8
Boston-Cambridge-Newton, MA-NH	$127,523	1	36%	3	52%	11	8%	1
Albany-Schenectady-Troy, NY	$91,554	5	29%	9	59%	4	7%	3
Providence-Warwick, RI-MA	$78,855	13	29%	10	47%	14	5%	10
Worcester, MA-CT	$83,484	9	34%	5	54%	8	5%	7
New Haven-Milford, CT	$84,977	8	29%	11	46%	15	5%	11
Syracuse, NY	$80,351	12	27%	12	58%	5	5%	9
Portland-South Portland, ME	$80,668	11	32%	6	54%	9	5%	6
Manchester-Nashua, NH	$100,403	3	36%	2	56%	7	7%	4
Corning, NY	$95,830	4	44%	1	81%	1	8%	2
Lebanon, NH-VT	$88,119	7	35%	4	67%	2	4%	13
Keene, NH	$73,895	14	30%	8	65%	3	4%	14
Concord, NH	$81,979	10	25%	13	48%	13	5%	12
Laconia, NH	$73,430	15	22%	15	50%	12	3%	15
Berlin, NH	$64,644	16	17%	16	53%	10	3%	16
Rockingham County + Strafford County NH	$89,268	6	30%	7	56%	6	6%	5
Maine	$74,691	7	31%	4	54%	3	4.53%	7
Vermont	$76,294	6	33%	2	58%	1	5.20%	5
Massachusetts	$116,764	1	35%	1	49%	5	7.54%	1
Connecticut	$96,031	2	29%	5	48%	6	5.72%	4
Rhode Island	$79,628	5	29%	6	47%	6	5.75%	3
New Hampshire	$94,530	4	32%	3	54%	2	5.88%	2
New York	$95,803	3	24%	7	41%	7	4.82%	6
United States	$90,115		29%		9%		6%	

Source: Lightcast

Innovation

New Hampshire performs well (2nd) on federal SBIR/STTR award amounts as a percent of GRP but lags in funds from the National Institutes of Health (NIH), federal R&D for Department of Human Services, Higher Education R&D in Life Sciences and venture capital. This is an area where greater focus and collaboration among research institutions is warranted and can include the state's effort as a Federal EPSCoR designee. These lower levels of R&D in Life Sciences in New Hampshire also account for its low rankings on scientists and Ph. D recipients within the cluster. However, the state does rank well on STEM occupations (all industries) in the workforce. This bodes well for future growth and the cross section of Life Sciences with Advanced Manufacturing.

Rankings by Innovation Funding

	SBIR/STTR $ Awarded/ Life Sciences GRP	Rank	NIH $ Awarded/ Life Sciences GRP	Rank	Venture Capital Raised/ Life Sciences GRP	Rank
Connecticut	0.02%	5	0.87%	4	0.26%	3
Maine	0.01%	7	0.51%	6	0.05%	4
Massachusetts	0.09%	1	1.63%	1	5.37%	1
New Hampshire	0.06%	2	0.39%	7	0.02%	5
New York	0.02%	6	0.90%	3	0.77%	2
Rhode Island	0.03%	4	1.46%	2	0.01%	6
Vermont	0.05%	3	0.59%	5	0.00%	7

Source: SBA, NIH, CrunchBase, NSF, and Lightcast

Rankings by Innovation Funding & Scientists

	NSF Federal R&D - Dep Hum Serv/GRP	Rank	NSF Higher Education R&D Life Sci/Life Sci GRP	Rank	NSF Life Science Doctoral Recipients/Labor Force	Rank	NSF Individuals in Science and Engineering Occupations as a % of All Occupations	Rank	NSF Life Scientists as a % of All Occupations	Rank
Connecticut	0.21%	3	1.52%	1	0.01%	3	5.61%	3	0.26%	4
Maine	0.19%	4	0.25%	7	0.00%	7	3.83%	7	0.29%	3
Massachusetts	0.55%	1	0.98%	5	0.02%	1	7.51%	1	0.86%	1
New Hampshire	0.15%	7	0.85%	6	0.01%	6	5.79%	2	0.23%	6
New York	0.18%	6	1.28%	3	0.01%	5	4.55%	5	0.22%	7
Rhode Island	0.40%	2	1.08%	4	0.01%	2	5.44%	4	0.25%	5
Vermont	0.19%	5	1.42%	2	0.01%	4	4.46%	6	0.31%	2

Source: SBA, NIH, CrunchBase, NSF, and Lightcast

Real Estate

Data on real estate specific to Life Sciences is limited but does shed light on where New Hampshire ranks. New Hampshire ranks 3rd in average lease rates (lowest=1) making the state competitive for tenants who are seeking space. It also ranks 3rd in vacancy rates. The rate will need to be tracked over time to ensure there is a healthy level of available stock. The table on the follow page includes real estate data highlights.

Research and Development Properties

Geography	Total Inventory (SF)	Total Available (SF) 2022	Rank	Average Lease Rates	Rank	Vacancy Rates	Rank
New York-Newark-Jersey City, NY-NJ-PA	16,822,850	1,760,270	2	$18.16	11	2.9%	6
Boston-Cambridge-Newton, MA-NH	33,281,615	5,388,436	1	$19.63	12	10.9%	10
Albany-Schenectady-Troy, NY	377,763	96,680	6	$9.50	2	25.6%	12
Providence-Warwick, RI-MA	1,838,790	367,517	5	$9.69	4	14.3%	11
Worcester, MA-CT	2,930,494	601,723	4	$14.57	9	5.2%	8
New Haven-Milford, CT	2,196,606	968,720	3	$13.94	7	9.8%	9
Syracuse, NY*	110,542	0	11	$12.00	6	0.0%	1
Portland-South Portland, ME*	203,859	20,480	9	$17.00	10	0.0%	1
Manchester-Nashua, NH	1,910,434	66,413	7	$11.26	5	2.7%	5
Corning, NY	0	0		N/A		N/A	
Lebanon, NH-VT **	216,972	0	11	$7.00	1	0.0%	1
Keene, NH	0	0		N/A		N/A	
Concord, NH	171,992	5,988	10	$9.50	2	3.5%	7
Laconia, NH	0	0		N/A		N/A	
Berlin, NH	0	0		N/A		N/A	
Rockingham County + Strafford County NH	1,055,674	28,722	8	$14.46	8	1.2%	4
Maine*	218,709	20,480	7	$17.00	6	0.0%	1
Vermont **	361,832	38,680	5	$7.46	1	5.1%	4
Massachusetts	36,314,301	6,295,231	1	$19.13	7	11.1%	5
Connecticut	4,723,065	1,491,505	3	$12.44	4	15.1%	7
Rhode Island	915,829	35,523	6	$9.11	2	1.5%	2
New Hampshire	3,195,072	101,123	4	$11.70	3	2.2%	3
New York	13,271,243	2,067,350	2	$12.96	5	14.4%	6
United States	477,018,913	57,788,651		$20.75		9.1%	

* The average lease rates in these regions are only for year 2020 as it was the most recent available data

** The average lease rates in these regions are only for year 2018 as it was the most recent available data

Source: CoStar

Glossary

Average Earnings Per Job (Industry)

Also called "average earnings per worker," average earnings is the result of total pre-tax industry earnings divided by same-year industry employment. Earnings are defined as labor-related personal income—that is, income from work. Income from stock dividends or interest, rents, Social Security and other non-work sources are not included. Average earnings is the sum of wages and salaries, and supplements.

Demand (I-O)

Demand is an estimate of the amount of goods and services required by a region. The value is calculated using industry purchases across the nation, measured in terms of sales. Industry wages, taxes, and other values added payments are indirectly part of the demand through the production of the supplying industry. It is not possible to know the proportions into which demand should be broken out into categories such as wages, taxes, etc., but it is assumed that demand includes those categories.

Exports (I-O)

Exports show the amount of money that is spent by industries located outside the region in exchange for goods or services produced by an industry located in the region. Exports can be either foreign or domestic. An example of foreign exports would be a business in Toronto purchasing consulting services from a consulting firm in New York in exchange for dollars. An example of domestic exports would be a firm in Maryland selling a software product to a firm in Alabama—the Maryland firm has exported its product to Alabama in exchange for dollars. Both the consulting and software examples are considered exports, because a good or service is leaving the region, and dollars are entering the region in exchange. The exports figure does not directly include wages of employees in the industry from which goods or services were purchased. Money entering the region in exchange for goods and services exported out of the region will likely be indirectly used to pay employees (regardless of where the employee lives), but the exports figure is agnostic of what the industry producing the good or service will do with the money.

Gross Regional Product (GRP)

Gross Regional Product (GRP) is simply GDP for the region of study. More commonly, GRP is GDP for any region smaller than the United States, such as a state or metro. GRP measures the final market value of all goods and services produced in the region of study. GRP is the sum of total industry earnings, taxes on production & imports, and profits, less subsidies (GRP = earnings + TPI + profits – subsidies).

Imports (I-O)

Imports show the amount of money that is spent by all industries located in the region in exchange for goods or services produced by an industry located outside the region. Money leaves the region, and a good or service is brought into the region and consumed. Imports can be foreign or domestic. An example of foreign imports would be a firm in New York paying money for consulting services from a firm in Toronto. An example of domestic imports would be the same firm in New York purchasing consulting services from a firm in Alabama. The imports figure does not directly include wages of employees in the industry from which goods or services were purchased. Money used to purchase imported goods and services will likely be indirectly used to pay employees of the industry from which the good or service was purchased (regardless of where the employee lives), but the imports figure is agnostic of what the industry producing the good or service will do with the money.

Location Quotient

Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region "unique." For example, if the leather products manufacturing industry accounts for 10% of jobs in an area but 1% of jobs nationally, then the area's leather-producing industry has an LQ of 10. So in the area, leather manufacturing accounts for a larger than average "share" of total jobs—the share is ten times larger than normal.

North American Industry Classification System (NAICS)

The North American Industry Classification System (NAICS) is the standard federal system for classifying business establishments. Each establishment is assigned a six-digit code and category title, organizing them primarily by similar production processes into five levels: sectors, subsectors, industry groups, industries, and national industries (national industries are specific to one or more of

the United States, Canada, and Mexico). Codes are hierarchical: less detailed categories are derived by removing digits from the end of more detailed codes.

Example

- 23: Construction (sector)
- 236: Construction of Buildings (subsector)
- 2362: Nonresidential Building Construction (Industry Group)
- 23622: Commercial and Institutional Building Construction (industry)
- 236220: Commercial and Institutional Building Construction (national industry which in this case is identical to its parent industry)

The NAICS classification is updated every five years to better reflect economic realities.

Shift Share

Used in both industry and occupation contexts, Shift Share is a standard method of regional economic analysis that helps identify whether job change in an industry/occupation in a region is due to national factors–the "rising tide lifts all boats" phenomenon–or whether it is due to factors within the region of study itself.

An industry/occupation could be growing/declining in a region because of one or several of the following factors:

- Growth Effect, the overall growth/decline of the entire national economy
- Industry/Occupation Mix Effect, the growth/decline of the industry/occupation in question at a national level
- Competitive Effect, growth/decline that cannot be explained completely by national trends and therefore highlights something unique about the region of study. The most important of the three is Competitive Effect, which identifies region-specific factors as being responsible for the growth/decline of the industry/occupation in question.

Expected Change shows the expected growth/decline for the industry/occupation in region in question given the National Growth Effect and the Industry/Occupation Mix Effect. The Competitive Effect is the leftover effect (if any) that cannot be explained by the National Growth Effect and Industry/Occupation Mix Effects as shown in the Expected Change metric.

Sales (I-O)

In input-output modeling, Sales is an industry's total annual sales (gross receipts), both to other industries and to consumers as well. Sales is representative of all four Classes of Worker. For the Retail (44), Wholesale (42), and Transportation (48) sectors, sales are only inclusive of the respective margin.

Standard Occupation Classification (SOC)

The Standard Occupational Classification (SOC) system is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one of about 775 detailed occupations according to their occupational definition. To facilitate classification, detailed occupations are combined to form about 450 broad occupations, about 95 minor groups, and 23 major groups. Detailed occupations in the SOC with similar job duties, and in some cases skills, education, and/or training, are grouped together.

The SOC system uses hyphenated codes to divide occupations into four levels: major groups, minor groups, broad occupations, and detailed occupations.

- 29-0000: Healthcare practitioners and technical occupations (major group)
- 29-1000: Health diagnosing and treating practitioners (minor group)
- 29-1020: Dentists (broad occupation)
- 29-1021: Dentists, general (detailed occupation)

The SOC classification system was updated in 2010, and the update to the 2018 classification is currently happening across various government LMI datasets.

Life Sciences Cluster 6 Digit NAICS Descriptions

NAICS Code	Full Description	Short Description
325411	Medicinal and Botanical Manufacturing	Medicinal and Botanical Mfg.
325412	Pharmaceutical Preparation Manufacturing	Pharmaceutical Preparation Mfg.
325413	In-Vitro Diagnostic Substance Manufacturing	In-Vitro Diagnostic Substance Mfg.
325414	Biological Product (except Diagnostic) Manufacturing	Biological Product (except Diagnostic) Mfg.
327212	Other Pressed and Blown Glass and Glassware Manufacturing	Other Pressed and Blown Glass and Glassware Mfg.
333314	Optical Instrument and Lens Manufacturing	Optical Instrument and Lens Mfg.
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	Electro- medical/therapeutic Apparatus Mfg.
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process	Instruments to Control Industrial Processes
334514	Totalizing Fluid Meter and Counting Device Manufacturing	Totalizing Fluid Meter and Counting Device Mfg.
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	Instrument Mfg. to Measure & Test Electrical
334516	Analytical Laboratory Instrument Manufacturing	Analytical Laboratory Instrument Mfg.
334517	Irradiation Apparatus Manufacturing	Irradiation Apparatus Mfg.
334519	Other Measuring and Controlling Device Manufacturing	Other Measuring and Controlling Device Mfg.
339112	Surgical and Medical Instrument Manufacturing	Surgical and Medical Instrument Mfg.
339113	Surgical Appliance and Supplies Manufacturing	Surgical Appliance and Supplies Mfg.
339114	Dental Equipment and Supplies Manufacturing	Dental Equipment and Supplies Mfg.
339115	Ophthalmic Goods Manufacturing	Ophthalmic Goods Mfg.
339116	Dental Laboratories	Dental Laboratories
541380	Testing Laboratories	Testing Laboratories
541713	Research and Development in Nanotechnology	Research and Dev. in Nanotechnology
541714	Research and Development in Biotechnology (except Nanobiotechnology)	Research and Dev. in Biotechnology
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and	Research and Dev. in Life Sciences
621511	Medical Laboratories	Medical Laboratories
621512	Diagnostic Imaging Centers	Diagnostic Imaging Centers
621991	Blood and Organ Banks	Blood and Organ Banks

Source: Census & Camoin

New Hampshire Life Sciences Industry Strategy

Emerging Opportunities and Industry Trends

Contents

Data Attachments

Introduction

In continuation of the Life Sciences Assessment and Strategy initiated by BEA, this section of research and analysis documents the emerging trends in the five industry groups identified in Life Sciences (noted in the graphic to the right). This research, in conjunction with ongoing interviews and onsite visits will answer the following research questions:

- *What are the emerging trends at a national and global level in the industry groups that are most prevalent in the State of New Hampshire?*
- *What are New Hampshire's strengths, challenges and opportunities related to these trends?*

For this assessment, Camoin utilized several different data sources to analyze emerging trends. These sources include:

- *Detailed industry reports at the 5-digit NAICS level from IBISWorld, a leading industry market research provider*
- *Data on Innovation and R&D*
- *The 2021 New Hampshire University Research and Industry Plan, commissioned by the NH EPSCoR[1] and supported by the New Hampshire Research and Industry Council*
- *Desktop research & interviews*
- *Previous labor market and industry analysis conducted as part of this assessment.*

Industry Groups


Medical Device Manufacturing


Medical Equipment and Supplies Manufacturing


Research and Development


Pharmaceutical and Medicine Manufacturing


Medical and Diagnostic Laboratories

[1] EPSCoR stands for Established Program to Stimulate Competitive Research

Overall Life Science Industry: US Performance Trends and Projections

All Life Sciences' industry groups, except **Medical Device Manufacturing**, which experienced a slight decline in revenue the past five years, experienced employment and revenue growth between 2017-2022. Growth is projected to continue for all industry groups through 2027.[2] Growth in employment is projected to be strongest in **Pharmaceutical and Medicine Manufacturing** (4.18%) and growth in revenues is projected to be strongest in **Medical and Diagnostic Laboratories** (2.57%) and **Pharmaceutical and Medicine Manufacturing** (2.36%).

Exports will slightly decline in **Pharmaceutical and Medicine Manufacturing** (which were boosted by COVID-19 vaccines) but will increase for **Medical Equipment and Supplies** and **Medical Device Manufacturing**. Foreign export potential reveals the following export opportunities for the State of New Hampshire:

- *Highest potential opportunities, attainable in the short-term:* Canada, Germany, United Kingdom, Netherlands
- *Long-term opportunities, more investment and research required:* China, South Korea, Japan, Hong Kong

Industry Group Trends and Projections

Medical Device Manufacturing

- Employment, revenue, and export annual growth rates are projected to outpace historical rates through 2027.
- Industry growth will be driven by demographic trends (aging population), increased access to healthcare through expanded insurance coverage, and technology enabling new and improved products.
- Recent globalization of the market has caused increased threats from import competitors and additional emphasis on costs. Dollar valuation, geopolitical stabilization and U.S. attempts to re-shore manufacturing capacity will be external factors affecting success.

[2] Findings from this section are derived from IBIS World, a national leader in industry market research. This data reflects national and global trends.

Medical Equipment and Supplies Manufacturing

- Revenue and export annual growth rates through 2027 are projected to outpace the last five years. Employment is also projected to grow though at rates slightly below the past five years.
- General increased demand for medical equipment should benefit from larger positive trends in health services demand, spending on R&D and an aging population that is more reliant on visual aids. Export growth and emerging markets should see growth from a weakening dollar and innovative product lines. A backlog of deferred services due to the pandemic will spur demand as the economy continues to normalize.

Pharmaceutical and Medicine Manufacturing

- Employment and revenue annual growth rates through 2027 are projected to outpace growth in the past five years. Exports are projected to grow but at a significantly lower rate over the next five years due to an eventual slowing of vaccine exports.
- Demographics and consumer sentiment are moving in the right direction for a mix of sectors that have a track record (and current investment in R&D levels) for delivering innovative products. A changing regulatory environment and post-pandemic normalization of downstream industries will create opportunity for pharmaceuticals to maintain consistent growth.
- Market fundamentals, especially import competition and labor costs are directing firms towards more niche and high margin areas of drug research like therapy areas for rare diseases and oncology.

Research and Development Services

- Annual employment growth rates between now and 2027 are projected to slightly outpace historical rates, while revenue growth is projected to slow.
- R&D will benefit from positive headwinds by a supportive federal government, the return to normal for consumer and product development demand and demographic trends whose health needs will require innovative life sciences solutions. The evolution and growth of private and non-profit/institutional segments should diversify growth opportunities and help weather near term economic volatility.
- Overlap with developments in digital technology and applications for new approaches to research will create novel and dynamic investments at the intersection of digital-material-biological R&D.

Medical and Diagnostic Laboratories

- Employment and revenue annual growth rates through 2027 projected to outpace historical rates in past five years.
- Aging demographics and demand from COVID and other diseases are keeping demand high for preventative and diagnostic screening. Additionally deferred health services due to the pandemic combine with aging demographics that create a near limitless demand for organ transplants.
- More healthcare systems and providers including Medicare, are recognizing the importance of diagnostic testing and for disease prevention and improving long-term health outcomes thus increasing demand for services.
- The industry is expected to benefit from scientific advances that yield new-and-improved service capabilities. Medical advancements are expected to enable more accurate and timelier diagnoses and treatments. Research in genomics will result in the development of more specialized diagnostic tests. Esoteric tests include procedures in molecular diagnostics, protein chemistry, cellular immunology and advanced microbiology. These tests are typically reimbursed at higher rates and therefore desired by industry.

Innovation Environment [3]

- SBIR/STTR Awards - New Hampshire outperformed the US in the amount awarded as a percent of GRP and has consistently been higher over the past six years.
- National Institute of Health (NIH) Awards – The State slightly underperforms the country over past five years when benchmarked using the amount awarded as a percent of GRP.
- National Science Foundation (NSF) Awards - New Hampshire's award amount as a percent of GRP is similar to that of the nation over the last five years.
- Venture Capital Funding - New Hampshire underperforms the nation over past six years in venture capital funds raised as a percent of GRP.
- R&D Expenditures - New Hampshire has outperformed the nation in R&D expenditures from all sectors as a percent of GRP over the past 5 years (where data is available).
- UNH Technology Transfer - UNH outperforms its peers in terms of total licenses and options executed as well as invention disclosures but underperforms in terms of new patent applications and new startups formed.

[3] As summarized in Report 1

R&D Innovation and Investment Performance Indicators

R&D and investment in commercialization provide indications of a state's capacity to leverage opportunities for industry growth. In the Industry Analysis section of this report, Camoin reported on R&D and investment indicators and found mixed results, which are summarized as follows:

Indicator	Performance	Status
SBIR/STTR Awards		New Hampshire outperformed the US in the amount awarded as a percent of GRP and has consistently been higher over the past six years.
NIH Awards		The State slightly underperforms the country over past five years when benchmarked using the amount awarded as a percent of GRP.
NSF Awards		New Hampshire's award amount as a percent of GRP is similar to that of the nation over the last five years.
Venture Capital Funding		New Hampshire underperforms the nation over past six years in venture capital funds raised as a percent of GRP.
R&D Expenditures		New Hampshire has outperformed the nation in R&D expenditures from all sectors as a percent of GRP over the past 5 years (where data is available).
UNH Technology Transfer		UNH outperforms its peers in terms of total licenses and options executed as well as invention disclosures but underperforms in terms of new patent applications and new startups formed.

KEY

 Performing well compared to the US

 Performing average compared to the US

 Performing poorly compared to the US

NH EPSCoR Program

In 2021, the NH EPSCoR program and the NH Research and Industry Council commissioned and then adopted the New Hampshire University Research and Industry Plan to guide R&D investment and "advance our state's competitiveness in science and engineering and foster partnerships with technology-based businesses that enhance job creation and economic development[4]." The key findings form that effort specifically related to emerging life science opportunities include:

- Overall, Life Sciences is performing well in New Hampshire and offers significant future economic opportunities.
- There are strong companies with national and global presence and a growing presence of small to medium sized companies.
- There is a strong connection to manufacturing and IT industries.
- Dartmouth's strength is computer science and related analytics; along with UNH's quantitative biology and bioinformatics at the UNH Hubbard Center for Genome Studies.
- Critical challenges exist including:
    - Getting the word out nationally about presence, performance, and opportunities in New Hampshire
    - Better connecting assets within the State's ecosystem – i.e. Dartmouth's work and related companies to rest of state
    - Attracting venture capital
    - Need for more start-ups and acceleration
    - Workforce – attracting and retaining the level of workers needed in the future at all education and skill levels
    - Absence of a medical school at UNH
- Targeted industry opportunities include:
    - MedTech
    - Medical device and equipment
    - Pharmaceutical research and manufacturing
    - Tissue and organ development
    - Research, Testing, and Medical Laboratories
    - Bioscience-Related Distribution

[4] 2021 New Hampshire University Research and Industry Plan, Keen Point Consulting LLC and Research Triangle Incorporated (RTI) for NH Research and Industry Council and NH EPSCoR, September 24, 2021

New Hampshire Life Sciences Industry Strategy

Data Attachment A: Industry Trends

US Industry Trends Forecasts

In order to better understand emerging opportunities within Life Sciences industries for the State of New Hampshire, Camoin assessed national market trends and forecasts using data from IBISWorld, a leading industry market research provider. For this assessment, Camoin utilized detailed industry reports at the 5-digit NAICS level from IBISWorld.

Summary – Life Sciences – All Industry Groups

All Life Sciences industry groups except Medical Device Manufacturing (which experienced a slight decline in revenues the past five years) experienced employment and revenue growth in the past five years, 2017-2022, and growth is projected for all groups over the next five years through 2027. Growth in employment (4.19%) is projected to be strongest in Pharmaceutical and Medicine Manufacturing (4.18%) and growth in revenues is projected to be strongest in Medical and Diagnostic Laboratories (2.57%) and Pharmaceutical and Medicine Manufacturing (2.36%)

COVID-19 has mixed impacts, increasing some activity due to the need for testing, personal protection equipment, and vaccines; but also reducing activity for non-emergency services.

Key Growth Indicators – Life Sciences in the US, Compound Annual Growth Rates

	Employment		Revenue		Exports	
Industry Group	**2017-2022**	**2022-2027**	**2017-2022**	**2022-2027**	**2017-2022**	**2022-2027**
Medical Device Manufacturing	1.13%	1.76%	-0.09%	1.73%	-0.66%	2.23%
Medical Equipment and Supplies	1.64%	1.60%	0.30%	1.17%	-0.26%	1.96%
Pharmaceutical and Medicine Manufacturing	3.67%	4.18%	1.75%	2.36%	6.65%	1.78%
Research and Development Services	2.02%	2.08%	1.85%	1.85%	n/a	n/a
Medical and Diagnostic Laboratories	0.94%	2.93%	2.28%	2.57%	n/a	n/a

Source: IBIS

Exports will slightly decline from the rate of growth in the past five years for Pharmaceutical and Medicine Manufacturing (which were boosted by COVID vaccines) but will increase for Medical Equipment and Supplies and Medical Device Manufacturing. Grouping and summarizing foreign export potential reveals the following export opportunities:

- Canada, Germany, United Kingdom, Netherlands
- China, South Korea, Japan, Hong Kong
- Mexico

Industry Detail

Medical Device Manufacturing

Employment, revenue, and export annual growth rates through 2027 are projected to outpace historical rates in past five years.

Industry growth will be driven by demographic trends (aging population), increased access to healthcare through expanded insurance coverage, and technology enabling new and improved products.

Recent globalization of the market has caused increased threats from import competitors and additional emphasis on costs. Dollar valuation, geopolitical stabilization and U.S. attempts to re-shore manufacturing capacity will be external factors affecting success.

Medical Equipment and Supplies Manufacturing

Revenue and export annual growth rates through 2027 are projected to outpace historical rates. Employment is also projected to grow at rates slightly below the past five years.

General increased demand for medical equipment should benefit from larger positive trends in health services demand, spending on R&D and an aging population more reliant on visual aids. Export growth and emerging markets should see growth from a weakening dollar and innovative product lines. A backlog of deferred services due to the pandemic should spur demand as the economy continues to normalize.

Pharmaceutical and Medicine Manufacturing

Employment and revenue annual growth rates through 2027 are projected to outpace historical rates. Exports are projected to grow but at a significantly lower rate over the next five years due to an eventual slowing of vaccine exports.

Demographics and consumer sentiment are moving in the right direction for a mix of sectors that have a track record (and current investment in R&D levels) for delivering innovative products. A changing regulatory environment and post-pandemic normalization of downstream industries will create opportunity for pharmaceuticals to maintain consistent growth.

Market fundamentals, especially import competition and labor costs are directing firms towards more niche and high margin areas of drug research like therapy areas for rare diseases and oncology.

Research and Development Services

Employment annual growth rates through 2027 are projected to slightly outpace historical rates while revenue growth is projected to slow.

R&D should benefit from positive headwinds by a supportive federal government, the return to normal for consumer and product development demand and demographic trends whose health needs will require innovative Life Sciences solutions. The evolution and growth of private and non-profit/institutional segments should diversify growth opportunities and help weather near term economic volatility.

Overlap with developments in digital technology and applications for new approaches to research will create novel and dynamic investments at the intersection of digital-material-biological R&D.

Medical and Diagnostic Laboratories

Employment and revenue annual growth rates through 2027 are projected to outpace historical rates.

Aging demographics and demand from COVID and other diseases are keeping demand high for preventative and diagnostic screening. Additionally deferred health services due to the pandemic combine with aging demographics that create a near limitless demand for organ transplants.

More healthcare systems and providers including Medicare, are recognizing the importance of diagnostic testing and for disease prevention and improving long-term health outcomes thus increasing demand for services.

The industry is expected to benefit from scientific advances that yield new-and-improved service capabilities. Medical advancements are expected to enable more accurate and timelier diagnoses and treatments. Research in genomics will result in the development of more specialized diagnostic tests. Esoteric tests include procedures in molecular diagnostics, protein chemistry, cellular immunology, and advanced microbiology. These tests are typically reimbursed at higher rates and therefore desired by industry.

Industry Group Detail

Medical Device Manufacturing

Comprises establishments primarily engaged in manufacturing navigational, measuring, electromedical, and control instruments. Examples of products made by these establishments are aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment.

Industries and NAICS Codes (IBIS 5 Digit):

Copier & Optical Machinery Manufacturing	33331
Navigational Instrument Manufacturing	33451a
Medical Device Manufacturing	33451b

The major products and services in this industry are:

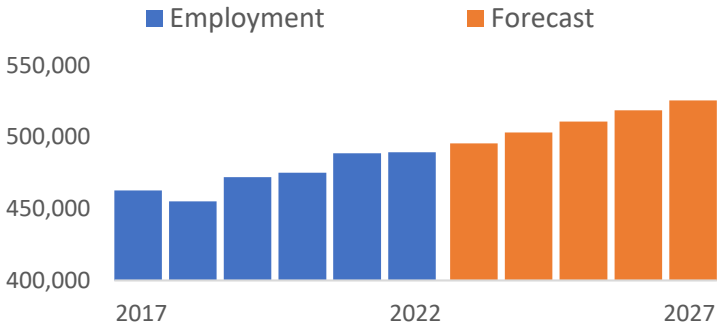
Optical instrument and lens manufacturing, photographic and photocopying equipment manufacturing, search, detection and navigation instruments, automatic environmental control instruments, industrial process control instruments, totalizing fluid meter and counting devices, electricity measuring and testing instruments, analytical laboratory instruments, neuromodulation and spinal devices, cardiovascular devices, diabetes devices, other devices, irradiation devices, patient recovery and noninvasive devices.

Key Growth Indicators

Employment in 2022: 489,391

Historical Growth Rate 2017 - 2022: 1.13%

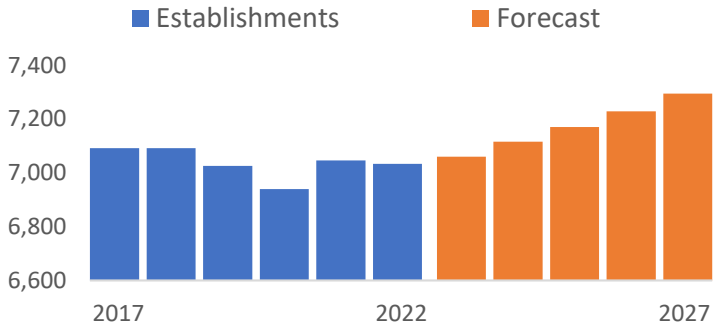
Forecast Growth Rate 2022 - 2027: 1.76%



Establishments in 2022: 7,033

Historical Growth Rate 2017 - 2022: -0.64%

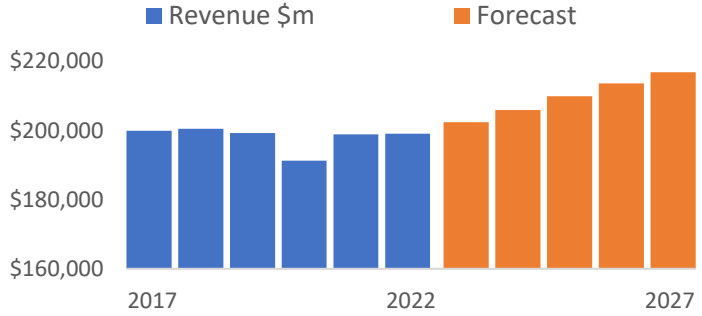
Forecast Growth Rate 2022 - 2027: 0.92%



Revenue in 2022: $199,002 M

Historical Growth Rate 2017 - 2022: -0.09%

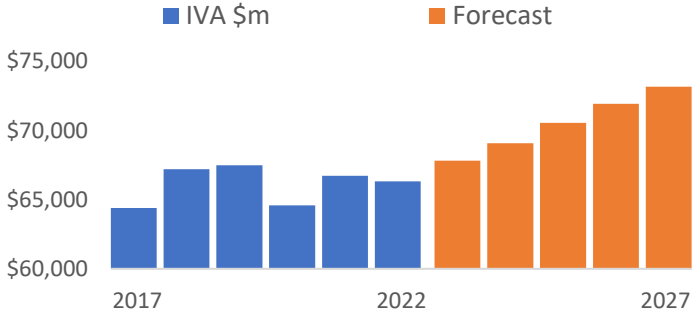
Forecast Growth Rate 2022 - 2027: 1.73%



Industry Value Add in 2022: 66,310

Historical Growth Rate 2017 - 2022: 0.59%

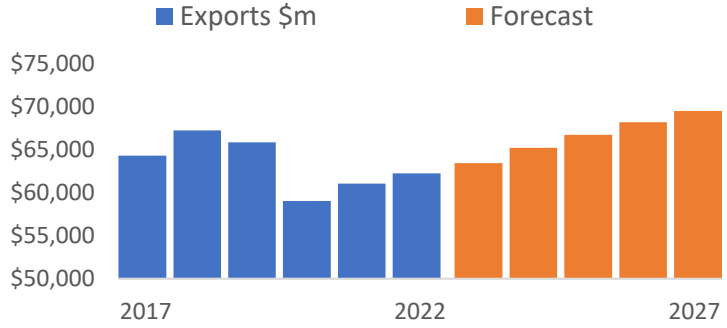
Forecast Growth Rate 2022 - 2027: 1.98%



Exports in 2022: $62,210 M

Historical Growth Rate 2017 - 2022: -0.66%

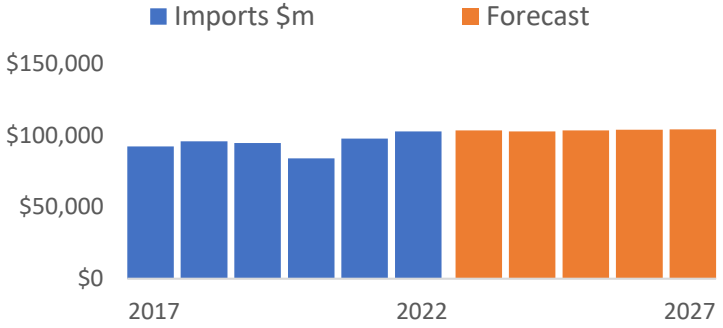
Forecast Growth Rate 2022 - 2027: 2.23%



Imports in 2022: 102,654

Historical Growth Rate 2017 - 2022: 2.20%

Forecast Growth Rate 2022 - 2027: 0.27%



Key Trends and Outlook

- High corporate profits (which typically indicate future investments), recovering consumer markets and stabilizing supply chains should mean revenue growth in the near forecast that outperforms the last few years
- Some of the spare capacity during Covid sent major players away from the traditional segments in commercial cooking equipment (no dine-in) and cleaning equipment (high office vacancy), and instead towards high value products related to Life Sciences. This shift is reinforced by current and anticipated growth in demand for health services
- Import competition, costs tracking higher than revenues and a strong dollar are threats to competitiveness and growth and have shown up in recent declining profit rates
- Consolidation and offshoring to emerging markets could provide easing of operating cost issues while building links to new consumer markets
- Control and technological devices will get a boost from CHIP legislation and the general trend of reshoring from China
- Demographic trends in the U.S. and other large economies ensure a growing elderly population with consequent high demand for health services whose providers are a significant source of demand
- Disruptions to (non-Covid) health services should retreat and restore additional demand
- Small companies are expected to continue to enter niche domestic markets, focusing on one or two medical devices.

Primary Export Countries:

- China
- South Korea
- Canada
- Japan
- Mexico

Primary Import Countries:

- China
- Mexico
- Japan
- Canada
- Germany
- Switzerland

Medical Equipment and Supplies Manufacturing

Comprises establishments primarily engaged in manufacturing (1) medical, surgical, ophthalmic, and veterinary instruments, (2) surgical appliances and supplies, (3) dental equipment and supplies used by dental laboratories and offices and (4) specialized glass forms by melting silica sand or cullet and making pressed, blown, or shaped glass or glassware (except glass packaging containers).

Industries and NAICS Codes (IBIS 5 Digit):

Glass Product Manufacturing	32721
Medical Instrument & Supply Manufacturing	33911a
Glasses & Contact Lens Manufacturing	33911b

The major products and services in this industry are:

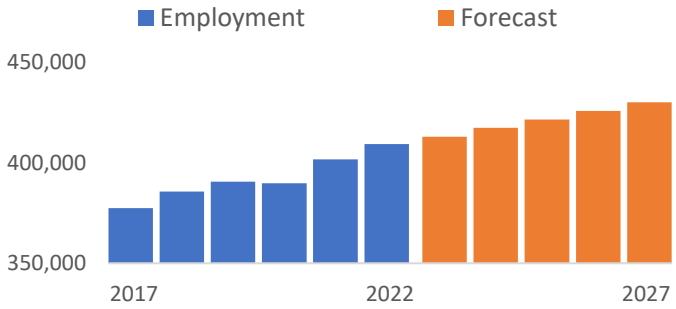
Pressed or blown glass & other glass products, glass containers, surgical appliances, surgical instruments, dental instruments and supplies, dental laboratories, hospital beds and other specialized hospital furniture, and personal safety equipment

Key Growth Indicators

Employment in 2022: 409,224

Historical Growth Rate 2017 - 2022: 1.64%

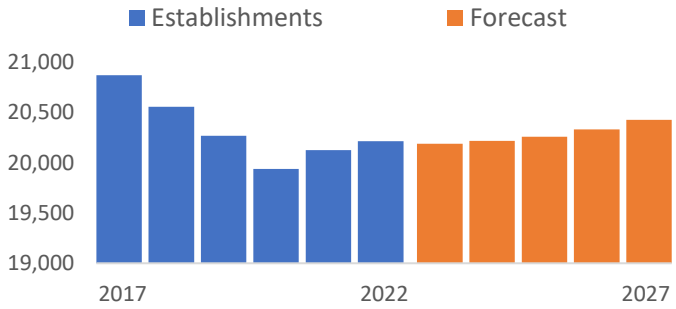
Forecast Growth Rate 2022 - 2027: 1.60%



Establishments in 2022: 20,212

Historical Growth Rate 2017 - 2022: -1.53%

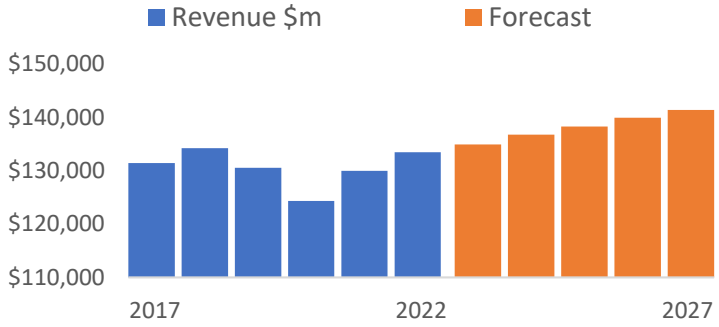
Forecast Growth Rate 2022 - 2027: 0.43%



Revenue in 2022: $133,424 M

Historical Growth Rate 2017 - 2022: 0.30%

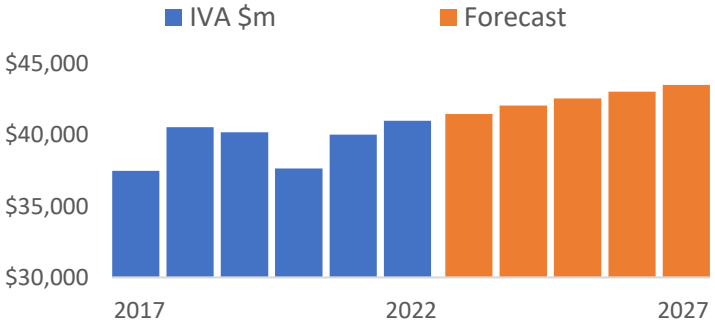
Forecast Growth Rate 2022 - 2027: 1.17%



Industry Value Add in 2022: 40,998

Historical Growth Rate 2017 - 2022: 1.82%

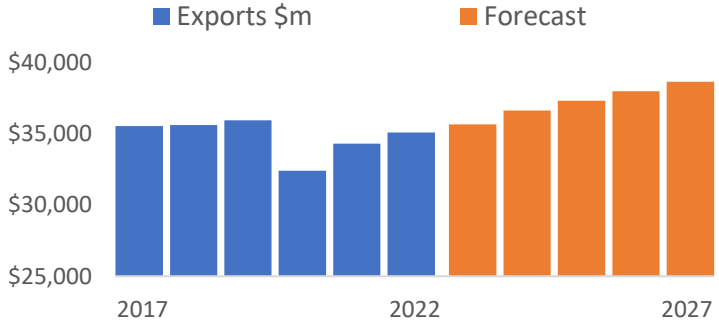
Forecast Growth Rate 2022 - 2027: 1.19%



Exports in 2022: $35,097 M

Historical Growth Rate 2017 - 2022: -0.26%

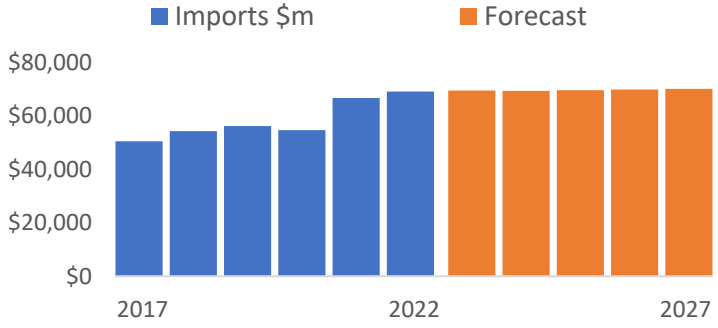
Forecast Growth Rate 2022 - 2027: 1.96%



Imports in 2022: 69,188

Historical Growth Rate 2017 - 2022: 6.46%

Forecast Growth Rate 2022 - 2027: 0.30%



**Growth rates are compound annualized growth*

Key Trends and Outlook

- A backlog of deferred services due to the pandemic should spur demand as the economy continues to normalize
- Larger companies with mature distribution channels are best positioned to take advantage of this upswing, but they are increasingly contested on price with GPOs
- Along with aging demographics in the US and elsewhere, emerging markets may provide the best opportunity for growth in order to capitalize on investments in product R&D
- Innovations in the diagnostic capabilities for lenses will open up new service lines and allow growth in areas less prone to imports
- Like pharmaceuticals, glass manufacturers have been responding to import competition by moving into more niche areas of application to maintain growth
- Growth in industrial and consumer uses for glass were heading up pre-pandemic and hopes are that a returning economy will similarly bring back high demand for products
- Advances in production techniques have allowed firms to maintain profitability with fewer high value employees
- R&D growth is a key downstream industry for glass manufacturing and its rosy forecast should spell the same for glass manufacturing
- As a manufacturing industry, medical instrument and supply manufacturing companies benefit from being located proximate to traditional manufacturing infrastructure, such as railroads, waterways and major highways; this benefits industry hotspots such as the Great Lakes, Southeast, and Mid-Atlantic regions which have logistics advantages
- The Medical Instrument and Supply Manufacturing industry is highly regulated by the Food and Drug Administration (FDA).

Primary Export Countries:

- China
- Netherlands
- Canada
- Japan
- Mexico
- Germany

Primary Import Countries:

- Mexico
- Japan
- Ireland
- Costa Rica
- Germany
- Italy
- China

Pharmaceutical and Medicine Manufacturing

Comprises of establishments primarily engaged in manufacturing (1) uncompounded medicinal chemicals (generally for use by pharmaceutical preparation manufacturers), (2) uncompounded botanicals, (3) in-vitro diagnostic substances and pharmaceuticals intended for internal and external consumption in dose forms, (4) in-vitro (i.e., not taken internally) diagnostic substances, such as chemical, biological, or radioactive substances, and (5) substances are used for diagnostic tests that are performed in test tubes, petri dishes, machines, and other diagnostic test-type devices. vaccines, toxoids, blood fractions, and culture media of plant or animal origin.

Industries and NAICS Codes (IBIS 5 Digit):

Brand Name Pharmaceutical Manufacturing	32541a
Generic Pharmaceutical Manufacturing	32541b
Biological Product (except Diagnostic) Mfg.	32541d

The major products and services in this industry are:

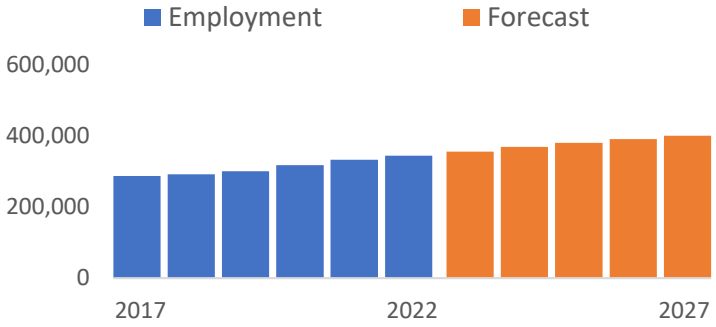
Diabetes prescriptions, oncology prescriptions, autoimmune prescriptions, respiratory prescriptions, mental health and nervous system prescriptions, antiviral medication, cardiovascular prescriptions, other prescriptions, cardiovascular disease, mental health and central nervous system, diabetes, pain, antibacterials, other, meal supplements, sports nutrition, specialty, herbs and botanicals, vitamins and minerals

Key Growth Indicators

Employment in 2022: 343,827

Historical Growth Rate 2017 - 2022: 3.67%

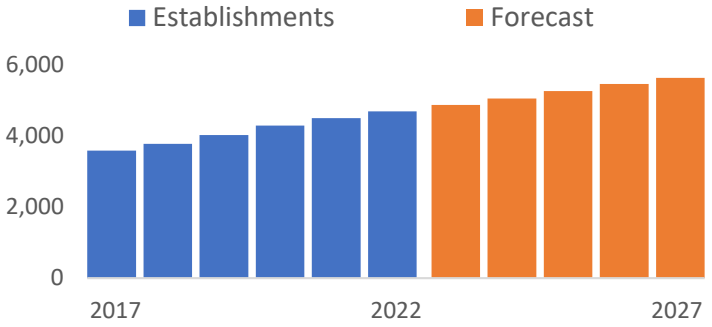
Forecast Growth Rate 2022 - 2027: 4.18%



Establishments in 2022: 4,680

Historical Growth Rate 2017 - 2022: 6.55%

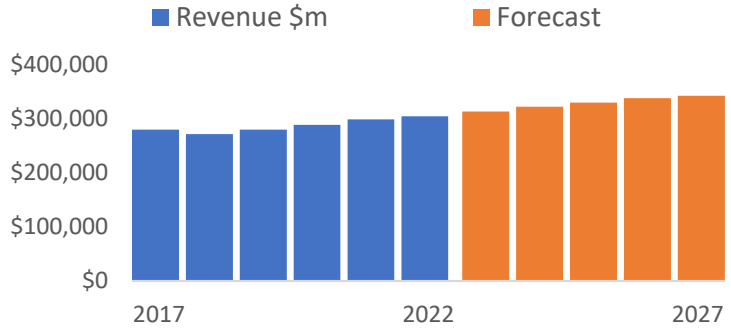
Forecast Growth Rate 2022 - 2027: 5.16%



Revenue in 2022: $305,001 M

Historical Growth Rate 2017 - 2022: 1.75%

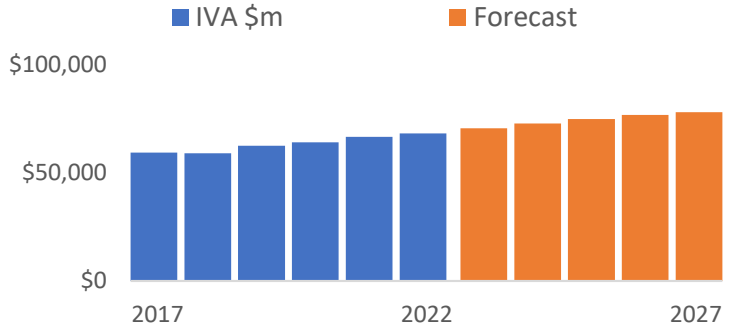
Forecast Growth Rate 2022 - 2027: 2.36%



Industry Value Add in 2022: 68,296

Historical Growth Rate 2017 - 2022: 2.86%

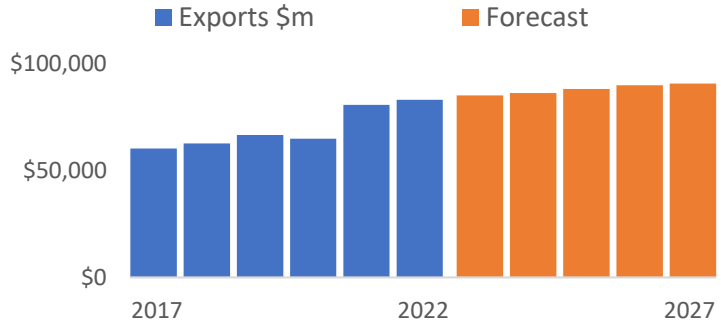
Forecast Growth Rate 2022 - 2027: 2.73%



Exports in 2022: $83,148 M

Historical Growth Rate 2017 - 2022: 6.65%

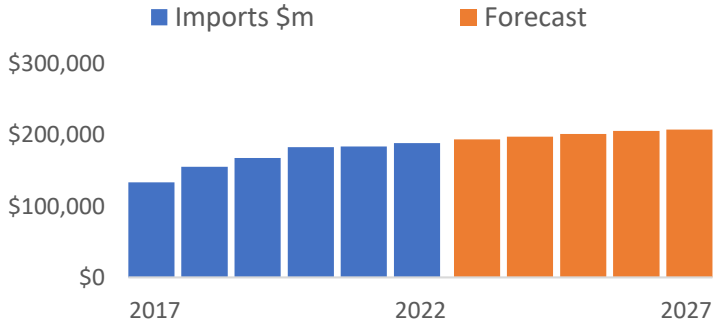
Forecast Growth Rate 2022 - 2027: 1.78%



Imports in 2022: 188,736

Historical Growth Rate 2017 - 2022: 7.21%

Forecast Growth Rate 2022 - 2027: 1.93%



**Growth rates are compound annualized growth*

Key Trends and Outlook

- Market fundamentals, especially import competition and labor costs are directing firms towards more niche and high margin areas of drug research like therapy areas for rare diseases and oncology
- Overall industry demand is driven by macro trends related to demographic shifts (older population), increased spending in R&D and higher share of people with health insurance covering pharmaceutical products
- Industry emphasis moving towards biologic and biosimilar drugs and another area of revenue growth is the expiration of exclusivity rights for major branded drugs
- On the heels of expedited COVID-19 vaccine approvals, the FDA is trying to accelerate approval processes and plans to reduce time for ANDA reviews by 20%
- Global demand for US vaccines should sustain export growth in the near term and then taper slowly
- As some of the major branded drugs expire (Humira, Stelara, Eylea, etc.) investments and employment in R&D should increase to strengthen the pipeline for future drugs
- Vitamin and supplement product markets are seeing increased adoption across consumer types interested in nutrition and preventative health
- Increasingly mainstream messaging on the industry, aided by media interest in the topic along with a return to normal rates of athletic participation should provide strong growth for supplements

Primary Export Countries:

- Netherlands
- Canada
- Japan
- United Kingdom
- Germany

Primary Import Countries:

- China
- Ireland
- Switzerland
- Germany

Research and Development Services

Comprises establishments primarily engaged in (1) performing physical, chemical, and other analytical testing services, (2) conducting nanotechnology research and experimental development. Nanotechnology research and experimental development involves the study of matter at the nanoscale (i.e., a scale of about 1 to 100 nanometers), (3) conducting biotechnology research and experimental development which involves the study of the use of microorganisms and cellular and biomolecular processes to develop or alter living or non-living materials and (4) research and experimental development in the physical, engineering, and Life Sciences. Note, this industry analysis excludes Research and Development Services within institutions of higher education. Their contribution is covered within the section of this report on Research and Development and Innovation Performance and Opportunity.

Industries and NAICS Codes (IBIS 5 Digit):

Laboratory Testing Services	54138
Scientific Research & Development	54171

The major products and services in this industry are:

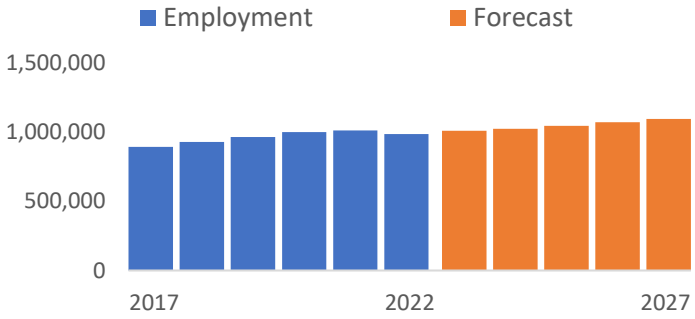
Environmental and biological testing, miscellaneous testing, physical and engineering sciences, Life Sciences, pharmaceuticals, biotechnology, medical and health sciences, licensing rights to intellectual property, other

Key Growth Indicators

Employment in 2022: 986,804

Historical Growth Rate 2017 - 2022: 2.02%

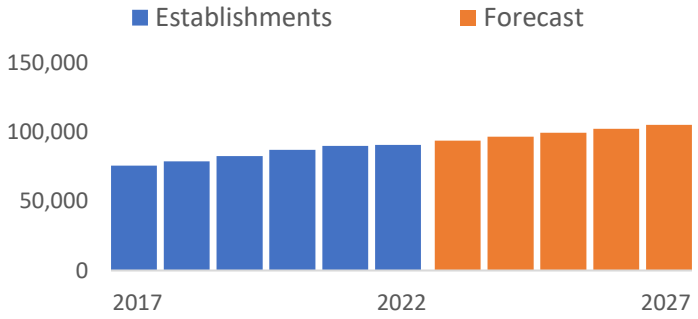
Forecast Growth Rate 2022 - 2027: 2.08%



Establishments in 2022: 90,811

Historical Growth Rate 2017 - 2022: 7.02%

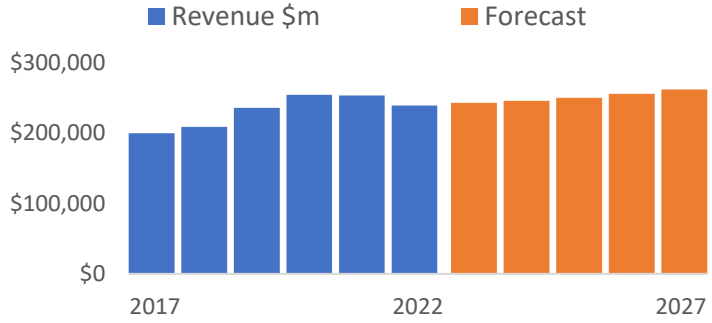
Forecast Growth Rate 2022 - 2027: 3.70%



Revenue in 2022: $239,245 M

Historical Growth Rate 2017 - 2022: 3.66%

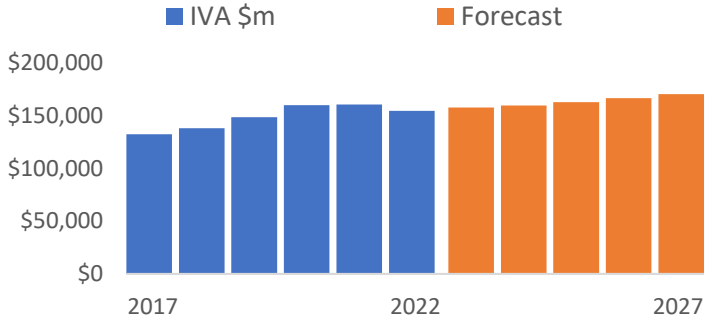
Forecast Growth Rate 2022 - 2027: 1.85%



Industry Value Add in 2022: 154,488

Historical Growth Rate 2017 - 2022: 3.13%

Forecast Growth Rate 2022 - 2027: 1.99%



Key Trends and Outlook

- As the federal government is among the largest sources of funding, social and political factors can be decisive for potential of future growth
- Institutional and non-profit research has emerged as a maturing segment within R&D
- Baby boomer's entering retirement and other demographic trends mix with increased levels of disease and chronic illness as key factors contributing to demand for health solutions
- Inflation Reduction Act and additional demand for biofuels will provide opportunity alongside health-related R&D
- Returning consumer demand should spur downstream needs for product testing
- Continued public health concerns along with increased governmental regulatory needs will create need as well
- Overlap with developments in digital technology and applications for new approaches to research will create novel and dynamic investments at the intersection of digital-material-biological R&D
- Scientific R&D with its diverse research areas is typified by low levels of concentration, but this may change as digitally enabled research and areas ripe for IP leverage become more accessible
- The industry remains U.S.-centric with high barriers to entry
- Although recession looms, private R&D funding should recover post-pandemic
- Higher interest rates force investors away from long-term returns like R&D, but hopefully easing rates over horizon will increase investor appetites

Medical and Diagnostic Laboratories

Comprises of establishments primarily engaged in manufacturing (1) uncompounded medicinal chemicals (generally for use by pharmaceutical preparation manufacturers), (2) uncompounded botanicals, (3) in-vitro diagnostic substances and pharmaceuticals intended for internal and external consumption in dose forms, (4) in-vitro (i.e., not taken internally) diagnostic substances, such as chemical, biological, or radioactive substances, and (5) substances are used for diagnostic tests that are performed in test tubes, petri dishes, machines, and other diagnostic test-type devices. vaccines, toxoids, blood fractions, and culture media of plant or animal origin.

Industries and NAICS Codes (IBIS 5 Digit):

Diagnostic & Medical Laboratories	62151
Blood & Organ Banks	62199

The major products and services in this industry are:

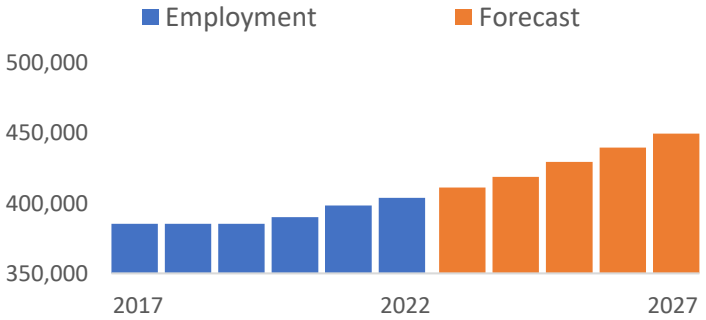
General pathology services, clinical pathology services, MRI imaging, anatomic pathology services, x-ray/radiology imaging, red blood cell collection, processing, and distribution services, blood plasma collection, processing, and distribution services, organ bank services, tissue bank services, all other human blood services, reproductive and stem cell bank services

Key Growth Indicators

Employment in 2022: 403,910

Historical Growth Rate 2017 - 2022: 0.94%

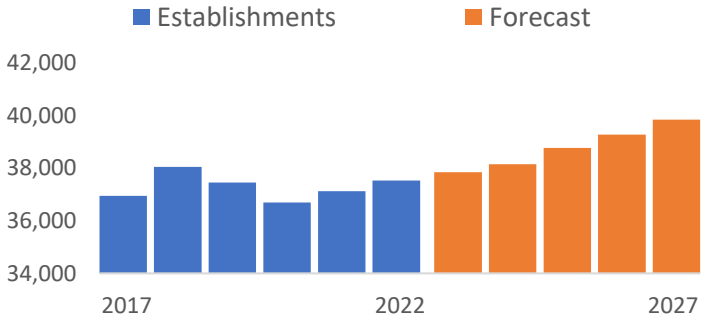
Forecast Growth Rate 2022 - 2027: 2.93%



Establishments in 2022: 37,534

Historical Growth Rate 2017 - 2022: 1.77%

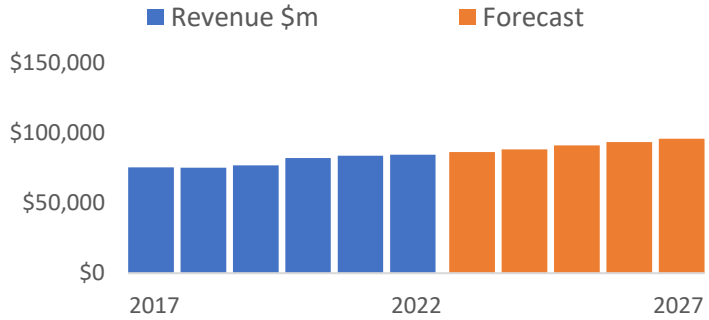
Forecast Growth Rate 2022 - 2027: 1.78%



Revenue in 2022: $84,603 M

Historical Growth Rate 2017 - 2022: 2.28%

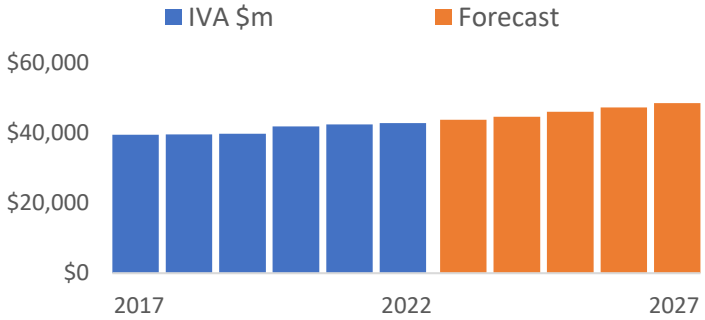
Forecast Growth Rate 2022 - 2027: 2.57%



Industry Value Add in 2022: 42,869

Historical Growth Rate 2017 - 2022: 1.62%

Forecast Growth Rate 2022 - 2027: 2.50%



**Growth rates are compound annualized growth*

Key Trends and Outlook

- Aging demographics and demand from COVID and other diseases are keeping demand high for preventative and diagnostic screening
- More healthcare systems and providers including Medicare, are recognizing the importance of diagnostic testing and for disease prevention and improving long-term health outcomes thus increasing demand for services
- Consolidation within the lab testing industry has enabled larger firms to secure contracts with hospitals and share R&D costs to boost profitability
- Managed-cost healthcare has allowed profitability for labs even as labor shortages and increased costs there and elsewhere have crept up
- The industry is expected to benefit from scientific advances that yield new-and-improved service capabilities. Medical advancements are expected to enable more accurate and timelier diagnoses and treatments. Research in genomics will result in the development of more specialized diagnostic tests. Esoteric tests include procedures in molecular diagnostics, protein chemistry, cellular immunology, and advanced microbiology. These tests are typically reimbursed at higher rates and therefore desired by industry
- Deferred health services due to the pandemic combine with aging demographics that create a near limitless demand for organ transplants
- Innovations in medical equipment will play a role in more effective and high-quality transplant operations
- Technology innovations that allow the production of transplants from stem cells could be a key to helping supply catch up with demand and increase revenue
- Industry challenges to growth include lack of the availability of skilled labor as the aging population retirees as well as cost pressures in healthcare

Emerging Opportunities and Challenges

Given the national market trends and projections, what are the emerging opportunities for New Hampshire Life Sciences and what challenges need to be addressed? To answer these questions, data on research and development and investment in commercialization provide indications of a state's capacity to leverage opportunities for industry growth. In the Industry Analysis section of this report, Camoin reported on R&D investment and commercialization indicators and found mix results in New Hampshire summarized as follows:

Indicator	Performance	Status
SBIR/STTR Awards		New Hampshire outperformed the US in the amount awarded as a percent of GRP and has consistently been higher over the past six years.
NIH Awards		The State slightly underperforms the country over past five years when benchmarked using the amount awarded as a percent of GRP.
NSF Awards		New Hampshire's award amount as a percent of GRP is similar to that of the nation over the last five years.
Venture Capital Funding		New Hampshire underperforms the nation over past six years in venture capital funds raised as a percent of GRP.
R&D Expenditures		New Hampshire has outperformed the nation in R&D expenditures from all sectors as a percent of GRP over the past 5 years (where data is available).
UNH Technology Transfer		UNH outperforms its peers in terms of total licenses and options executed as well as invention disclosures but underperforms in terms of new patent applications and new startups formed.

More detailed findings on New Hampshire R&D investment & commercialization performance indicators include:

SBIR/STTR Awards - The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are competitive programs that expand R&D funding opportunities for small businesses. Both programs are intended to promote entrepreneurial R&D and the commercialization of resulting innovations. Over the last six years, (2016-2021) companies in New Hampshire received 134 Life Sciences related SBIR/STTR awards, equaling over $98.9 million. Compared to the United States, New Hampshire has outperformed in receiving Life Sciences related SBIR/STTR awards; the amount awarded as a percent of GRP has consistently been higher for the state than the nation. Within the state, Creare, LLC (39 awards, $27.5 million) and Celdara Medical, LLC (22 awards, $19.5 million) were the top award recipients over this period.

National Institutes of Health (NIH) Awards - The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, provides critical funding for Life Sciences research. Over the five-year period from 2017-2021 organizations in New Hampshire received 1,162 NIH awards equaling nearly $572.9 million in funding. The number of awards and amount awarded to organizations in the state has remained consistent over this five-year period, and slightly underperforms the country when benchmarked using the amount awarded as a percent of gross regional product (GRP). Over 78% of funds awarded to New Hampshire's organizations were awarded to Dartmouth College.

National Science Foundation (NSF) Awards - The National Science Foundation (NSF) funds research and education in science and engineering through grants contracts, and cooperative agreements. From 2017 through 2021 organizations in New Hampshire have received 64 NSF awards equaling nearly $15.1 million. New Hampshire's award amount as a percent of GRP is similar to that of the United States. The bulk of awards were received by the University of New Hampshire and Dartmouth College, each of which received 48% and 47% of the funds, respectively.

Venture Capital Funding - Venture capital (VC) investments transform innovation into economic growth by providing funding to grow companies, and therefore grow the economy. VC provides equity investments for the purposes of new growth. According to data from Crunchbase, Life Sciences related organizations in New Hampshire have received very little VC funding. From 2016 through 2021, there have been 11 VC deals among the state's Life Sciences related companies, with over $36.7 million being raised. New Hampshire underperforms the United States on this measure, with the capital raised as a percent of GRP being lower than it is nationally. Nationally, the number of deals and

amount of capital raised by Life Sciences related activities is on the rise. Companies that have received most of New Hampshire's VC funding include Pristine Surgical ($18.0 million), VentriFlo, Inc. ($10.0 million), and Kantum Pharma ($3.5 million).

R&D Expenditures - According to The National Science Foundation's (NSF) *National Patterns of R&D Resources*, over the five-year period from 2015-2019 (the most recent year for which data is available) nearly $12.7 billion was spent on research and development in New Hampshire. When benchmarked as a percent of GRP, New Hampshire has generally outperformed the United States over this period. Of total R&D spending by the major sectors (industry/business, higher education, and not-for profit), in 2019 83.5% of New Hampshire's R&D expenditures were from industry/business, 16.2% from higher education, and less than 1% from not-for-profits.

University Technology Transfer - Technology transfer is the process of product development and commercialization of inventions and ideas that are born in research institutions. Technology transfer occurs primarily through patents and the creation of new startup companies. AUTM's Annual Licensing Activity Survey polls U.S. universities, hospitals and other research institutions on key metrics that measure an institution's level of technology transfer. The University of New Hampshire (UNH) is the only institution in the state which contributes to the survey. Key measures of technology transfer performance include total research expenditures, total licenses and options executed, gross license income received, invention disclosures, new patent applications, and new startups formed. Compared to its peer group as defined by AUTM (institutions with total research expenditures between $102.8 million and $212.8 million in 2020), UNH outperforms its peers in terms of total licenses and options executed as well as invention disclosures but underperforms in terms of new patent applications and new startups formed.

New Hampshire EPSCoR

New Hampshire is part of the national Established Program to Stimulate Competitive Research (EPSCoR). This program provides federal funding to support R&F capacity building and performance and is provided to states that are smaller and lack a large research base. In 2021, the NH EPSCoR program and the NH Research and Industry Council commissioned and then adopted the New Hampshire University Research and Industry Plan to guide R&D investment and "advance our state's competitiveness in science and engineering and foster partnerships with technology-based businesses that enhance job creation and economic development."[1]

As part of the plan, Life Sciences was specifically examined including the following targeted research areas in Life Sciences:

- Biotherapeutics
- Quantitative Biology & Bioinformatics
- MedTech
- Environmental Remote Sensing (note: this industry/area of science is out of the scope of the industries considered within the Camoin analysis and represented here for context and connections)

An assessment of the following areas was also included:

- Early Career Faculty
- Major Facilities/Specialized Equipment
- Industry Presence
- NSF FY22 Funding Outlook

The following are key findings from this the plan, as they specifically relate to capacity and opportunities growing the Life Sciences industry in New Hampshire.

[1] 2021 New Hampshire University Research and Industry Plan, Keen Point Consulting LLC and Research Triangle Incorporated (RTI) for NH Research and Industry Council and NH EPSCoR, September 24, 2021

The following list includes each of the assets and research areas that rated well (rated as emerging or established):

- **Early Career Faculty:** MedTech
- **Major Facilities/Specialized Equipment:** All Life Sciences targeted research areas
- **Industry Presence:** MedTech and Biotherapeutics
- **NSF FY22 Funding Outlook:** Quantitative Biology & Bioinformatics, Environmental Remote Sensing

Analysis and findings further confirm what we learned in the Camoin analysis including:

- Overall, Life Sciences is performing well in New Hampshire and offers significant future economic opportunities
- There are strong companies with national and global presence and a growing presence of small to medium sized companies
- There is a strong connection to manufacturing and IT industries
- Dartmouth's strength in computer science and related analytics; along with UNH's quantitative biology and bioinformatics at the UNH Hubbard Center for Genome Studies
- Critical challenges exist including:
    - Getting the word out nationally about presence, performance, and opportunities in New Hampshire
    - Better connecting assets within the State's ecosystem – i.e., Dartmouth work and related companies to rest of state
    - Attracting venture capital
    - Need for more start-ups and acceleration
    - Workforce – attracting and retaining the level of workers needed in the future at all education and skill levels
    - Absence of a medical school at UNH

Targeted industry opportunities include:

- MedTech
- Medical device and equipment
- Pharmaceutical research and manufacturing
- Tissue and organ development
- Research, Testing, and Medical Laboratories

- Bioscience-Related Distribution

Highlights of the opportunities for each targeted research areas examined in the EPSCoR report are as follows: (we have retained the wording directly from the EPSCoR report)[2]

- Biotherapeutics –invest and leverage strengths in therapeutic proteins and functional biomaterials research and commercialization activity. One potential research theme is bioprocessing 4.0, which seeks effective, integrated approaches to Manufacture cells, identify specific cell types for manufacture, Optimize biomanufacturing (cellular engineering), and scale up of cellular and protein-based materials. Additionally, NH benefits from its close proximity to Boston biotech companies/ecosystem and Dartmouth's active angel investor network to help support startup creation and growth.
- MedTech - Foster greater MedTech startup activity and growth through New Hampshire's tech sector strengths, the Dartmouth-Hitchcock Medical Center, and the megatrend of IT and medical device convergence; Advance the NH Tech Alliance's BioMedTech Cluster to develop a more comprehensive state strategy and a dedicated NH Bio organization; Potential research themes to leverage NH's existing research capabilities for this area include: Imaging/diagnostic automation and autonomy with a specific focus on sensors, imaging, and artificial intelligence (AI) , Machine learning for data processing/diagnosis
- Quantitative Biology & Bioinformatics - expand research in human genome mapping, modeling of the human brain, and molecular profiling. Research and applications in these areas generate big data requiring new computational and computing approaches to test biological hypotheses.

[2]2021 New Hampshire University Research and Industry Plan, Keen Point Consulting LLC and Research Triangle Incorporated (RTI) for NH Research and Industry Council and NH EPSCoR, September 24, 2021

New Hampshire Life Sciences Industry Strategy

Data Attachment B: US Metro Data

US Metros by Concentration in Life Sciences, 2021

MSA Name	2021 Location Quotient	2016 Jobs	2021 Jobs	2016 - 2021 % Change	2016 Payrolled Business Locations
Los Alamos, NM	46.76	9,868	12,093	23%	15
Warsaw, IN	11.98	7,103	6,872	(3%)	25
Bloomington, IN	7.26	6,239	8,082	30%	36
Brookings, SD	7.25	1,483	2,209	49%	20
McPherson, KS	7.20	1,222	1,753	43%	2
Idaho Falls, ID	5.99	5,749	7,047	23%	43
Durham-Chapel Hill, NC	5.95	21,263	31,186	47%	430
Pahrump, NV	5.82	1,112	1,186	7%	13
Columbus, NE	5.68	1,814	1,785	(2%)	2
Holland, MI	5.31	3,158	3,313	5%	9
Corning, NY	5.11	2,698	2,761	2%	10
Marion, NC	4.52	2,475	1,128	(54%)	3
Boulder, CO	4.45	11,702	13,604	16%	347
Mountain Home, AR	4.25	774	1,044	35%	7
Kalamazoo-Portage, MI	4.19	6,661	7,594	14%	66
Burlington, NC	3.56	3,141	3,620	15%	58
East Stroudsburg, PA	3.31	2,458	2,844	16%	27
Albuquerque, NM	3.28	16,364	19,750	21%	344
Logan, UT-ID	3.26	2,665	3,381	27%	49
Lewistown, PA	3.10	1,105	780	(29%)	7
Boston-Cambridge-Newton, MA-NH	3.10	96,009	128,635	34%	2,442
Trenton-Princeton, NJ	3.09	9,225	12,073	31%	161
Sweetwater, TX	3.09	12	322	2637%	2
San Jose-Sunnyvale-Santa Clara, CA	3.07	47,709	53,308	12%	1,106

Source: Lightcast

US Metros by Employment in Life Sciences, 2021

MSA Name	2021 Jobs	2016 - 2021 % Change	2021 Location Quotient	2021 Payrolled Business Locations
New York-Newark-Jersey City, NY-NJ-PA	145,953	7%	1.06	4,790
Boston-Cambridge-Newton, MA-NH	128,635	34%	3.10	3,351
Los Angeles-Long Beach-Anaheim, CA	113,804	5%	1.17	3,888
San Francisco-Oakland-Berkeley, CA	111,027	39%	2.93	2,419
San Diego-Chula Vista-Carlsbad, CA	74,600	20%	3.05	1,936
Chicago-Naperville-Elgin, IL-IN-WI	68,878	3%	1.02	1,899
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	68,122	10%	1.57	1,949
Washington-Arlington-Alexandria, DC-VA-MD-W	56,917	18%	1.16	2,429
Minneapolis-St. Paul-Bloomington, MN-WI	55,314	8%	1.89	890
San Jose-Sunnyvale-Santa Clara, CA	53,308	12%	3.07	1,386
Detroit-Warren-Dearborn, MI	43,475	(14%)	1.51	699
Houston-The Woodlands-Sugar Land, TX	39,338	18%	0.81	1,729
Dallas-Fort Worth-Arlington, TX	36,158	13%	0.61	1,668
Seattle-Tacoma-Bellevue, WA	33,779	23%	1.05	1,464
Salt Lake City, UT	31,692	25%	2.62	947
Durham-Chapel Hill, NC	31,186	47%	5.95	610
Phoenix-Mesa-Chandler, AZ	29,894	41%	0.86	1,173
Miami-Fort Lauderdale-Pompano Beach, FL	29,603	14%	0.70	2,066
Indianapolis-Carmel-Anderson, IN	26,552	5%	1.64	538
Pittsburgh, PA	24,692	6%	1.48	619
Atlanta-Sandy Springs-Alpharetta, GA	24,456	29%	0.57	1,650
Baltimore-Columbia-Towson, MD	23,863	11%	1.14	1,026
Tampa-St. Petersburg-Clearwater, FL	21,107	19%	1.00	997
Albuquerque, NM	19,750	21%	3.28	393
Denver-Aurora-Lakewood, CO	18,982	9%	0.79	1,127

Source: Lightcast

New Hampshire Life Sciences Industry Strategy

Data Attachment C: Comparative Analysis of State Roles in Life Sciences

Comparative Analysis of State Roles in the Life Sciences

Common support that state governments provide to attract and grow life science and biotechnology industries includes business development activities and business incentives in the form of loans, grants, or tax credits. Some states have established programs and funding specifically dedicated to the special needs of life science firms, while others utilize existing resources to support high-value, targeted industry sectors.

Programs and Services

Generally, state efforts and resources to support the life sciences fall into five broad categories. See Diagram 1 for a bulleted listing of typical programs and services for each of these categories.

- Collaboration, Discovery, and Promotion
- Facilities and Real Estate
- Financial Assistance
- Policy, Regulatory Relief, and Technical Assistance
- Talent and Workforce Development

The type of assistance provided by the state government is influenced by the degree of its responsiveness to established companies, whether it seeks to attract new companies from elsewhere, and/or support start-ups and emerging technologies. This is determined by political views regarding the role of government in supporting business growth.

In states that have more robust life sciences ecosystems, government officials demonstrate interest and capacity to work closely with industry to address issues. Thus, the depth and breadth of support offered by states vary widely, depending on the state's goals, resources, and budget priorities, as well as the influence and engagement of industry groups and their leaders.

For example, the Commonwealth of Massachusetts has the most established and successful cluster of life sciences and biotechnology industries. Over a nearly 50-year period, the Massachusetts State government has helped nurture and grow the industry by providing consistent, proactive engagement, expertise, and funding streams in support of these industries (it is the only state that "checks every box" and more on the listing of services and programs outlined in Diagram 1.)

Heavy state involvement in managing services to the life sciences is not a prerequisite for success. The one golden rule for establishing a life science cluster, however, is for a state not to obstruct or inhibit the environment for organic growth to occur. For instance, compared to Massachusetts, officials with the State of California government and its economic development officials are less engaged in programmatic activities. Rather, three powerhouse metropolitan areas in the State of California (San Francisco, Los Angeles, and San Diego) each provide the public and private leadership and resources required for its life science firms to succeed.

Diagram 1.0
Range of Biotechnology & Life Science Efforts
Coordinated and/or Supported by State Governments

Collaboration, Discovery, & Promotion

Business Development & Marketing[1]

Commercialization & Tech Transfer[2]

Employer/University Based Research Partnerships[3]

Networking & Mentorship[2]

Proof of Concept/Pre-Clinical Research[2]

Facilities & Real Estate

Accelerator Space[2,3]

Incubator Space[2,3]

Laboratories[2]

Shared Space Facilities[2,3]

Site Development – Biotech/Life Sciences[1,2,3]

Special Development Districts and Zones[1]

Financial Assistance

Business Attraction[1]

Discretionary Grants1

Early-Stage Financing[1,2]

Grants & Loans[1,2]

Investment Tax Credits[1]

Machinery & Equipment Financing[1]

Multi-Disciplinary Research Grants[1,3]

Net Operating Loss Carry-Forward[1]

New Jobs Tax Credit[1]

Research & Development Tax Credits[1]

SBIR/STTR Match[1]

Seed Financing[2,3]

Single Sales/Use Refunds[1]

Technology Improvements/Advances[1]

Policy, Regulatory Relief, and Technical Assistance

Advocacy and Education[2]

Industry Research and Analyses[1,2,3]

Regulatory Relief[1]

Manufacturing Process Improvements[1,2]

Technical Assistance[1,2,3]

Zoning and Land Use Advice[1]

Talent & Workforce Development

Certificate and Degree Programs[1,3]

Employer-Based Skills Development[1,2,3]

Internships and Apprenticeships[3]

K-12 Education and Outreach[1,2]

Academic Talent/Research Recruitment[3]

Industry Talent Recruitment[2,3]

Workforce Development[1]

Source: Camoin Associates

[1] Programs and services of some state and/or municipal government departments and agencies.
[2] Primarily quasi-public, public/private, or independent not-for-profit organizations, with some private sector roles.
[3] Usually involving academic and research institutions in collaboration with private industry.

Organizational Frameworks and Considerations

Generally, there are four structural frameworks for providing programs and services to nurture and grow a state's life science and biotechnology industries, as shown below. Following a brief description of each framework are considerations for relatively light touch, lower-cost ideas, along with one or two bolder initiatives for consideration,

1) Public Sector: Departments of State Government

   The department for economic development or its equivalent is most often the primary point for advancing state-administered initiatives and programs to support life sciences. Core functions include business development, marketing, and promotion, as well as structuring and delivering any financial incentives established in statute, sometimes in coordination with budget and revenue departments.

   Beyond these core functions, public administrators often liaise with leaders at the local municipal levels and with executives in the life science profession and can serve as spokespeople for state government positions, policies, and special initiatives that impact companies. Many states provide targeted research, analysis, and in-depth studies to compete with other states and nations for jobs and investments. State government departments are frequently expected to convene public and private representatives to develop overarching strategic plans and operating blueprints for growing the life sciences and biotechnology ecosystem in their states.

Considerations/Implications

- Continue to learn from and collaborate with industry groups to help inform and educate the executive and legislative branches of state government as to challenges and opportunities facing the industry. The goal here is to champion, as appropriate, legislation and policies that advance the competitiveness of the life science industry.
- Help the industry navigate issues of regulatory relief and local actions that can impede industry growth.
- Provide continuous training for business development industry representatives so that they can help tell the story and market the competitive advantages of doing business in the state. Ideally, these staff members or contract employees would be trained or have prior work experience in life sciences, and demonstrate a strong passion for understanding epic global health challenges that are being addressed by the state's private and academic institutions.
- Facilitate planning and development plans for sites and infrastructure that are needed to attract and for future expansion of existing life science companies. Thought might be given to the establishment of special zones throughout the state dedicated to industry.
- Review the feasibility of providing funding matches to federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer grants. This would help leverage federal resources. It can be helpful to companies to expand their research and development efforts and bring their innovations to market more quickly. It would make New Hampshire firms more competitive in the application

process, increasing their chance of receiving a grant. A funding match program can also encourage small businesses to pursue innovative ideas that might not be feasible without additional funding.

- Continue to promote STEM education in K-12 and further develop workforce development programming that exposes students and adults to the world-changing possibilities of pursuing careers in the life sciences.
- Adapt elements of best practice internship and apprenticeship programs in the life sciences currently underway in Massachusetts and North Carolina to meet New Hampshire's needs. The goal would be to directly expose New Hampshire-based STEM-driven high school students and recent graduates to career opportunities in the life sciences and provide needed talent to help grow the state's industry cluster.

2) Not-for-Profit Organizations: Industry Representation

Many states have not-for-profit organizations that represent the interests of the life sciences community. The primary group is usually an association that helps educate members on issues of critical importance, provides networking and learning opportunities, and is an advocate for the industry.

Biotechnology Innovation Organization (BIO) has state affiliates in many states, including California, Massachusetts, Pennsylvania, and New Jersey, that work to support the growth of the biotechnology industry in their respective states. Some state associations are organized as independent, non-profit trade groups, such as BioFlorida, Colorado BioScience Association, California Life Sciences Association, Texas Life Sciences Collaboration Center, New York State Office of Science, Technology, and Academic Research (NYSTAR), Pennsylvania Biotechnology Center of Excellence, Illinois Biotechnology Industry Organization (iBIO).

Considerations/Implications

- A well-administered group is critical to provide networking for executives, and nurturing of talent and mentoring for young professionals, especially as New Hampshire grows its life sciences cluster.

3) Quasi-Public Entities: Specialized Expertise

Some states have established quasi-public or specialized not-for-profit organizations to help develop and lead strategic initiatives. For instance, the Commonwealth of Massachusetts helped form the Massachusetts Life Sciences Center to "support innovation, research and development, commercialization, and manufacturing activities in the fields of biopharma, medical device, diagnostics, and digital health." It is a quasi-public agency governed by a board of directors that funds innovation-driven economic and workforce development initiatives statewide.

Other states have designated a group(s) to conduct research-oriented roles and responsibilities. These groups are typically set up as public/private partnerships. For example, the Virginia Biosciences Health Research Collaboration (d.b.a. the Virginia Catalyst) specializes in translational medicine and commercialization. It provides grant funding for collaborative projects and makes investments in research tools and infrastructure for research universities, healthcare systems, and companies so that they gain a competitive position over other regions in the country in solving large unmet medical needs.

The Ohio Biomedical Research and Innovation Fund works with the state government, businesses, and academic institutions to support the growth of the life sciences and biotechnology industries in Ohio. The organization has partnered with the state government to provide funding for research and development, tax incentives for businesses, and workforce development programs.

Considerations/Implications

- An existing or new entity or consortia will need to help introduce advanced manufacturing processes and specialized equipment to further research and development in public, institutional, and private facilities.

4) Academic Institutions: Talent and Discovery

At the heart of all successful life science ecosystems are world-renowned research universities. New Hampshire is fortunate to have such institutions in the state and others within proximity to further multi-disciplinary endeavors.

Academic institutions advance the life sciences industry in several ways. They conduct cutting-edge research in the life sciences, which can lead to new discoveries and technologies that can be commercialized and applied in the life sciences industry. They provide education and training to the next generation of life sciences professionals, ensuring a pipeline of skilled workers for the industry.

Some institutions are skilled in working with industry partners to transfer research findings and technologies developed in academic labs to the commercial sector, where they can be developed into new products and therapies. Others encourage partnership and collaboration with other academic institutions and companies in the life sciences industry to jointly develop and commercialize new products and therapies. These partnerships can bring together the expertise and resources of both academia and industry to advance the field.

Additionally, higher education institutions can provide access to advanced research facilities, infrastructure, and equipment that can be made available to industry partners, providing them with access to the resources they need to conduct their research and development activities.

Considerations/Implications

- At the most senior levels of leadership, encourage research, tech transfer, and commercialization of new discoveries within higher education institutions.
- Provide scholarships for promising students interested in research and academic incentives to attract talented researchers from academic institutions around the world to study and conduct work in the state.
- Advance employer/university-based partnerships.
- Strengthen and/or provide new certificate and degree programming.
- Support and encourage employer-based skills development in the life sciences

Any of the above organizational structures can become involved in forming development partnerships to meet the space and real estate needs of researchers, entrepreneurs, and small and established businesses. As a region builds out its life sciences ecosystem, it will require space for collaboration and shared learning, research, production, and distribution of products.

The state government is often expected to assist, directly or indirectly, with helping to ensure that there are enough shared spaces, incubators, and accelerators in areas of need. This includes well-equipped laboratories. Finally, the state government's economic development leaders are oftentimes expected to anticipate and help advance larger real estate requirements for expanding industries. In some communities, this can include providing resources for site preparation and infrastructure development, assistance with arranging finance, and, in some cases, quasi-public and higher education institutions can assume ownership and management of buildings and business parks designed to meet the needs of life science and biotechnology companies.

National Policy on the Life Sciences

United States

On September 12, 2022, the White House released an Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy.

In it, the US federal government outlines objectives to:

- Bolster Federal investment in R&D
- Foster biological data ecosystem
- Improve and expand domestic biomanufacturing production capacity and translational research
- Boost biomass production and create climate-smart incentives
- Expand market for bioenergy and biobased products
- Train a diverse, skilled workforce
- Clarify and streamline regulations
- Elevate biological risk management
- Promote standards, establish metrics, and develop bioeconomy systems
- Secure and protect the nation's bioeconomy
- Engage the international community to enhance and secure biotechnology R&D

The Executive Order provides extensive goals and objectives to be undertaken and directs specific departments and agencies of the Federal Government to take action to further each of the objectives listed above.

Canada

In 2021, Canada released a five-pillar Biomanufacturing and Life Sciences Strategy. It was designed as a long-term pandemic resilience initiative and to promote growth in the life sciences sector. It calls for:

- Strong and coordinated governance
- Laying a solid foundation by strengthening research systems and the talent pipeline
- Growing businesses by doubling down on existing and emerging areas of strength
- Building public capacity
- Enabling innovation by ensuring world class regulation.

New Hampshire Life Sciences Industry Strategy

Action Plan Matrix

ACTION PLAN MATRIX

The following pages contain the Action Plan Matrix for the State of New Hampshire Life Sciences strategy. This is intended to be a management tool to monitor and advance the strategies that are discussed in the recommendations section that begins are page 6 in the Executive Summary. Below is an example of how the Action Plan Matrix is presented on the following pages.

#	GOAL AREA			
#	Strategy	Next Steps	Partners	Priority / Resources
Reference number for the strategy	*This is the primary action that will be advanced to contribute to the overall plan.*	*This section includes the next steps for the strategy or where the focus should be as progress is made.*	*This section includes the entities that will lead or partner to advance a strategy.*	*Resource Scale* *$ Minimal new resources needed.* *$$ Some new investments or reallocation of resources are needed* *$$$ Significant new investments are needed* *Priority Scale* IMMEDIATE HIGH MEDIUM

1. MARKETING AND COMMUNICATION

#	Strategy	Next Steps	Partners	Priority / Resources
1a.	**Build awareness about the state's extensive Life Sciences market and proximity to regional assets.**	■ Conduct a rollout of the Life Sciences report across the State and communicate regional assets and competitive factors unique to each region. This could also be done in conjunction with the CEDRs. ■ Use data from the Life Sciences report to develop a regional marketing campaign that targets leading metros and New England.	Industry association, private sector, PR firm	IMMEDIATE $$
1b.	**Expand messaging for attraction to include industry-specific data and targeted messaging.**	■ Use data from the Life Sciences report to develop a regional marketing campaign that targets leading metros and New England.	Industry association, private sector, PR firm	IMMEDIATE $$
1c.	**Facilitate communication and resource sharing with existing businesses in New Hampshire.**	■ Designate a Life Sciences point person at BEA to support the work of the industry association and share relevant state reports and programs on a consistent basis. ■ Communicate results of this work and ongoing implementation plans with the state's R&D and higher education partners, including the state university system, Darmouth, and NH EPSCoR	Industry association, private sector	HIGH $

2. BUSINESS DEVELOPMENT AND ATTRACTION

#	Strategy	Next Steps	Partners	Priority / Resources
2a.	**Continue to grow the concentration of businesses that fit within the opportunity sectors through attraction.**	■ Domestically, target metros with high employment and that are highly concentrated in Life Sciences. ■ Begin a Life Sciences attraction campaign in Canada using targeted data from the Life Sciences report.	Inter-departmental coordination at BEA , existing companies	HIGH $$
2b.	**Expand BEA's digital presence and usage of communication channels in attraction efforts.**	■ Update BEA's website presence to reflect the focus on Life Sciences and the important assets and opportunities throughout the state. ■ Track visitation on the website to build relationships with potential or expanding businesses. ■ Attend targeted trade shows to build the state's recognition regionally, nationally, and globally.	Inter-departmental coordination at BEA	MEDIUM $$

3. WORKFORCE AND TALENT

#	Strategy	Next steps	Partners	Priority / Resources
3a.	**Look for cross-industry partnerships to support occupations that have a substantial impact on the economy.**	■ In ongoing workforce attraction campaigns, craft messages for workers at different skill levels – entry, middle, high. ■ In those campaigns, target production, engineering, and management skillsets. ■ Communicate frequently with industry partners around industry growth and job/occupation opportunities, including career paths, current openings, internships, and apprenticeships.	Higher education, community colleges, industry associations, New Hampshire Department of Labor, workforce recruiters and HR directors within Life Sciences companies or with knowledge of the industry	IMMEDIATE $$$
3b.	**Continue to pursue public-private-philanthropic partnerships in workforce development efforts.**	■ Facilitate collaborations across the state to find concentrations of workers/skillsets that can evolve into full-time, lasting training programs.	Higher education, community colleges, industry associations, New Hampshire Department of Labor, workforce recruiters and HR directors within Life Sciences companies or with knowledge of the industry	HIGH $$

3c.	**Support workforce initiatives that highlight opportunities to grow from within the state and from outside attraction.**	■ Work with marketing team to create targeted messages for each population. ■ Gather information from job seekers to develop a profile of those interested in positions.	Higher education, community colleges, industry associations, New Hampshire Department of Labor, workforce recruiters and HR directors within Life Sciences companies or with knowledge of the industry	MEDIUM	$

4. ORGANIZATION AND PARTNERSHIPS

#	Strategy	Next Steps	Partners	Priority / Resources
4a.	**Enlist a Life Sciences specialist at BEA to play the role of network builder and facilitator and where appropriate, provide direct support and services.**	▪ Reallocate internal resources to support the Life Sciences specialist position. ▪ Task the Life Sciences specialist with helping the industry navigate issues of regulatory relief and local actions that can impede industry growth. ▪ Continue to learn from and collaborate with industry groups to help inform and educate the executive and legislative branches about challenges and opportunities facing the industry. ▪ Support industry efforts to organize and promote Life Sciences in New Hampshire. In the near-term, meet with emerging industry association to review the report and strategy and develop ongoing working relations.	Industry organizations, Life Sciences companies, and research institutes	HIGH $$
4b.	**Provide continuous training for business development industry representatives.**	▪ Review internal resources to align with the goals of the Life Sciences Specialist at BEA. ▪ Support the attendance of relevant conferences, statewide meet ups, and other networking events. ▪ Ensure access to labor market analysis and industry resources.	Industry organizations, Life Sciences companies, and research institutes	MEDIUM $

5. REGULATIONS AND POLICIES

#	Strategy	Next Steps	Partners	Priority /Resources
5a.	**Actively support the Life Sciences business community and look for partnership opportunities.**	▪ Stay connected to industry businesses and stakeholders to continually understand impacts of policies and regulations. ▪ Explore options for the BEA to support Life Sciences industries. This includes but is not limited to: R&D tax credits and target industry grants.	Private sector, industry associations State Legislature	IMMEDIATE $$$

6. ENTREPRENEURSHIP

#	Strategy	Next Steps	Partners	Priority/Resources
6a.	**Address gaps in the statewide entrepreneurial resource system.**	▪ Explore creating a funding match for SBIR/STTR grants to help businesses prepare for their applications. ▪ Support additional opportunities for incubation and acceleration – starting and growing companies from within New Hampshire. ▪ Support an acceleration program that attracts a cohort of entrepreneurs.	Industry associations, entrepreneurs and small businesses, startup and entrepreneur ecosystem builders, existing entities within higher education, and research institutions	MEDIUM $$

About Camoin Associates

Camoin Associates has provided economic development consulting services to municipalities, economic development agencies, and private enterprises since 1999. Through the services offered, Camoin Associates has had the opportunity to serve EDOs and local and state governments from Maine to California; corporations and organizations that include Lowes Home Improvement, FedEx, Amazon, Volvo (Nova Bus) and the New York Islanders; as well as private developers proposing projects in excess of $6 billion. We have completed over 1,500 projects in 45 states plus the Virgin Islands. Our reputation for detailed, place-specific, and accurate analysis has garnered attention from national media outlets including *Marketplace* (NPR), *Forbes* magazine, *The New York Times* and *The Wall Street Journal*. Additionally, our marketing strategies have helped our clients gain both national and local media coverage for their projects in order to build public support and leverage additional funding. To learn more about our experience and projects in all of our service lines, please visit our website at www.camoinassociates.com. You can also find us on Twitter @camoinassociate and on Facebook.

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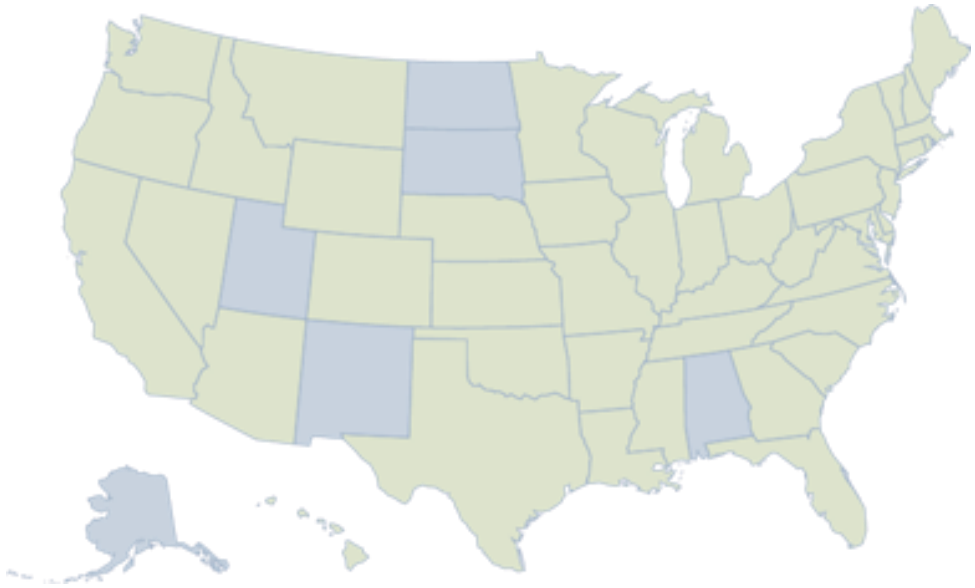

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