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North Carolina

STATE OF TECHNOLOGY

2023 Industry Report + State Rankings



North Carolina State of Technology 2023 Industry Report

INTRODUCTION

The State of the Technology Industry Report is in its ninth year. First produced in January 2015 the report tracks and highlights trends in an important and growing industry. The report identifies results to celebrate for NC TECH members, and raises issues that affect the state's competitiveness for attention by North Carolina's state and local policy makers. NC TECH has committed to conducting this research annually. This 2023 report shows the final statistics in tech for 2021, including facts, trends, and insights into North Carolina's technology industry. While the economy has been very volatile in recent years due to the COVID-19 pandemic, tech has proved to be one of the most resilient sectors of the economy. This report provides information for companies considering headquarter relocation, operations establishment, or expansion. It is a source of data and trends for policy makers, and a resource for innovation sector organizations, the economic development community, and for the media. First and foremost, the report highlights the vibrancy and immense economic impact of North Carolina's technology sector.

NC TECH was founded in 1993 with a mission to advance North Carolina's technology sector. NC TECH now has more than 700 members including the top technology companies, organizations, and institutions across the state. NC TECH brings their members together around the business of technology for peer interaction, educational programming, information sharing, relationship building and networking. NC TECH is the go-to organization for policy makers on issues affecting the tech sector and supports the development of world-class, well-educated students and workers to make North Carolina a favored home for globally competitive companies.

NC TECH contracted with Economic Leadership, a North Carolina based firm, to again create and build the State of the Technology Industry report. For this report, the technology industry is broken down into four sub-categories:

- (1) Information Technology, Telecom, Hardware and Software
- (2) Energy Technology
- (3) Environmental Technology, and
- (4) Life Sciences.

This methodology was established for the inaugural report based on several definitions of the tech industry – primarily TechAmerica Foundation's 2013 Technology Industry Classification – and has remained consistent each year of the State of the Technology Industry Reports. A full accounting of the categories is provided in the appendix. Keeping the methodology consistent and transparent over nine years allows for meaningful trend analysis over time.

North Carolina Technology Industry Summary Statistics, 2021

Indicator	Technology Industry	State Total	State Total Percentage
Employees	290,823	4,509,160	6.4%
Establishments	25,368	315,071	8.1%
Wages (millions)	\$36,714	\$303,468	12.1%
Sales (millions)	\$105,430	\$967,057	10.9%

Source: EL calculations based on Lightcast 2022.4

North Carolina's Technology Industry by Sub-Categories, 2021

Technology Categories	Employment, 2021	Employment Change, 2019-2021	Employment Change, 2016-2021	Establishments, 2021	Sales, 2021 (millions)	National Location Quotient
Energy Tech	13,444	0.8%	1.8%	576	\$10,639	0.47
Environmental Tech	25,976	2.8%	14.2%	1,705	\$5,893	1.09
Life Sciences	98,124	9.1%	27.1%	5,814	\$32,908	1.09
IT	153,279	8.4%	14.4%	17,273	\$55,990	0.95

Source: EL calculations based on Lightcast 2022.4

This report also looks beyond just the companies that are classified within the tech industry; data is also analyzed on tech occupations that are employed across all industries. North Carolina is also compared to other states on metrics that evaluate the greater tech ecosystem such as venture capital funding and research and development spending.

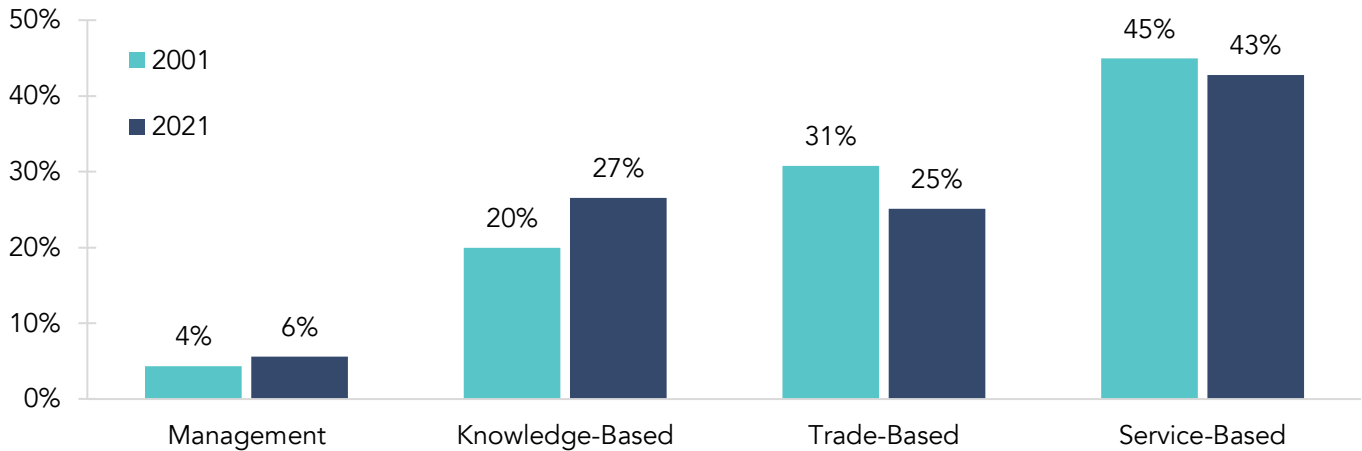
HIGHLIGHTS:

- ❖ North Carolina is the #9 state in total tech industry employment growth from 2016-2021.
- ❖ North Carolina is the #2 state for Percentage of Women in the Technology Industry with women making up 36.5 percent of the workforce.
- ❖ The state saw an increase in tech occupations of over 28 percent in the last five years, ranking the 4th fastest in the country.
- ❖ The state ranked 13th and 12th in both total and business performed research & development.
- ❖ The state ranked 9th in venture capital funding per gross state product.
- ❖ The state had the 3rd highest growth rate in STEM education completions from 2016 to 2021.
- ❖ North Carolina had the 8th largest job creation rate from startups in 2021.
- ❖ Since 2019, the tech industry employment grew by 7.8 percent, showing resiliency in a difficult economic time.

SECTION 1. STATE OF THE INDUSTRY & REGIONAL TRENDS

The technology industry has been one of the driving forces in North Carolina’s shifting economy. In the last two decades, the economy of North Carolina has evolved dramatically. Occupations that were once traditional leaders in the state, like trade-based jobs, now account for a lower percentage of the state’s economy. Meanwhile, growth has increased the role of in management and knowledge-based jobs in the economy.

Occupational Share of North Carolina’s Economy, 2001 vs 2021



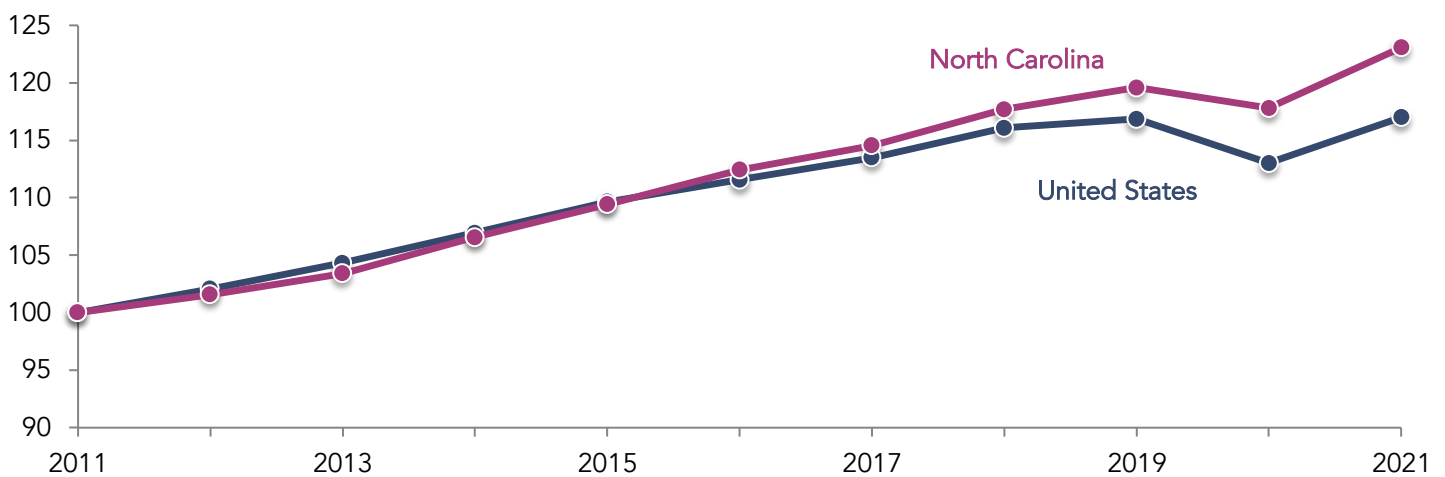
Source: EL calculations based on Lightcast 2022.4

North Carolina’s Economic Performance

Overall, the economy in North Carolina has performed well in the last decade. Since 2016, total employment has grown at higher rates than the national average. A significant contributor to this growth has been population growth. Most of that growth has come from young people. The state added over 121,240 people aged 20 to 39 years old in the last ten years. This surge of young, working aged people has sparked the state’s economy and to its pool of workers.

Total Non-Farm Private Employment Change, 2011-2021

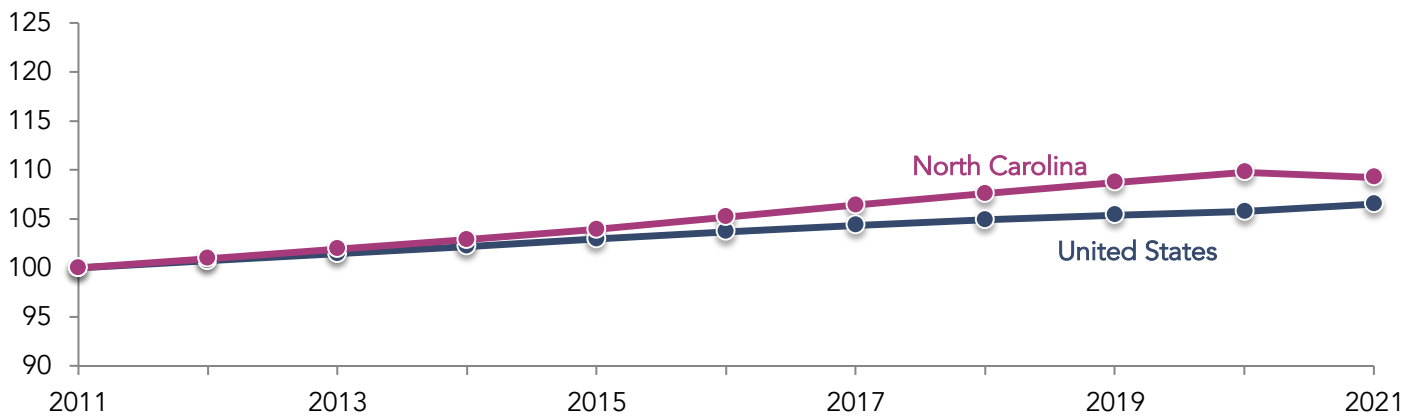
100 = 2011 Employment Level



Source: Bureau of Economic Analysis [BEA] (2022)

Population Change, 2011-2021

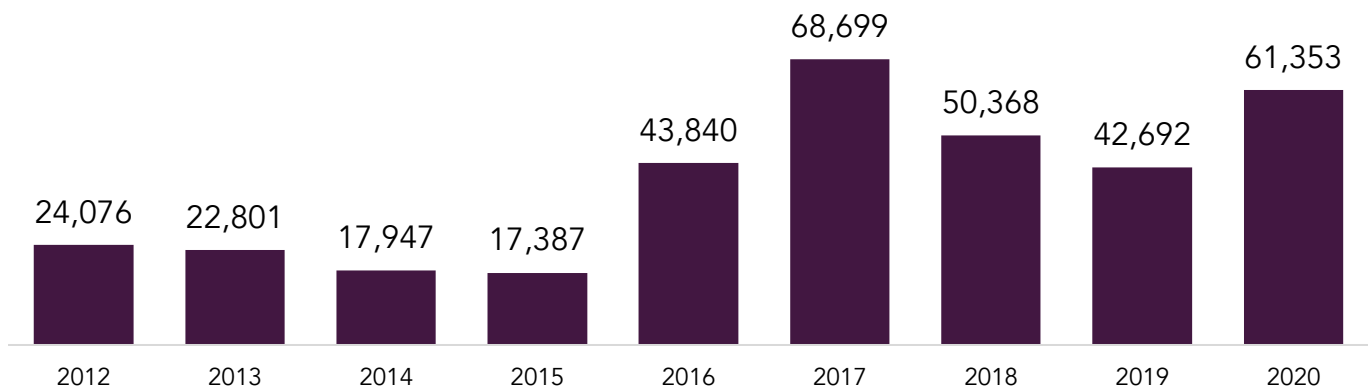
100 = 2011 Population Level



Source: Lightcast 2022.4

Data from IRS tax records show a sharp increase in domestic migration in recent years. In 2020, the state saw net migration reach one of its highest levels in the last decade. Other research supports the notion that North Carolina was one of the states people chose to relocate to during the COVID-19 pandemic and the proliferation of remote work.

North Carolina Net Domestic Taxpayer Migration, 2012-2020



Source: Lightcast 2022.4

Note: Based on IRS data from individuals who file taxes.

Top In-Bound and Out-Bound Migration Counties, 2020

Top Five In-Bound Counties		Top Five Outbound Counties	
York County, SC	+4,166	York County, SC	-7,469
San Diego County, CA	+3,572	Horry County, SC	-3,519
Fairfax County, VA	+3,047	Lancaster County, SC	-3,383
Los Angeles County, CA	+2,984	Spartanburg County, SC	-2,377
Broward County, FL	+2,974	San Diego County, CA	-2,351

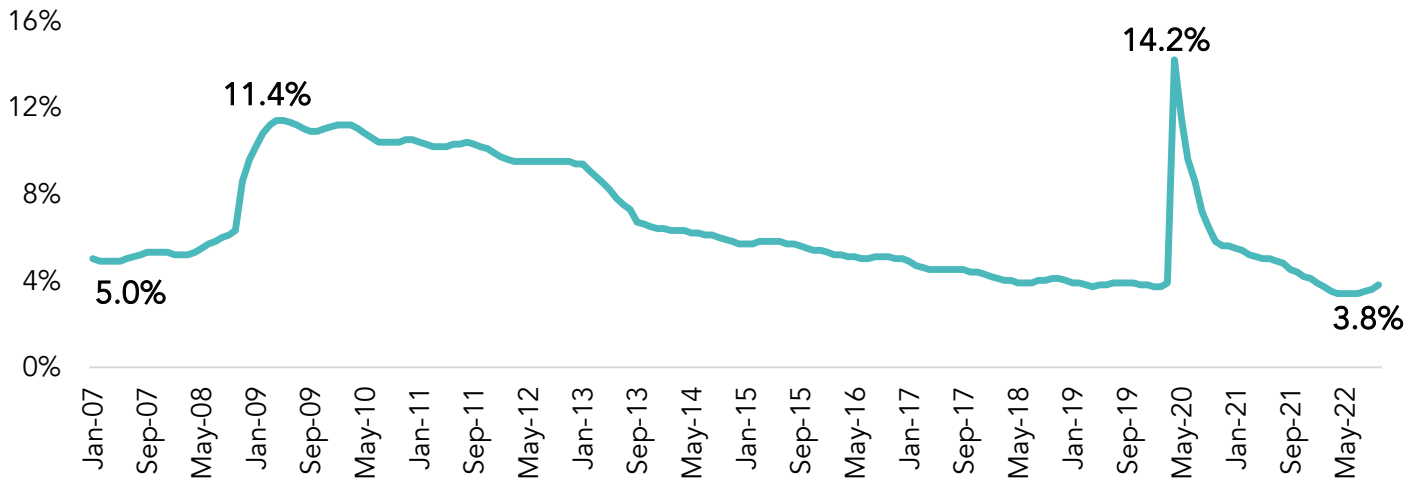
Source: Lightcast 2022.4

Note: Based on IRS data from individuals who file taxes.

During the onset of the COVID-19 pandemic and subsequent shutdowns unemployment spiked to a high of 14.2 percent in the state. The unemployment rate has largely recovered by September 2022 with only 3.8 percent unemployed. After a dip in 2020, North Carolina's labor force participation rate is also up to levels higher than before the pandemic.

North Carolina Unemployment Rate

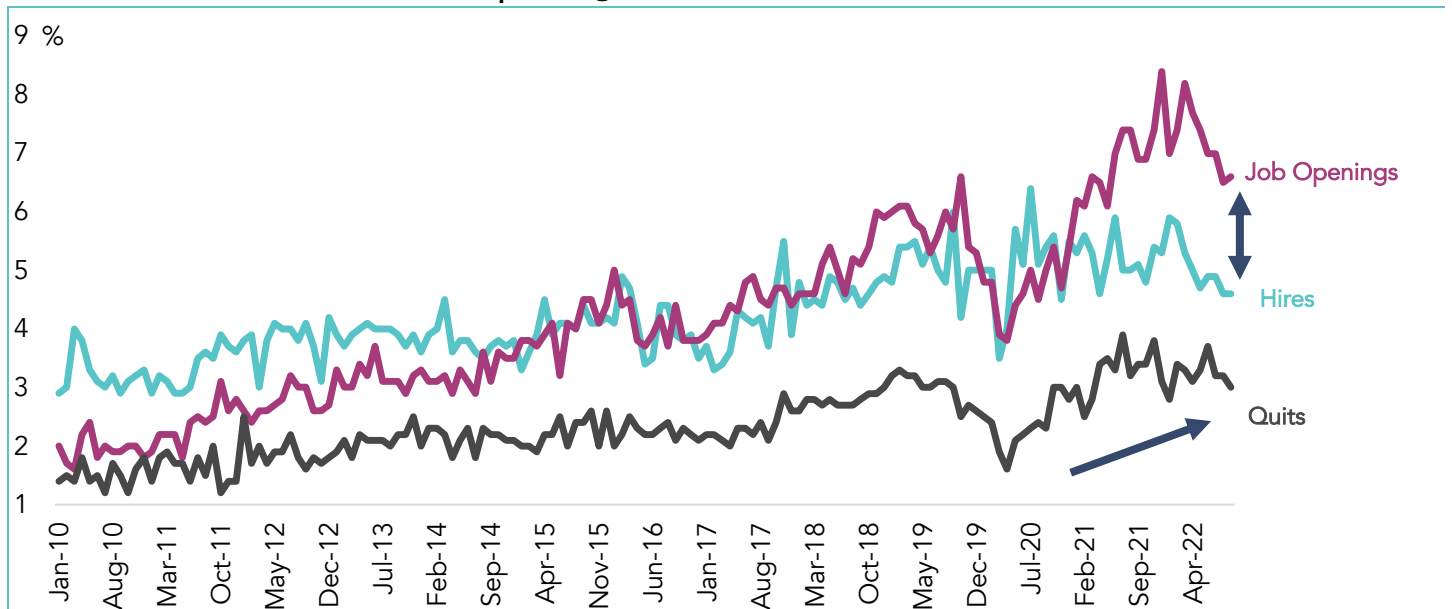
January 2007 – October 2022



Source: Bureau of Labor Statistics (2022)

Despite this recovery, the state is still experiencing the struggle to fill open positions. Demand and business conditions remain strong leading to a high rate of job openings. However, hiring has not been able to keep pace. This pattern matches national and global labor shortages. Buoyed by the number of openings, workers are also taking the opportunity to find better fitting positions, leading to a recent increase in the number of quits.

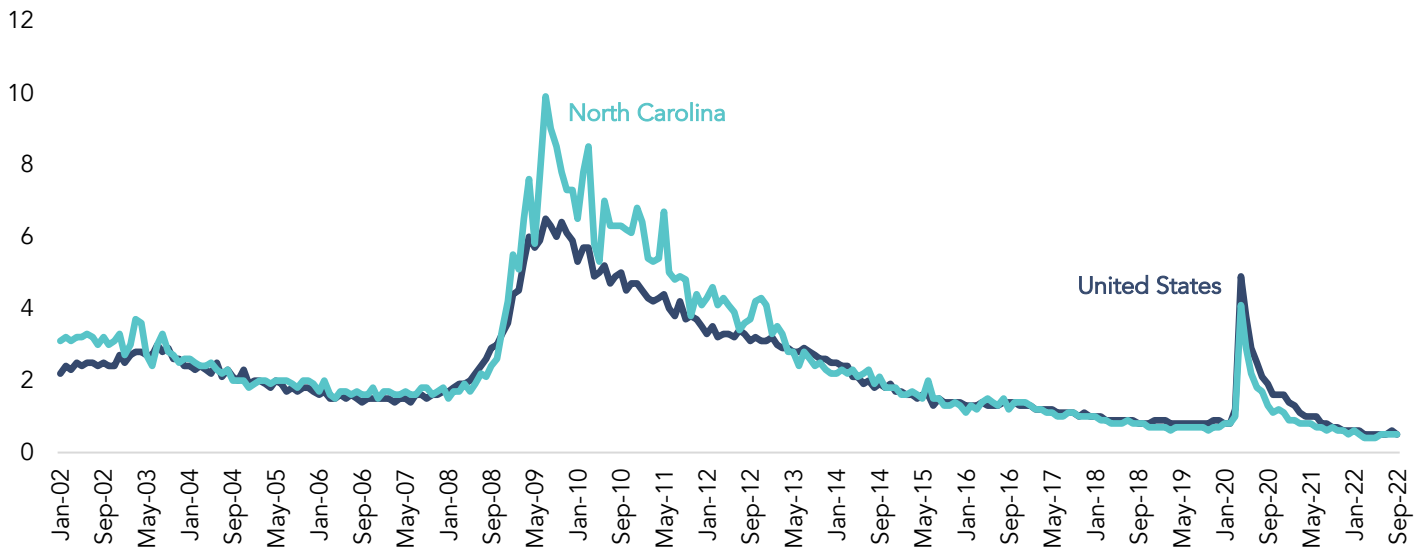
North Carolina Rate of Job Openings, Quits, and Hires, 2010-2022



Source: BLS (2022)

In the past there were often multiple unemployed workers in the economy for every job opening. In the recovery from the Great Recession this number was becoming increasingly smaller. In the wake of the pandemic, North Carolina’s labor market has been even tighter than the nation’s.

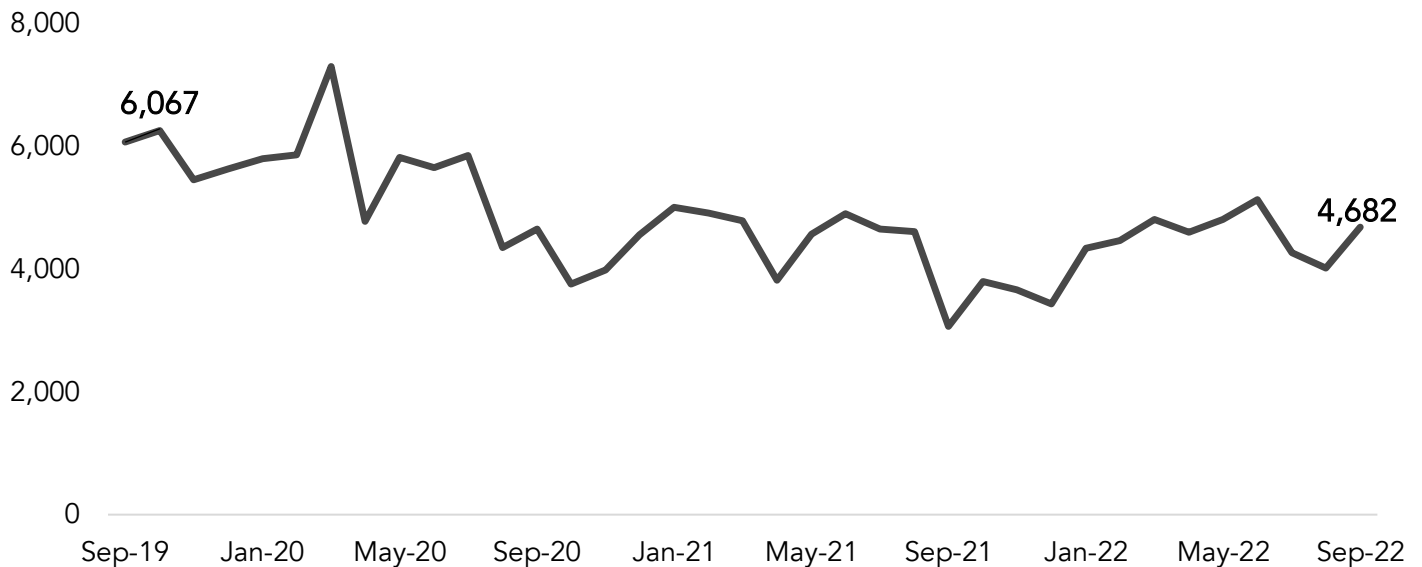
Unemployed Persons Per Job Opening Ratio, 2002-2022



Source: BLS (2022)

In the last year, the number of unemployed workers relative to the number of job openings has reached record lows. Greater population trends like low birth rates, Baby Boomer retirements, and lower rates of international migration are limiting workforce growth in North Carolina and across the nation. The number of people unemployed with experience in computer and mathematics occupations has declined in the last several years. This means the pool has thinned for employers looking to fill these positions.

North Carolina Computer & Mathematics Unemployed Workers, Sept 2019 – Sept 2022



Source: Lightcast 2022.4

SECTION 2. METHODOLOGY

In this report, we review the state of North Carolina's technology industry and compare current North Carolina trends to those of other states. A tech industry is a firm that operates in the tech space but might have employees that perform work that is not tech related (i.e. an accountant at Microsoft). Later in the report we measure tech occupations. Tech occupations are workers whose roles are tech-related and can be employed at tech focused or not tech focused companies (i.e. the IT manager for a furniture manufacturer). The term "tech sector" is used to refer to both the tech industries and tech occupations.

We also rank North Carolina on factors that influence the technology sector such as research & development funding and talent availability. These metrics are defined as the "tech infrastructure". Reviewing these indicators can provide policy makers with an understanding of the industry's current reality, as well as takeaways that may provide insight for the best course of action to further support growth in the industry. North Carolina has many strengths including a deep pool of talent, outstanding quality of life, an affordable and competitive business climate and the presence of great research universities.

To analyze North Carolina's technology industry, we have identified 88 separate six-digit NAICS code industries to characterize the Total Technology Industry for the state and for comparison of other US states. A full list of each six-digit industry is available in the appendix of this report.

The Total Technology Industry (hereby referred to as the 'tech industry') was further broken down into four sub-categories:

- Energy Technology
- Environmental Technology
- Life Sciences
- IT, Telecom, Hardware & Software (Tech Core)

We chose these categories based on several definitions of the technology industry. The primary source for defining the technology industry is based on TechAmerica Foundation's 2013 Technology Industry Classification. Other state and city industry reports were evaluated, and this report maintains a definition that is comparable to these reports. The definitions remain consistent with our nine previous State of Technology reports.

To calculate metrics and trends of the tech sector in terms of employment, wages, and establishments, Economic Leadership used data developed by Lightcast (formerly EMSI Burning Glass) which is largely based on the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages. Lightcast data fills in gaps from the BLS non-disclosure policy by amalgamating several economic data sources to provide the best estimates for the years 2001-2032.

The majority of the technology sector data presented in this report are calculations based off of Lightcast data for the year 2021. Most trend data presented is for the five-year period from 2016-

2021. The input-output model used to determine the technology industry’s overall economy impact for this study is also based on Lightcast multiplier estimates.

To measure tech occupations that exist across all industries, we reviewed 85 separate five-digit SOC codes across computer and engineering occupations in Lightcast to determine how many tech workers exist in the state across all industries.

Data for the tech infrastructure state comparisons comes directly from publicly available resources such as the National Science Foundation, Bureau of Economic Analysis, and the US Census Bureau. This ensures consistent and comparable data across all the states.

SECTION 3. THE NORTH CAROLINA TECH INDUSTRY

The review of North Carolina’s technology industry found that in 2021 the industry employed 290,820 people and workers earned about \$37 billion in income. The tech industry accounted directly for over six percent of the total jobs in the state, but about 12 percent of the state’s total earnings and almost 11 percent of sales. In 2021, there were 25,368 technology establishments operating in North Carolina.

North Carolina Tech Industry Summary Statistics, 2021

Indicator	Technology Industry	State Total	State Total Percentage
Employees	290,823	4,509,160	6.4%
Establishments	25,368	315,071	8.1%
Wages (millions)	\$36,714	\$303,468	12.1%
Sales (millions)	\$105,430	\$967,057	10.9%

Source: EL calculations based on Lightcast 2022.4

We also evaluated the contribution of the tech industry to additional economic categories such as gross state product (GSP) and taxes. For this data we relied on Lightcast estimates of the state economy from 2021. The tech industry accounts for about 10 percent of taxes paid within the state. In 2021, the tech industry contributed to over 12 percent, \$78 billion, of GSP.

North Carolina Tech Industry Economic Contributions, 2021

Indicator	Technology Industry	State Total	State Total Percentage
Taxes Paid (millions)	\$3,780	\$39,767	9.5%
Exports (millions)	\$44,389	\$606,219	7.3%
GSP (millions)	\$77,694	\$632,740	12.3%

Source: EL calculations based on Lightcast 2022.4

The technology industry was broken down for further analysis to its four sub-industries as well as manufacturing and service activities. The Information Technology (IT) group includes industries related to hardware manufacturing, software services, telecommunications, and other computer related services. Energy Technology includes industries related to fossil fuel and renewable power operations. Environmental Technology includes industries related to electrification, batteries, environmental consulting, and waste remediation services. Life Sciences includes industries related to pharmaceutical manufacturing and research and development in biotechnology.

The IT sub-category accounts for over half of the jobs in the tech industry. The majority of the state’s employment growth in the industry is driven by tech service establishments, compared to tech manufacturing. Tech manufacturing jobs in the state have been more volatile with some years of gains and others of losses. Since 2019, tech manufacturing has been adding jobs.

North Carolina’s Tech Industry by Sub-Categories, 2021

Technology Categories	Employment, 2021	Employment Change, 2019-2021	Employment Change, 2016-2021	Establishments, 2021	Sales, 2021 (millions)	National Location Quotient
Energy Tech	13,444	0.8%	1.8%	576	\$10,639	0.47
Environmental Tech	25,976	2.8%	14.2%	1,705	\$5,893	1.09
Life Sciences	98,124	9.1%	27.1%	5,814	\$32,908	1.09
IT	153,279	8.4%	14.4%	17,273	\$55,990	0.95
Category	Employment, 2021	Employment Change, 2019-2021	Employment Change, 2016-2021	Establishments, 2021	Sales, 2021 (millions)	National Location Quotient
Tech Services	223,729	9.6%	21.6%	24,657	\$75,977	0.90
Tech Manufacturing	67,095	1.9%	6.0%	711	\$29,453	1.22
TOTAL TECH INDUSTRY	290,823	7.8%	17.6%	25,368	\$105,430	0.96

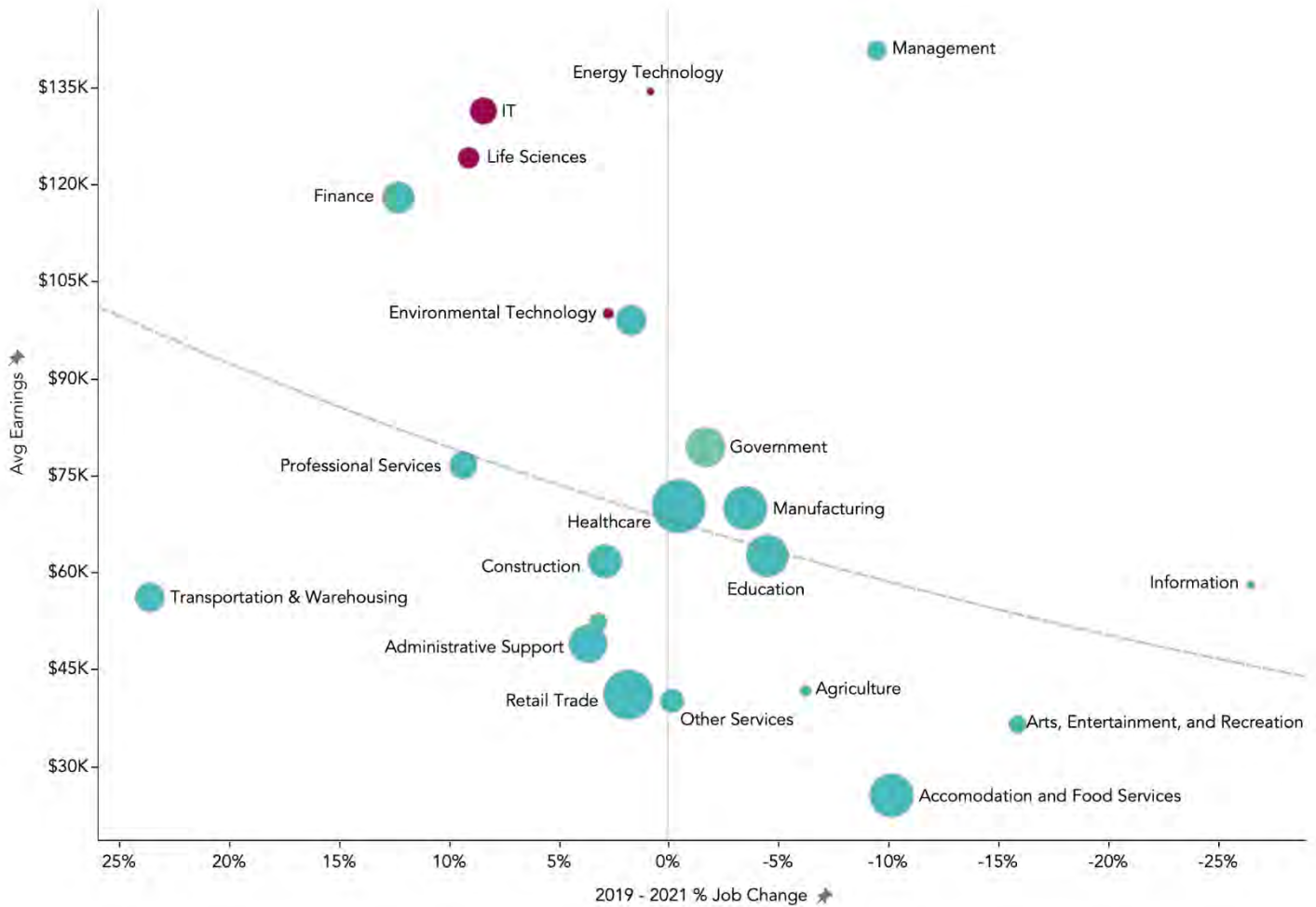
Source: EL calculations based on Lightcast 2022.4

Note: Some values may not add to the exact total due to rounding.

We calculated location quotients (LQ) for these sub-industries. Location quotients greater than 1.00 indicate that an industry is concentrated within a state, and a significant part of a region’s economic base. Industries with high location quotients often generate much of an economy’s exports and wealth. North Carolina exhibits a strong position in tech manufacturing based on its national location quotient. Overall, the tech industry has an LQ of 0.96 indicating the industry is almost as concentrated in the state as in the nation. LQs for the tech industry were around 0.88 in the first State of the Technology report, meaning tech is becoming a larger share of North Carolina’s employment and economy. LQ levels that are too high can reveal an overreliance and indicate an economy that is overly susceptible to shocks in that industry. Therefore, the moderate concentration in tech also signifies that the industry is part of a diverse state economy.

Incredibly, all subcategories saw net positive job growth from 2019 to 2021. This is despite the fact that the recovery from the pandemic has been uneven across sectors. At the end of 2021, low wage jobs like food preparation and manufacturing still had significant job losses. Meanwhile, high wage jobs that were able to adapt to remote work quickly and serve customers virtually added jobs during this turbulent time. Knowledge-based jobs, like those in tech for example, have offered high median earnings and been less disrupted by the pandemic. The tech industry has been a key support to North Carolina's economy during this timeframe and tech offers workers stable and high-wage opportunities.

North Carolina's Pandemic Impacts by Industry

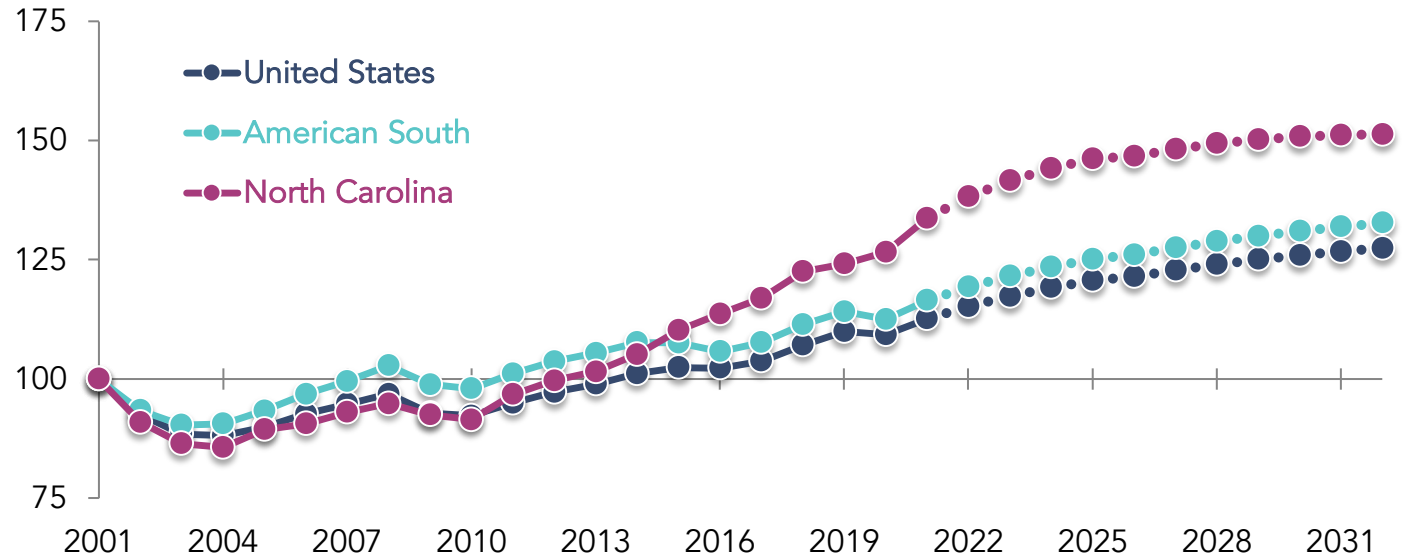


Source: EL calculations based on Lightcast 2022.4

The future also looks strong for the industry as Lightcast models predict growth over the next 10 years for the state at a higher rate than the nation and the average for the southern states.

Long Term Tech Industry Employment Trends

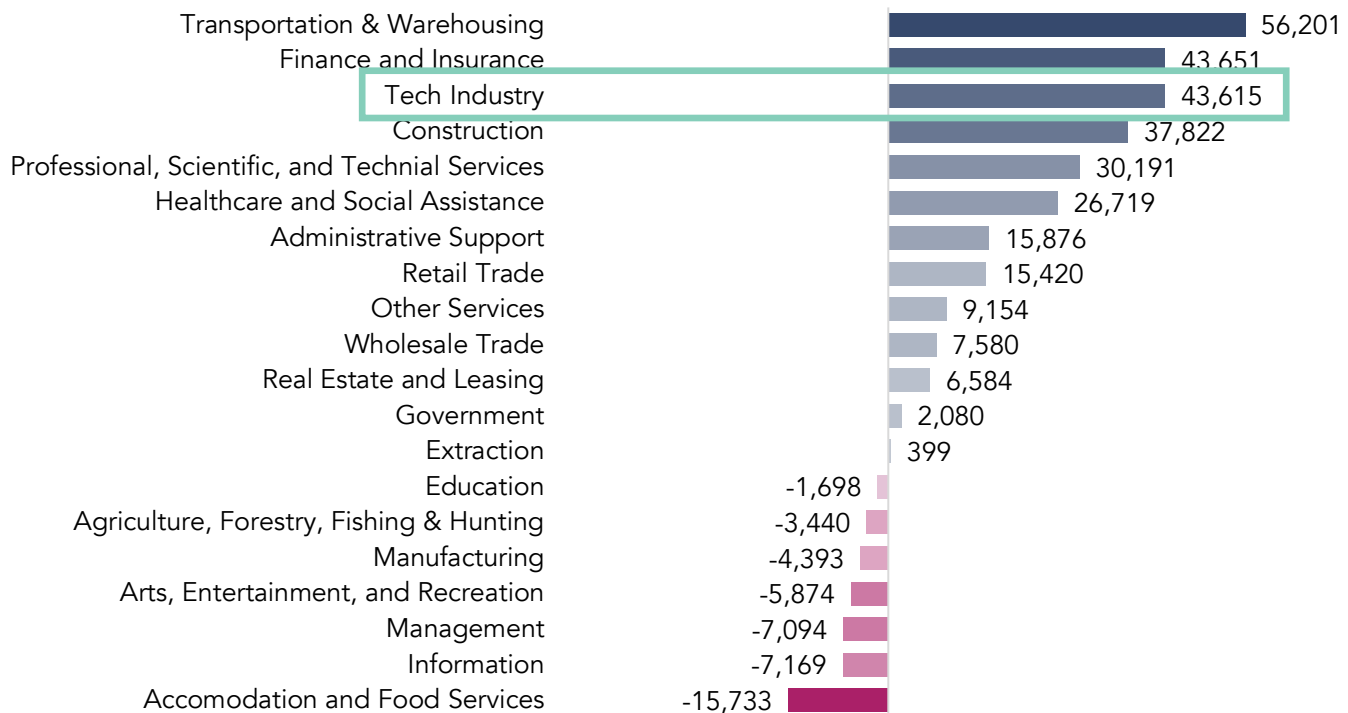
2001 Employment Levels = 100



Source: EL calculations based on Lightcast 2022.4

The tech industry is also becoming a major engine of the state economy. In the last five years, the tech industry added a net of 43,615 jobs. This was the third highest industry group, more than health care, manufacturing, or construction. The top two industries for net jobs added were transportation & warehousing and finance. These industries pay wages at or below the state average in earnings per worker. The state’s economy is benefiting by having a high-wage industry as a top job grower.

Net Jobs Change in North Carolina by Industry, 2016-2021



Source: EL estimates based on Lightcast 2022.4

Employees within technology companies in North Carolina on average earn high incomes. The average earnings per worker in the tech industry was \$135,000 in 2021. The average earnings for workers across all industries in the state is about \$70,500. This metric of earnings includes all the wages, salaries, and supplements received by a worker. Supplements including employee benefits on average accounted for about \$20,760 of a tech industry worker’s earnings in North Carolina.

Average Annual Earnings per Worker by Sub-Industry, 2021

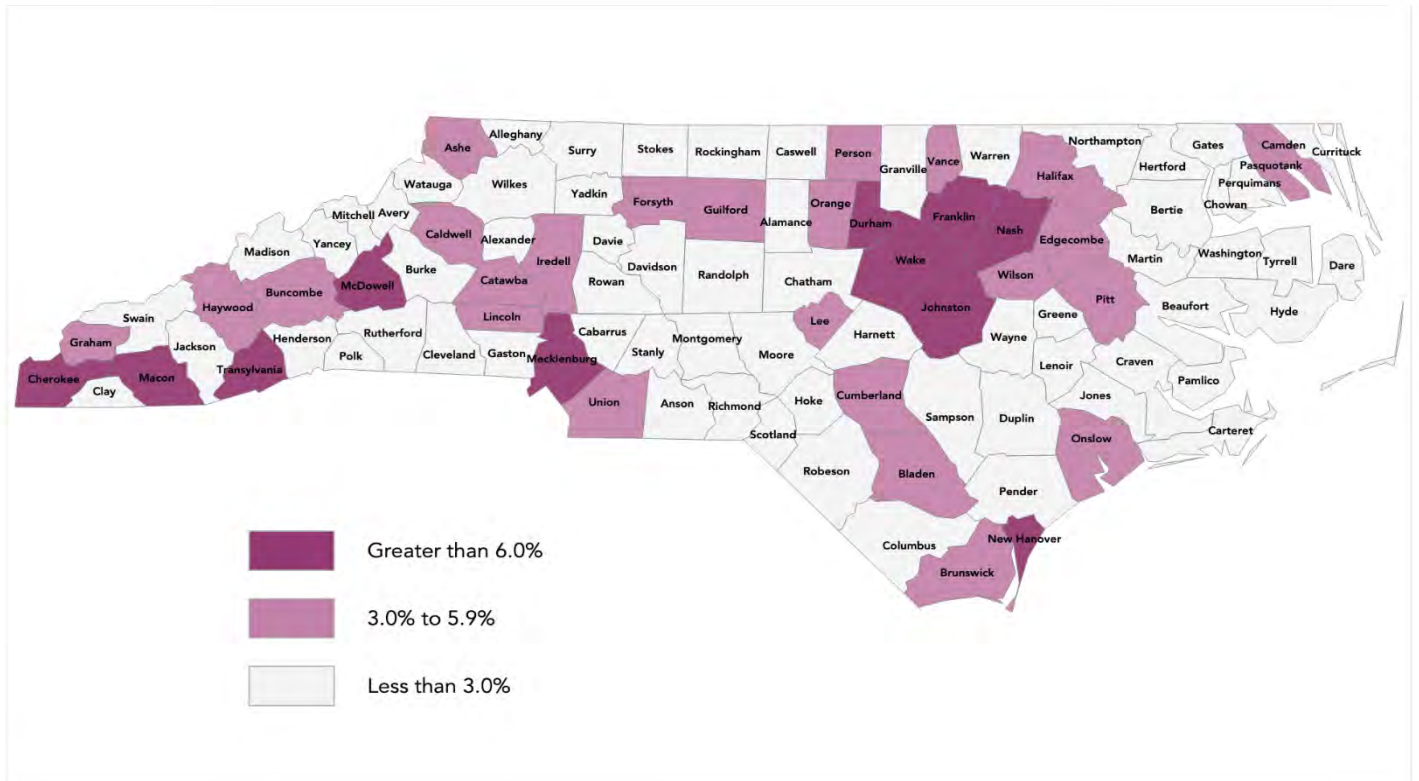
Technology Categories	North Carolina	North Carolina (Purchasing Power)	National Average
Energy Tech	\$143,700	\$156,400	\$166,900
Environmental Tech	\$103,900	\$113,100	\$91,800
Life Sciences	\$128,700	\$140,200	\$145,400
IT	\$143,400	\$156,200	\$181,300
All Categories	North Carolina	North Carolina (Purchasing Power)	National Average
Tech Services	\$133,100	\$144,900	\$162,300
Tech Manufacturing	\$141,200	\$153,700	\$161,900
TOTAL TECH INDUSTRY	\$135,000	\$147,000	\$162,200

Source: EL estimates based on Lightcast 2022.4 and BEA (2022)

Tech industry wages are lower when compared to the national averages, meaning that the state still offers cost advantages to technology companies in terms of labor. Wages can be hard to compare across the country due to the varying cost of living. When purchasing power is accounted for, North Carolina’s wages are more comparable with the national average. A worker in the tech industry in California may make a higher salary than a tech industry worker in North Carolina but the wages may be comparable due to the lower cost of living in NC. The highest tech industry wages are found in energy technology, IT, and tech manufacturing.

Across the state, major metro areas have been leading the tech industry growth. Mecklenburg, Wake, and Durham counties account for about 57 percent of the tech industry in North Carolina. While tech industry jobs are still very strong in the urban centers of the state, jobs have spread to many areas of North Carolina. Tech industry jobs now account for more than six percent of all jobs in counties as geographically diverse as Macon, Transylvania, McDowell, Caldwell, Franklin, and New Hanover counties. Over one-third of all the state's counties have more than three percent of their total jobs in the tech industry.

Tech Industry Jobs as a Percentage of Total Jobs, 2021



Source: EL calculations based on Lightcast 2022.4

We also isolated the industries into even further detailed groupings, super sub-industries. This breakdown shows that software services are a significant driver of the tech industry growth in the state. Jobs in this group have grown by 33 percent from 2016 to 2021. Again, growth is strong across almost all categories.

North Carolina’s Tech Industry by Super Sub-Industries, 2021

Sub-Industries	2021 Employment	Employment Change (2016-2021)	Establishments (2021)	National Location Quotient
Software	88,592	33.0%	14,023	0.99
Engineering, Environmental, & Clean Tech	41,800	23.9%	3,398	1.00
Internet & Telecommunications	38,701	-7.6%	2,945	0.90
R&D and Testing	37,196	38.1%	2,758	1.05
Life Sciences Manufacturing	32,230	10.8%	316	1.44
Electronics Hardware	25,985	1.6%	306	0.93
Remediation and Waste Management	12,875	26.3%	1,048	0.89
Other Energy and Power Generation	12,700	-2.6%	522	0.45
Renewable Energy	745	334.6%	55	1.22
TOTAL TECH INDUSTRY	290,823	17.6%	25,368	0.96

Source: EL calculations based on Lightcast 2022.4

The tech industry contributes to the state economy far beyond its direct employees and payroll. Supply chain demands and added income multiply throughout the economy and help support jobs across a variety of industries. Using multipliers from Lightcast’s social account matrix input-output model, the total economic impact of the tech industry on North Carolina’s economy was determined. Employment, earnings, and sales within the industry represent the direct impact on the state economy. These effects are multiplied through the economy by supply chain purchases (indirect) and income effects (induced) to estimate the total impact on the state.

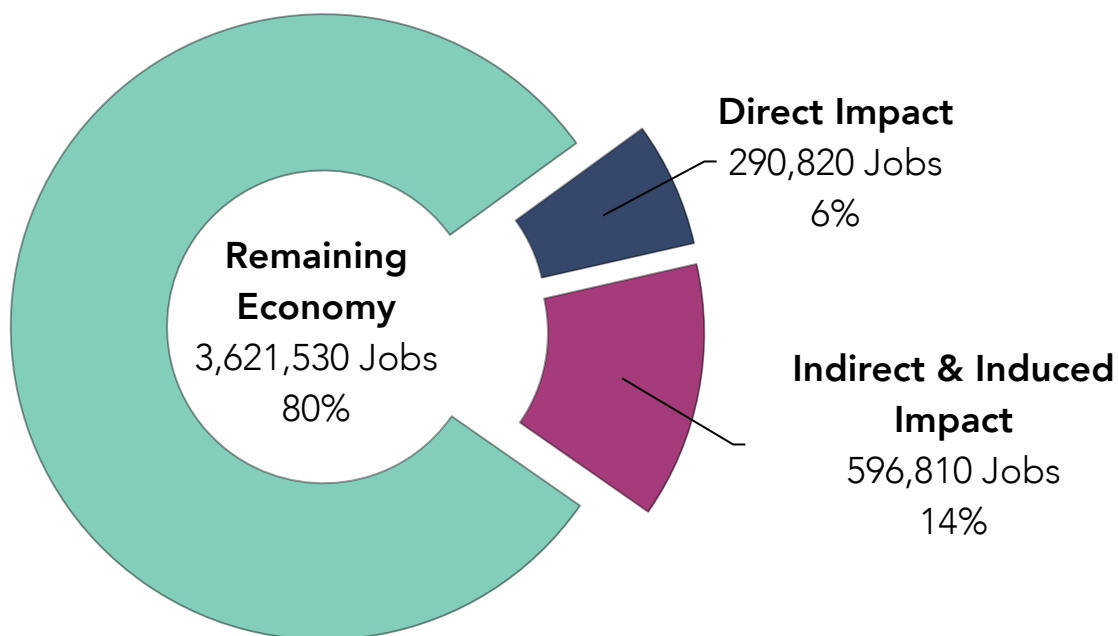
Economic Impact of Tech Industry on State Economy, 2021

Impact Type	Employees	Earnings (Millions)	Sales (Millions)
Direct Impact	290,823	\$36,714	\$105,430
Multiplier	3.05	1.95	1.94
Indirect & Induced Impact	596,807	\$34,847	\$98,602
Total Impact	887,631	\$71,561	\$204,032
Percentage of NC Economy	19.7%	23.6%	21.1%

Source: EL calculations based on Lightcast 2022.4

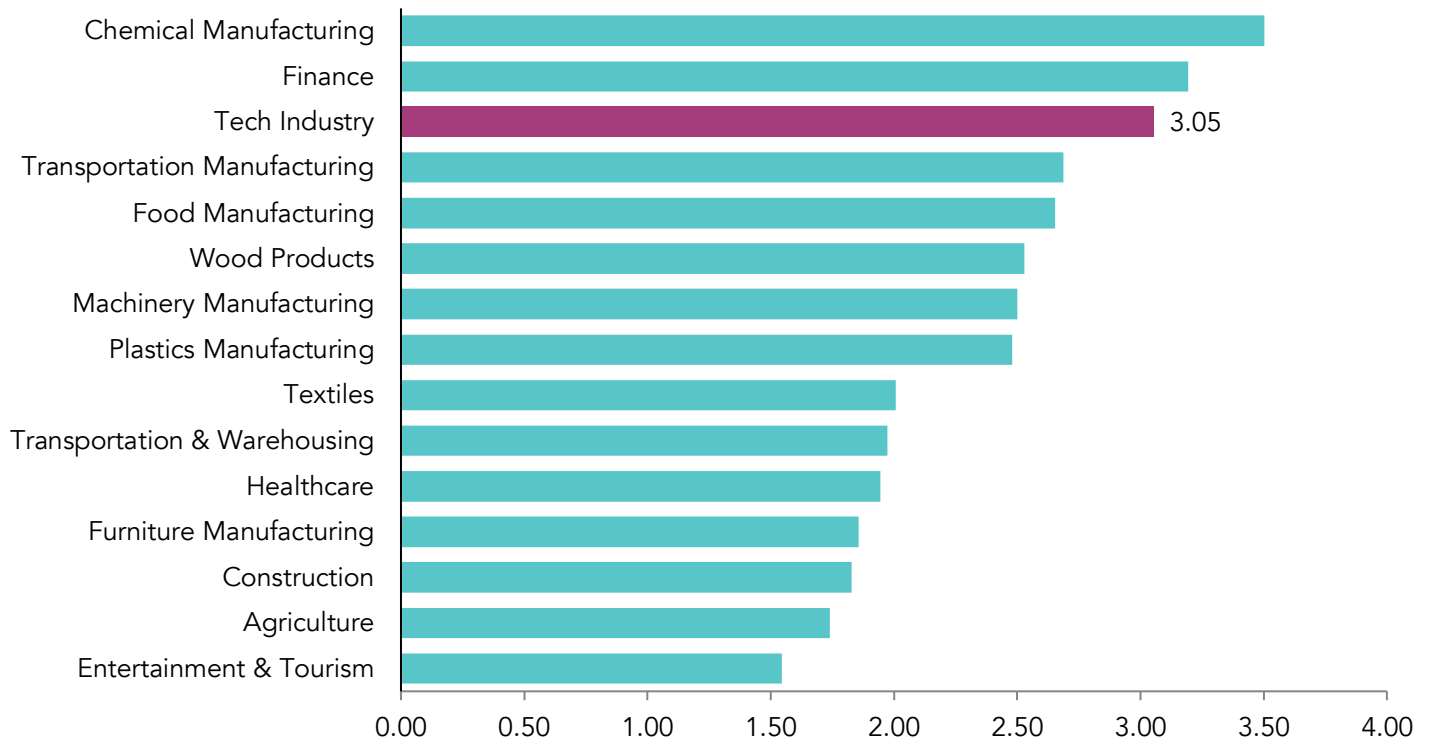
The tech industry in North Carolina has an employment multiplier of 3.05. For example, one position in the tech industry supports another two positions elsewhere in the state economy for a total impact of three jobs. \$37 billion in earnings in the tech industry supports \$72 billion wages across the North Carolina economy, accounting for almost 24 percent of North Carolina’s total earnings. The graph below displays the contribution of the tech industry of 20 percent to the overall state employment. The tech industry jobs multiplier of 3.05 was one of the largest across the state’s economy.

Tech Industry Contribution to North Carolina’s Economy, 2021



Source: EL calculations based on Lightcast 2022.4

North Carolina Job Multiplier by Selected Industries, 2021



Source: EL estimates based on Lightcast 2022.4

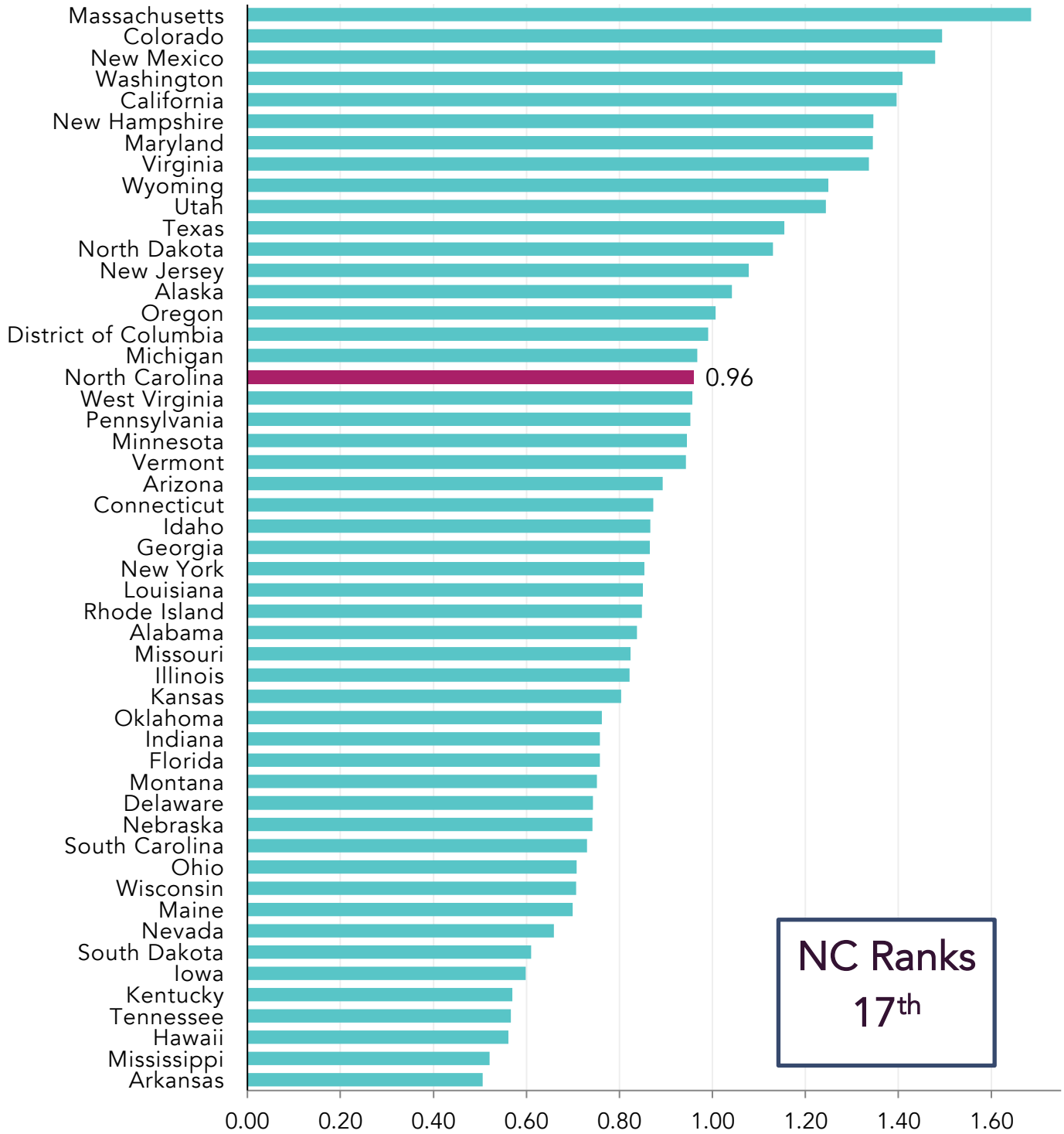
SECTION 4. STATE COMPARISONS OF TECH INDUSTRY METRICS

Using the same methods for calculating the tech industry in North Carolina, the same metrics were calculated for the remaining states and the District of Columbia to measure how North Carolina tech trends compare. The District of Columbia is included in the charts, but not included in the state rankings. This section of the report evaluates many of the North Carolina level metrics shown in Section 3 compared against the values for the United States as a whole and the other states. This section looks first at metrics for the total tech industry but also shows state comparisons of the IT sub-industry. Tech occupation data is compared in a later section of the report.

When comparing the tech industry to the make-up of a state's entire economy, states like California and Washington that are internationally known for their tech industries have much higher portions of the tech industry in their overall economies. However, an average concentration is not necessarily a negative trait, as it can indicate a diverse economy that is not overly reliant on one industry.

Since the first State of the Technology Sector report, North Carolina has continued to move up in this category. Based on the other strong rankings there is reason to expect tech to move to an even more significant role in the state economy. The state now ranks 17th in tech industry concentration, up from 20th last year.

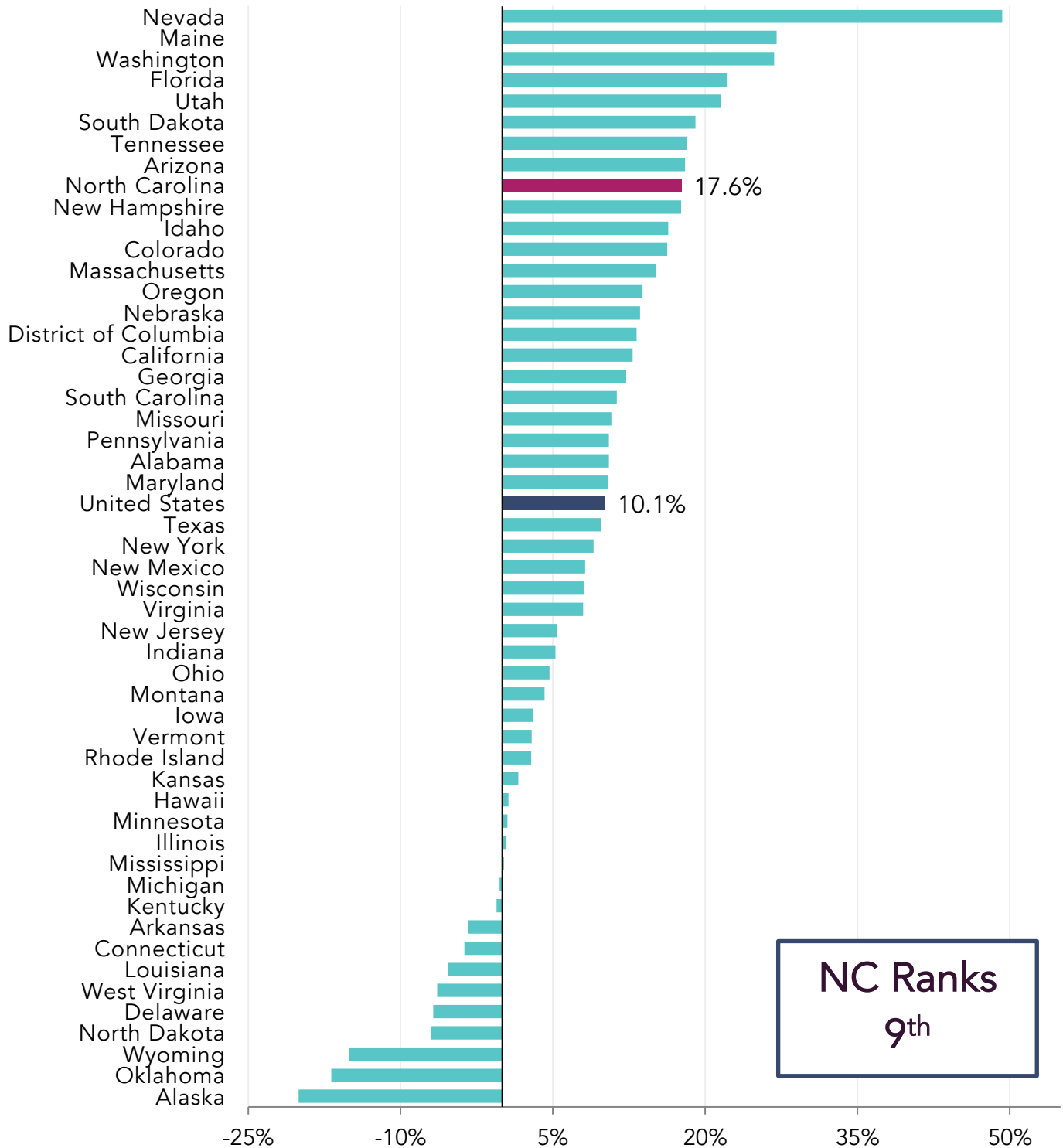
Tech Industry Location Quotients, 2021



Source: EL estimates based on Lightcast 2022.4

One of the strongest performance indicators for the state's tech industry is its recent growth and future growth potential. In the past five years, jobs in this industry have grown by almost 18 percent in the state. That is the 9th highest growth rate in the country and nearly double the national average of 10 percent. The number one state, Nevada, is growing at a high rate due to the rapid expansion at the Tesla Gigafactory in Reno.

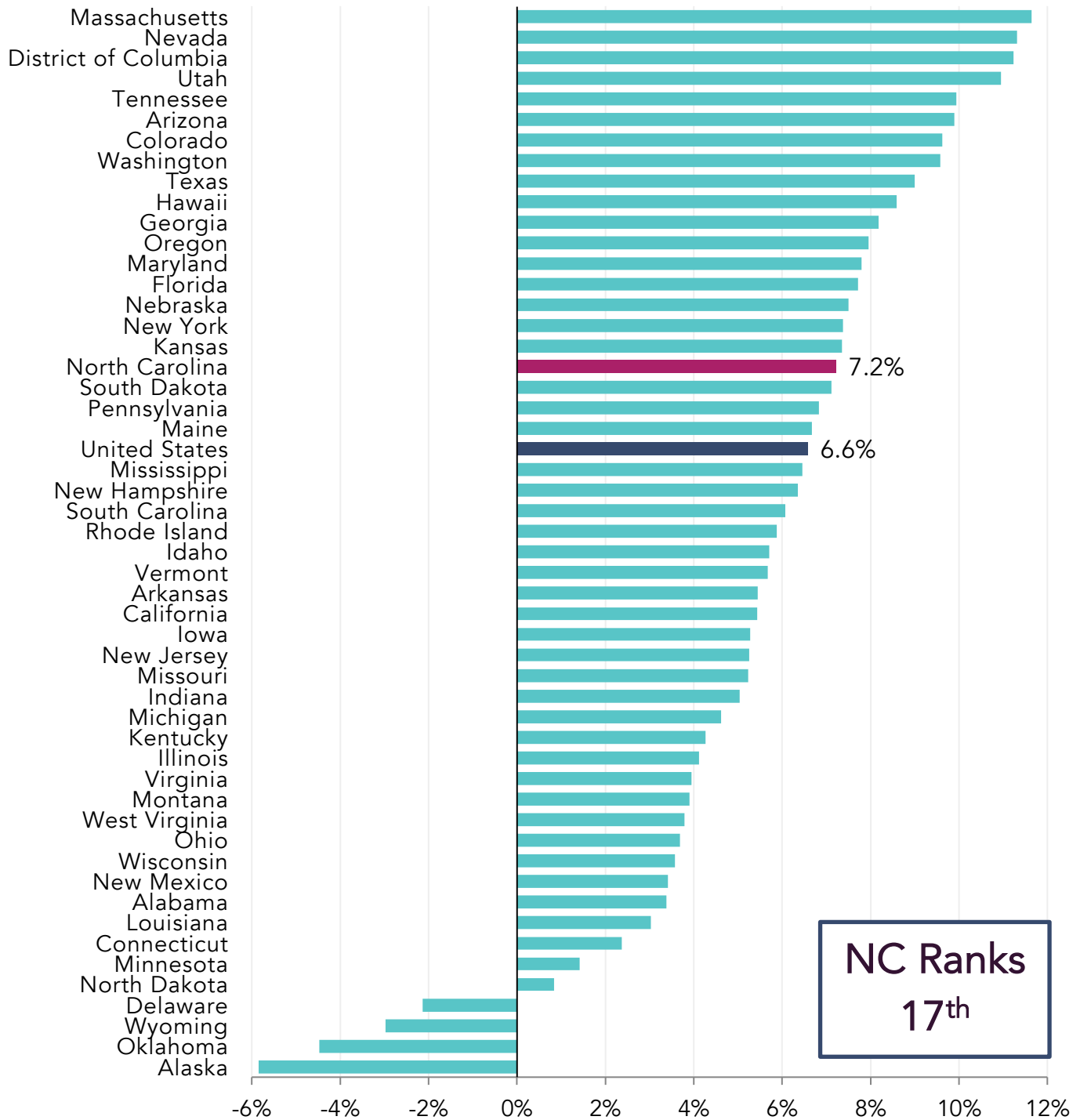
Tech Industry Employment Growth, 2016-2021



Source: EL estimates based on Lightcast 2022.4

Using Lightcast forecasting models, we calculated the expected growth of the tech industry for all 50 states and the District of Columbia for the next five years. North Carolina is estimated to grow its tech industry employment by 7.2 percent from now to 2027. This ranks North Carolina 17th out of all the states, and higher than the national average.

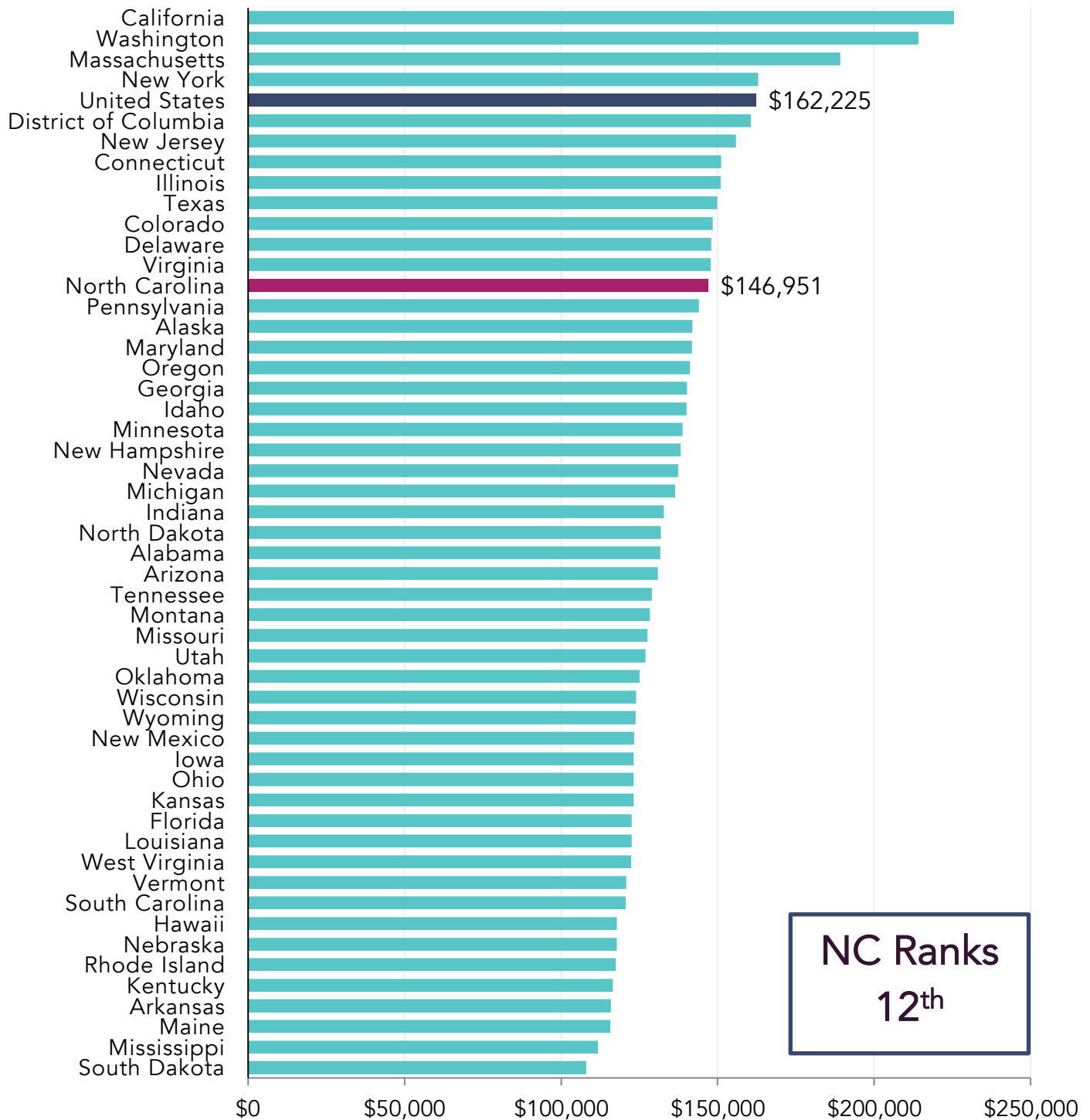
Expected Tech Industry Employment Growth, 2022-2027



Source: EL estimates based on Lightcast 2022.4

North Carolina’s tech industry wages are below the national average but are ranked in the top 15. Normalizing tech industry wages by purchasing power, or accounting for the lower cost of living in North Carolina, the annual wage is closer to the national average and the state rank is 12th. The metric shows a dramatic difference between the other fast-growth tech states. For example, Utah, Florida, and Maine are three of the top growing tech markets but adjusted wages for tech industry workers are much lower.

Average Annual Wage for Tech Industry Employees with Purchasing Power, 2021

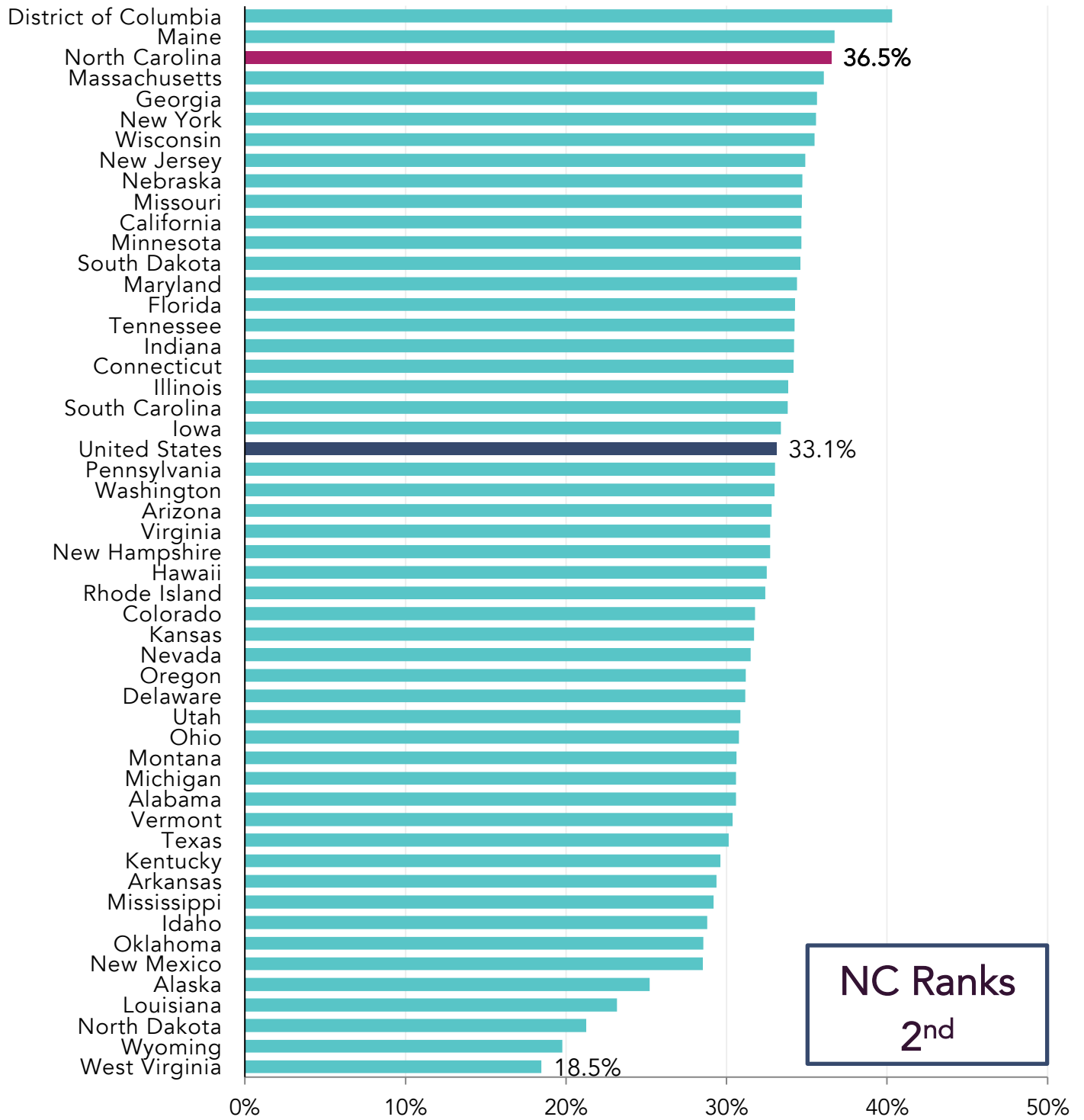


**NC Ranks
12th**

Source: EL estimates based on Lightcast 2022.4 and BEA (2022)

The gender make-up of the tech industry across all 50 states was evaluated. The tech industry has been traditionally, and is still, male dominated. States are making efforts to encourage women into STEM careers and education. While almost every state has far from equal representation in this industry, North Carolina is again a top state. For the first four years of this report, North Carolina was the top state (not including DC) but was edged to second by Maine in recent years.

Percentage of Women in the Tech Industry Workforce

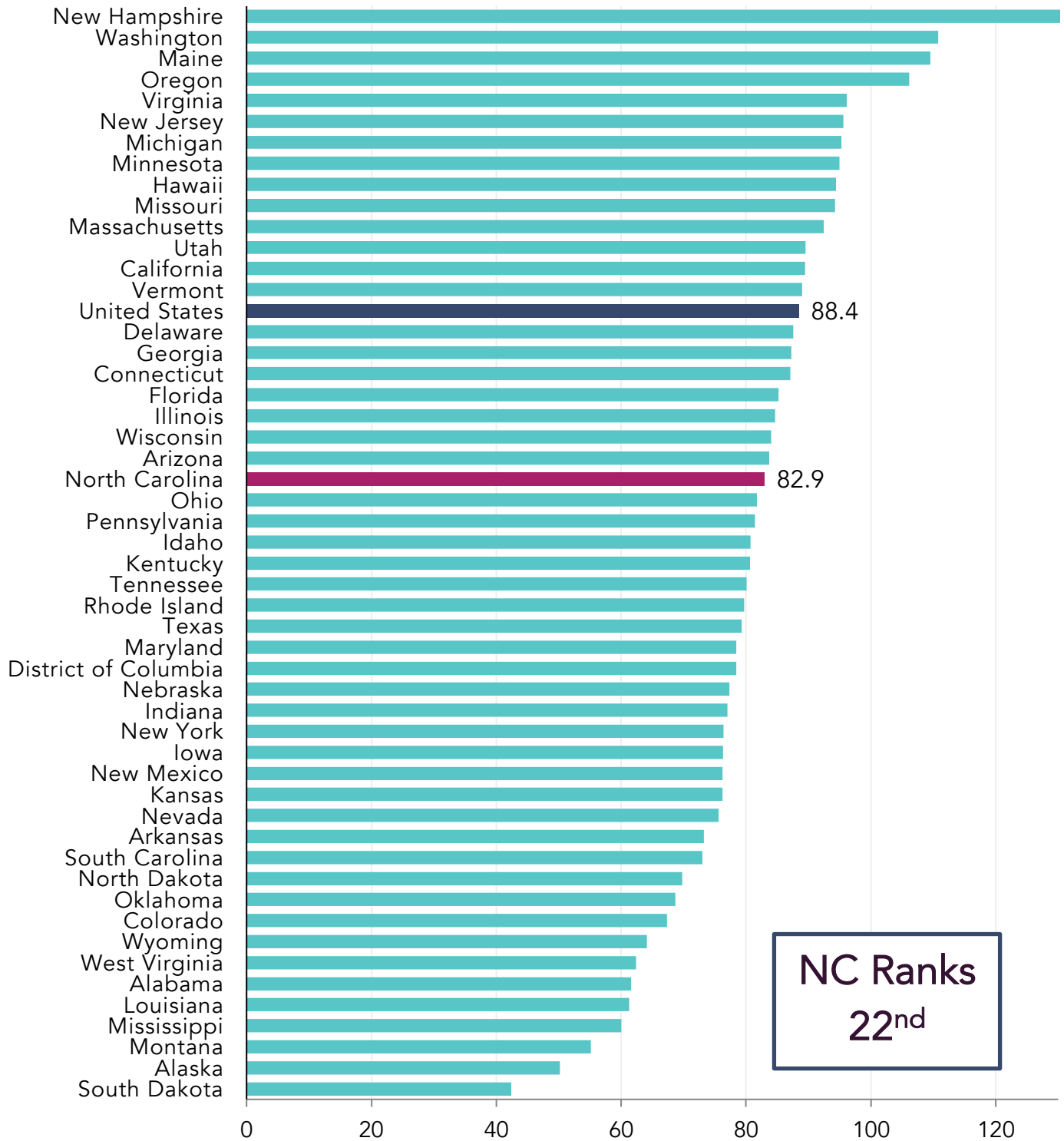


Source: EL estimates based on Lightcast 2022.4

The tech industry diversity index is calculated by dividing the percentage of tech industry workers who identify as people of color or in the Hispanic community by the ratio present in the overall population. Therefore, if a state has a tech industry diversity index lower than 100, this indicates that the tech industry is less diverse compared to the state’s overall population. A value of 100 would mean the tech industry is representative of the state’s overall population. Only four states had a

diversity index score above 100. North Carolina had a diversity index of 82.9 indicating that people of color are underrepresented in the tech industry compared to the state’s general population. This ranks the state 22nd for the second year in a row.

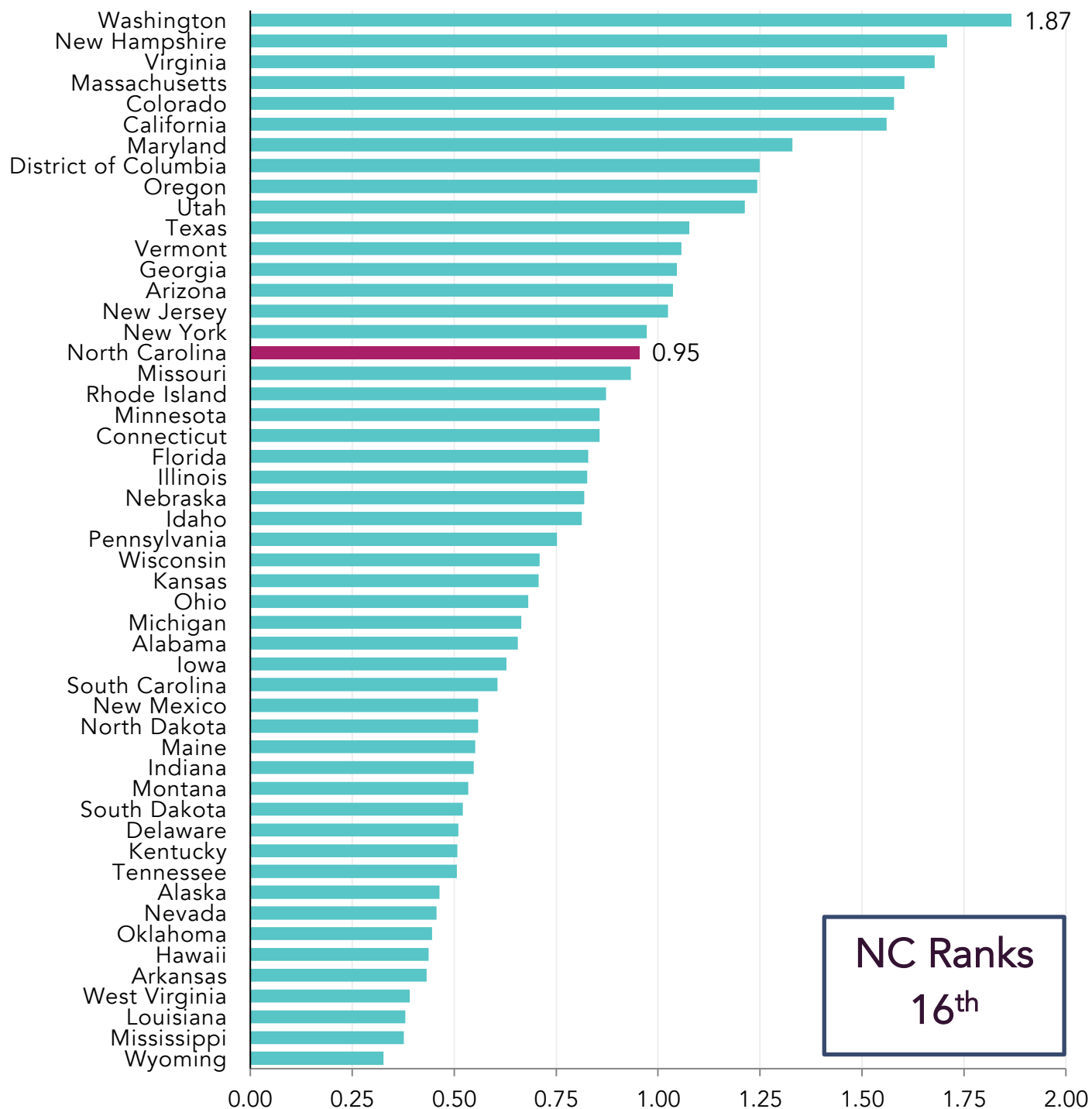
Tech Industry Diversity Index, 2021



Source: EL estimates based on Lightcast 2022.4 and US Census Bureau (2022)

Next, we evaluated the IT sub-industry specifically. This group of industries represents the high-tech core including hardware manufacturing, internet, telecommunications, and software companies. In 2021, the IT industry accounted for 3.4 percent of total state employment with a location quotient of 0.95. The concentration of IT industry employment in North Carolina is just under the national average. North Carolina ranks 16th across the states in terms of location quotients.

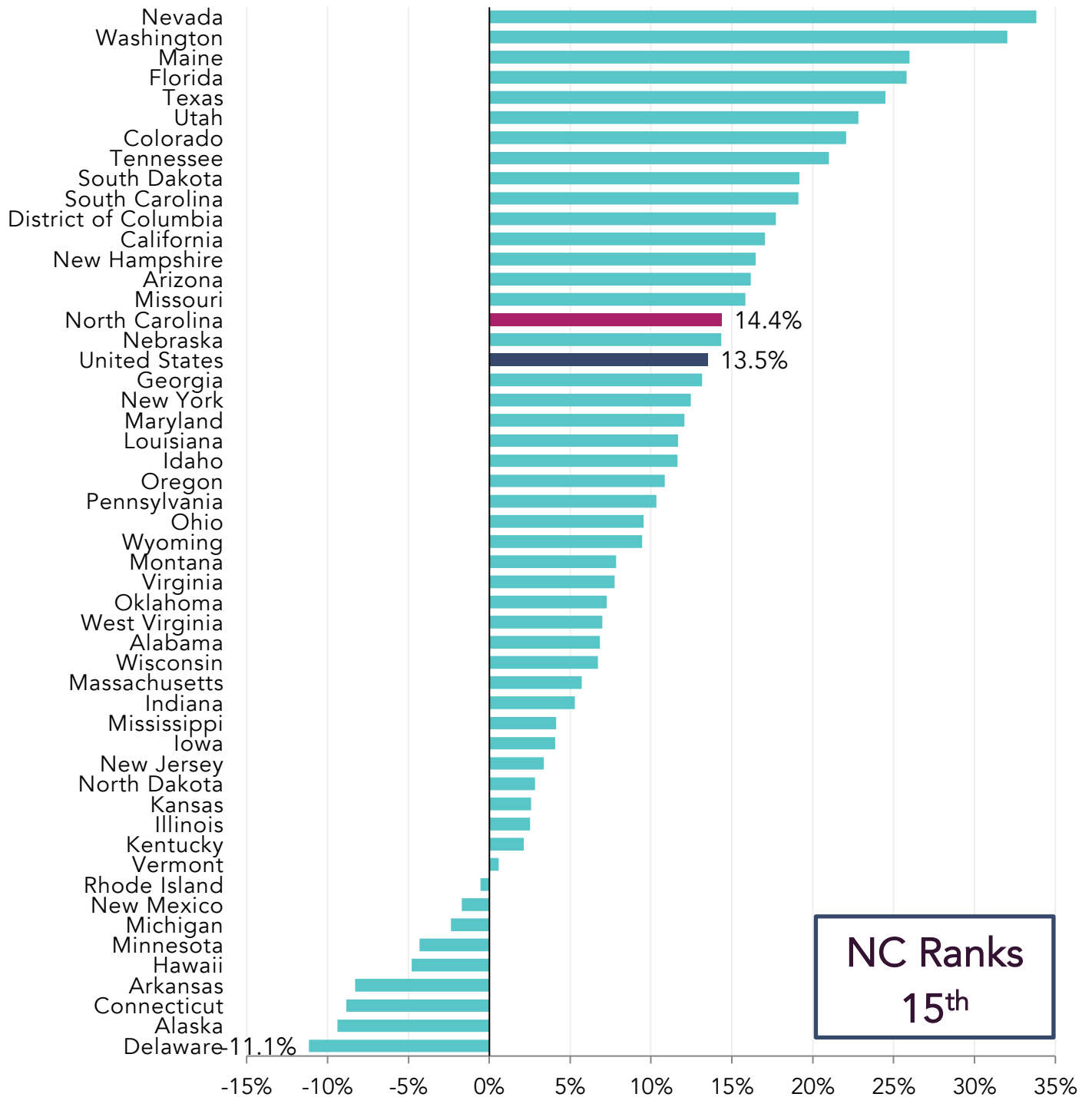
IT Industry Location Quotient, 2021



Source: EL estimates based on Lightcast 2022.4

The employment growth rate in IT from 2016 to 2021 for the state was 14 percent. This was the 15th fastest growth rate across all 50 states. In the first two State of the Technology Sector reports, North Carolina ranked 1st and 2nd in this metric and has remained in the top 15 in recent years. This data has been impacted by the reclassification of 4,000 jobs in Mecklenburg County away from the IT industry to the finance industry.

IT Industry Employment Growth, 2016-2021

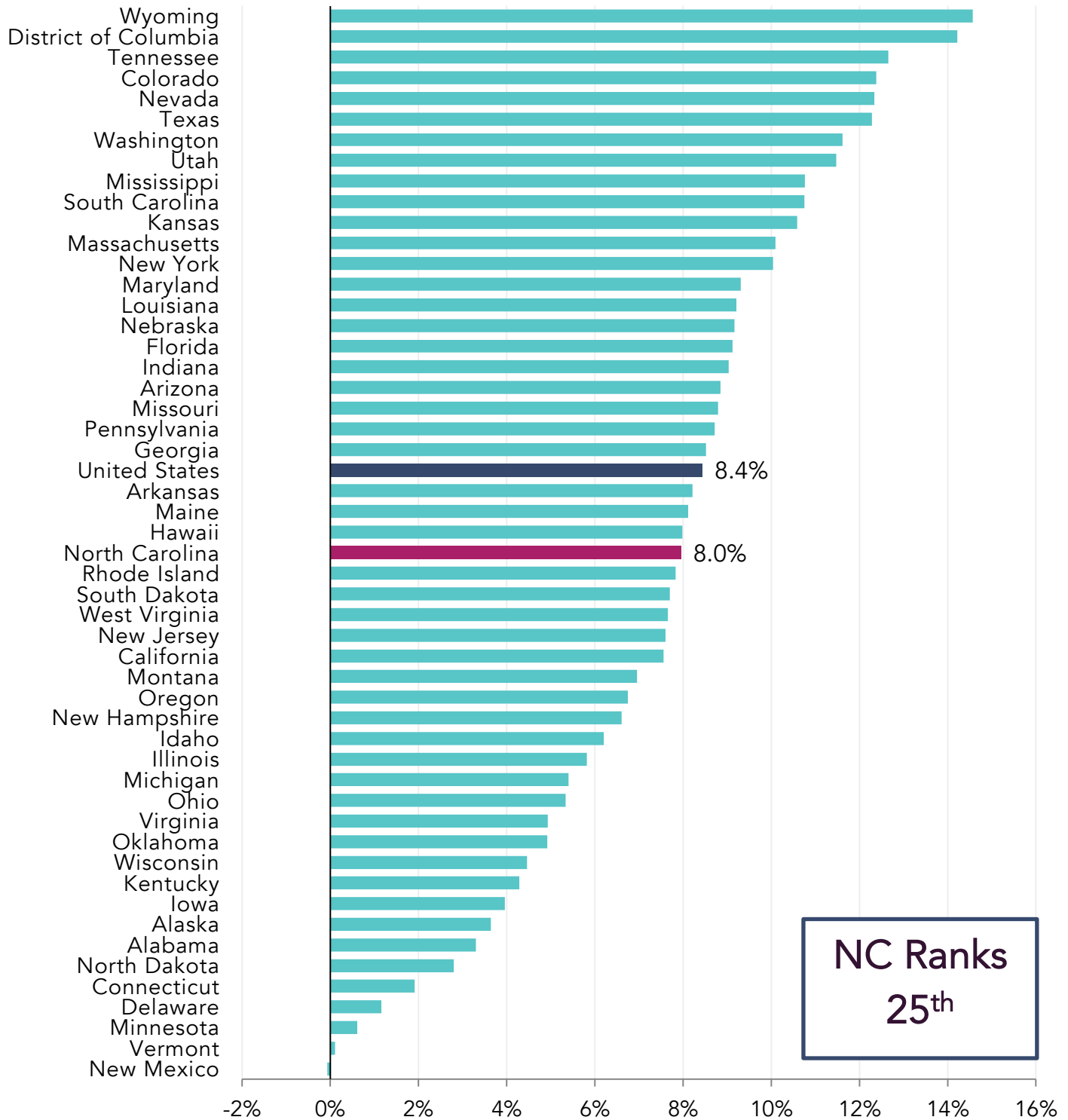


Source: EL estimates based on Lightcast 2022.4

**NC Ranks
15th**

North Carolina IT growth is currently projected to level off in the future. From 2022 to 2027, employment in IT is expected to grow by 8 percent, right around the national average. The state's ranking on this metric is down to 25th from 21st last year.

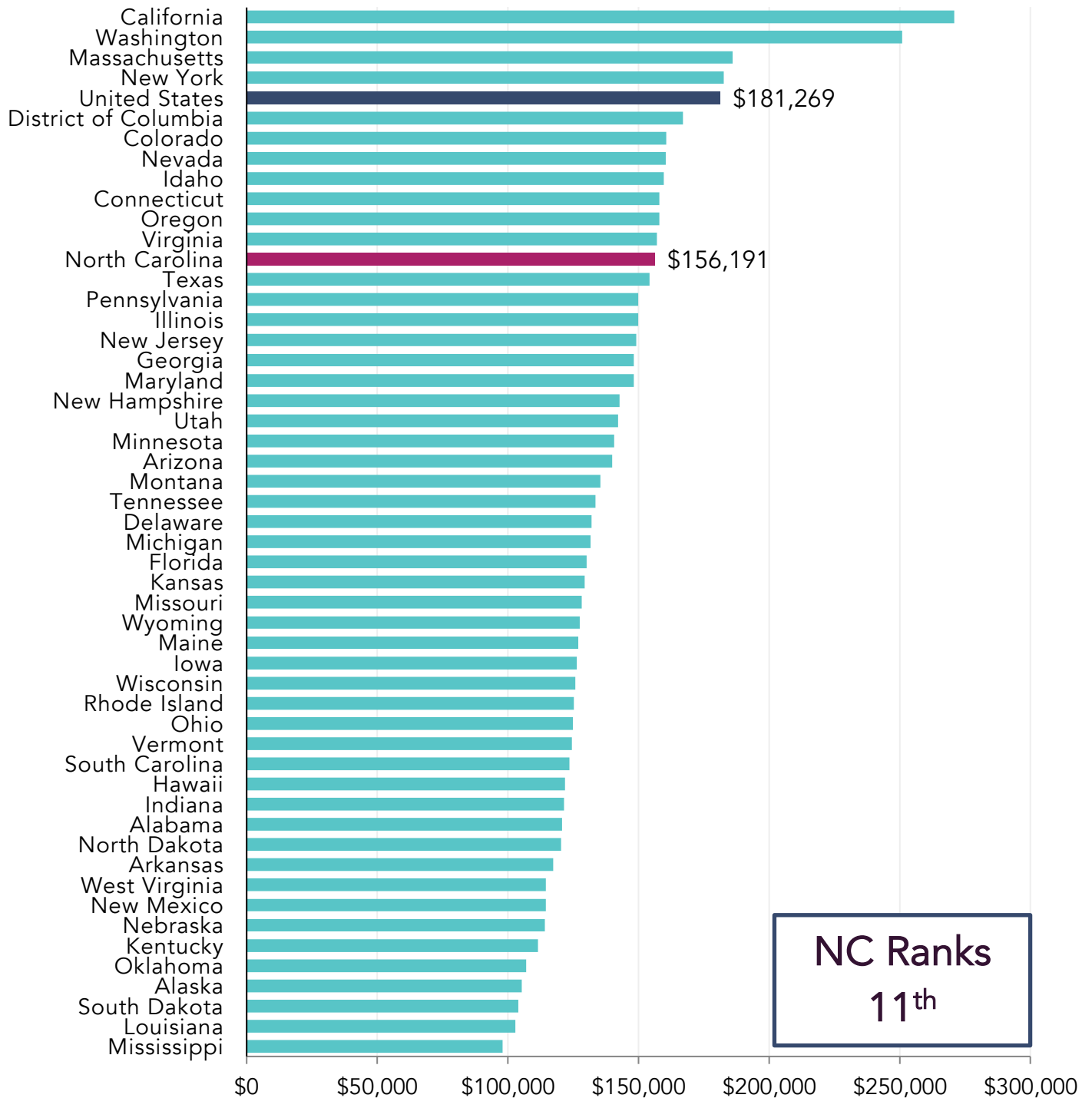
Expected IT Industry Employment Growth, 2022-2027



Source: EL estimates based on Lightcast 2022.4

Similar to the total tech industry, the IT industry’s wages are lower in North Carolina than the national average. Still, the state ranks 11th across states for IT industry average wage when purchasing power is considered. The lower cost of living in the state can make it attractive to tech firms looking for lower operating costs. Within the state, IT wages are double the average for wages across all industries.

Average Annual Wage for IT Industry Employees with Purchasing Power, 2021



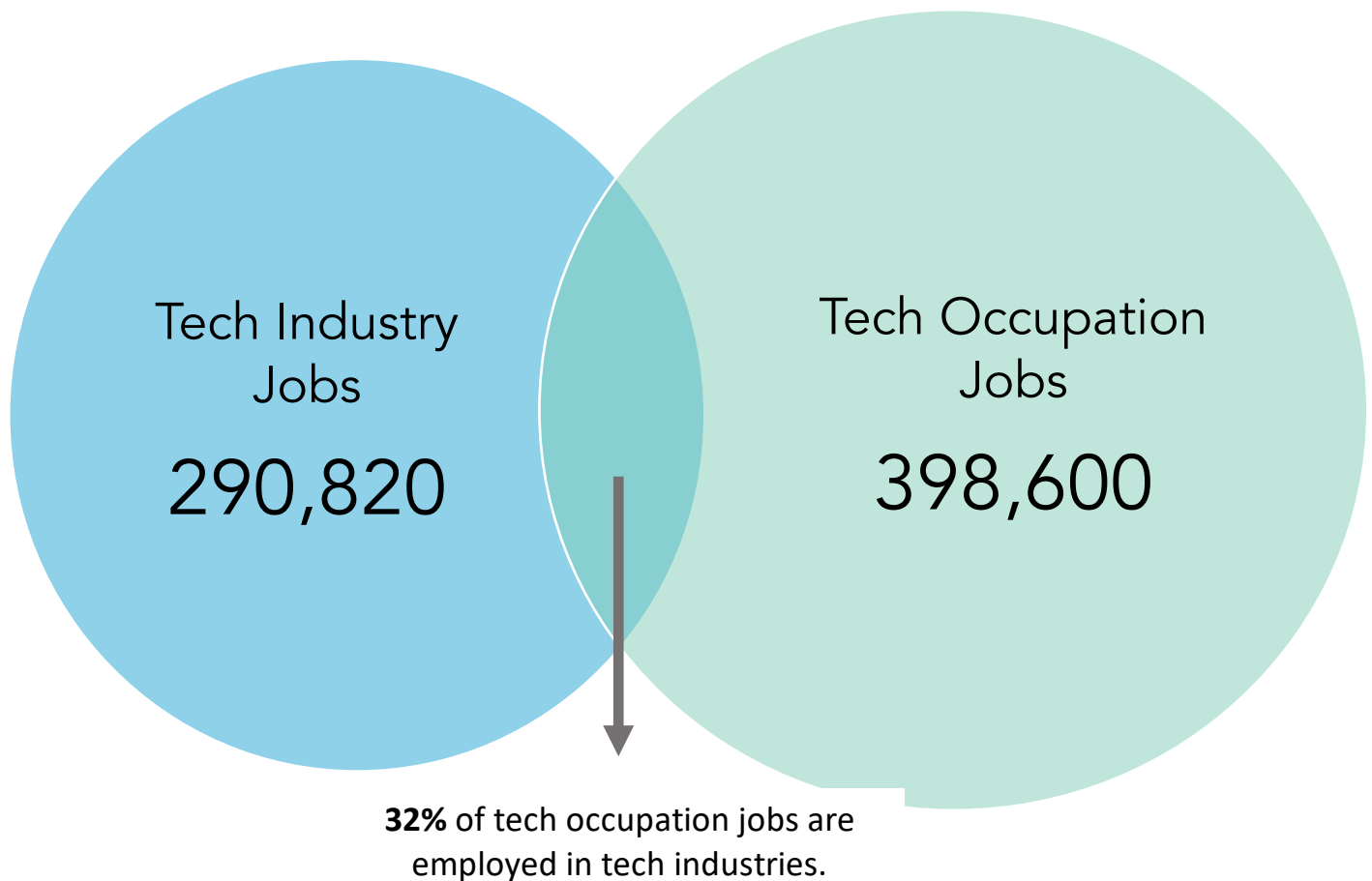
Source: EL estimates based on Lightcast 2022.4 and BEA (2022)

SECTION 5. TECH OCCUPATIONS

Technology workers today are present in almost every industry. As technology has permeated most businesses and is increasingly important to company competitiveness, industries like banking, energy, and healthcare employ more tech workers. In order to account for the number of tech occupations that exist across all industries we reviewed 85 separate five-digit Standard Occupational Codes (SOC) codes focusing mostly on computer and engineering driven work. In 2021 there was a reclassification of SOC codes and the groupings of occupations for this report changed as a result. A complete list is included in the appendix. Here we will review the breakdown of tech occupations within North Carolina and then we will compare these statistics against other states and the national average.

Using this methodology, the data showed that there are 398,600 workers in tech occupations in North Carolina. This number is higher than the 290,820 workers employed by the tech industry. This means there is a significant portion of tech occupations outside traditional technology companies in the state. About 32 percent of tech occupations jobs are located within the tech industry; the rest are employed in other industries such as manufacturing and finance. This value is down from 36 percent in last year's report.

Staffing Patterns of Tech Industries and Tech Occupations, 2021



Source: EL estimates based on Lightcast 2022.4

Software developers were the top tech occupation with over 52,000 workers. Their median annual earnings are over \$119,000. Tech occupations have grown by 28 percent in the past five years.

Top 12 Tech Occupations in North Carolina Table, 2021

Description	2021 Occupations	Change in Employment, 2016-2021	Median Annual Wage ^(a)	Annual Openings	Turnover Rate
Software Developers	52,004	+83%	\$119,080	7,366	46%
Business Operations Specialists, All Other	30,402	+75%	\$64,771	4,147	44%
Computer User Support Specialists	23,726	+12%	\$48,381	2,361	56%
Market Research Analysts and Specialists	23,699	+54%	\$62,088	3,429	65%
Computer Systems Analysts	23,438	-2%	\$99,341	2,451	49%
Management Analysts	23,095	+48%	\$96,762	3,157	60%
Project Management Specialists	22,858	+66%	\$97,240	3,046	59%
Computer and Information Systems Managers	16,801	+46%	\$143,146	2,051	44%
Civil Engineers	10,796	+33%	\$78,957	1,357	40%
Financial and Investment Analysts	9,811	+42%	\$81,411	1,247	61%
Network and Computer Systems Administrators	9,266	-18%	\$79,872	840	42%
All Tech Occupations^(b)	398,596	28%	\$85,770	53,123	48%

Source: EL estimates based on Lightcast 2022.4

^a Wage estimate is different from the average annual wage values in the previous charts. The average annual wage value is calculated across all occupations in the tech industry and measures the average versus the median.

^b This is a sum of the 85 SOC codes (see appendix) not only the 12 most common occupations displayed in the table above.

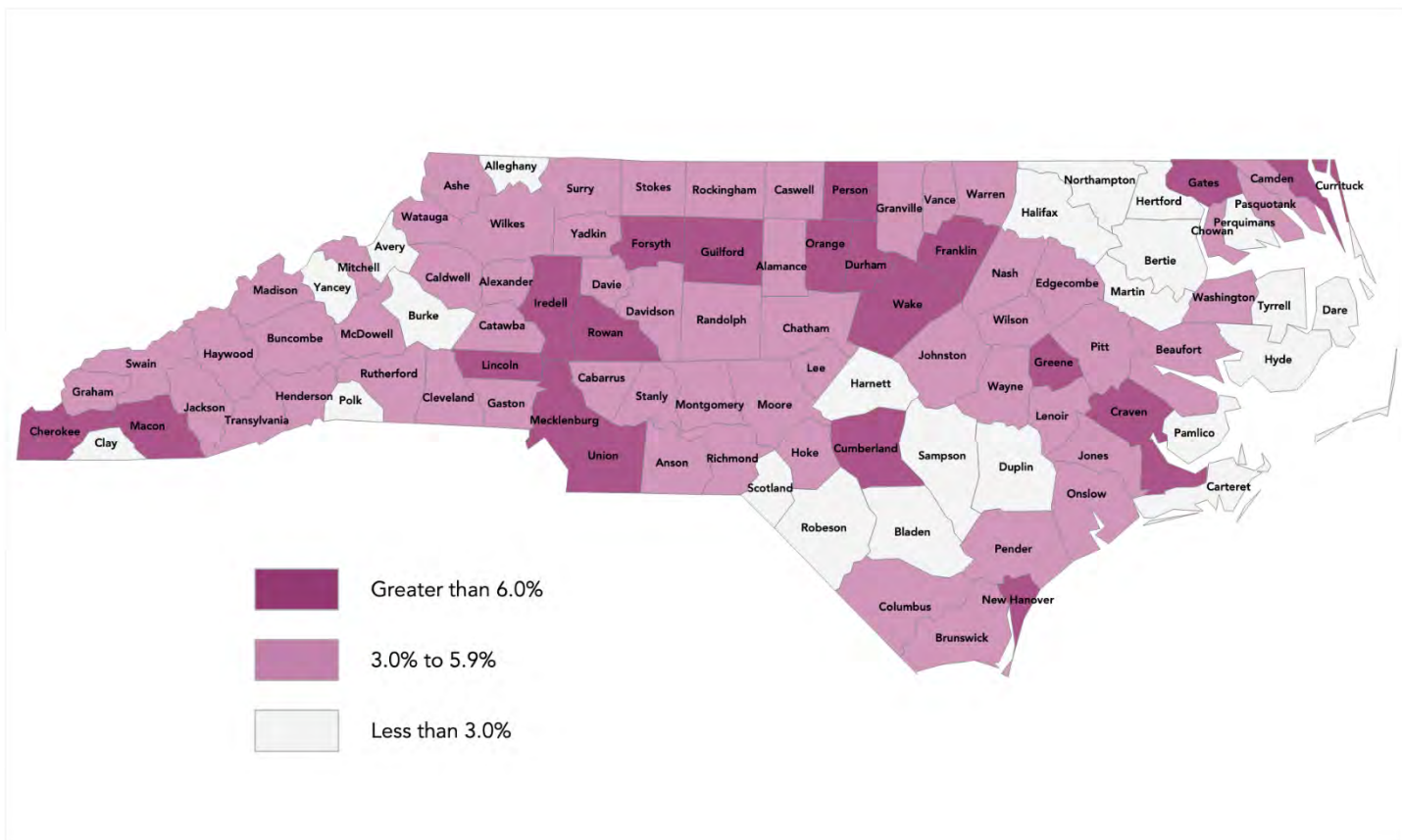
Top 5 Tech Occupations in Growth

Top Five in Net Job Growth		Top Five in Growth Percentage	
Software Developers	+23,591	Mathematical Science Occupations, All Other	+450%
Business Operations Specialists, All Other	+13,072	GIS Technicians	+346%
Project Management Specialists	+9,108	Data Scientists	+187%
Market Research Analysts and Specialists	+8,315	Actuaries	+133%
Management Analysts	+7,502	Calibration Technologists and Technicians	+121%

Looking at growth rates in the past five years, analysts are in high demand. The increasing use of Big Data has created demand for workers who can help process and dissect that information. This shows that from a talent perspective, cultivating a tech workforce is not just about coding websites and apps, but having smart individuals who are well versed in statistics and mathematics.

Like tech industry jobs, tech occupations tend to strongly concentrate in the more urban counties. The top counties with tech occupations also tend to follow the “Piedmont Crescent” I-40/I-85 corridor. Tech occupations are more widespread throughout the state compared to tech industry jobs. More counties reached the 3.0 percent threshold this year. A change and expansion of SOC codes might be playing a role in the increased presence of tech jobs throughout the state.

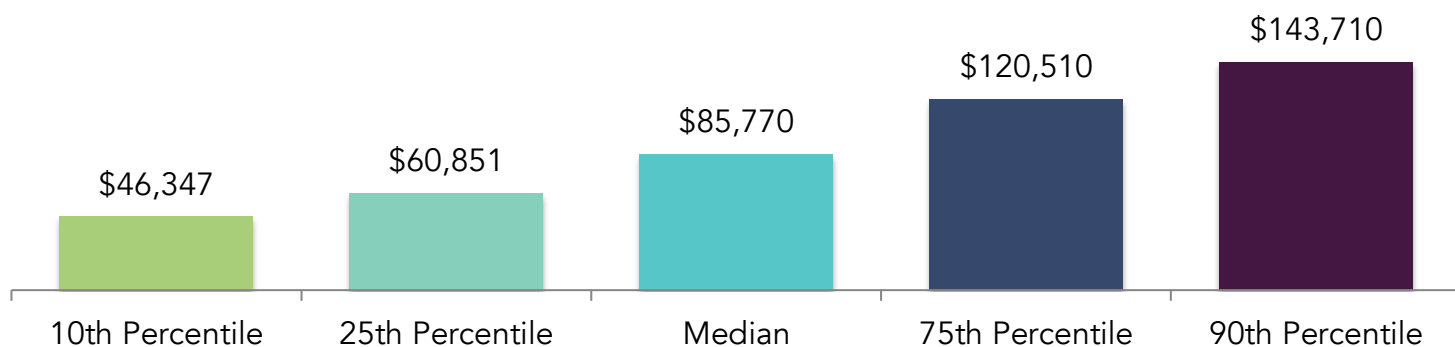
Tech Occupations as a Percentage of All Occupations, 2021



Source: EL estimates based on Lightcast 2022.4

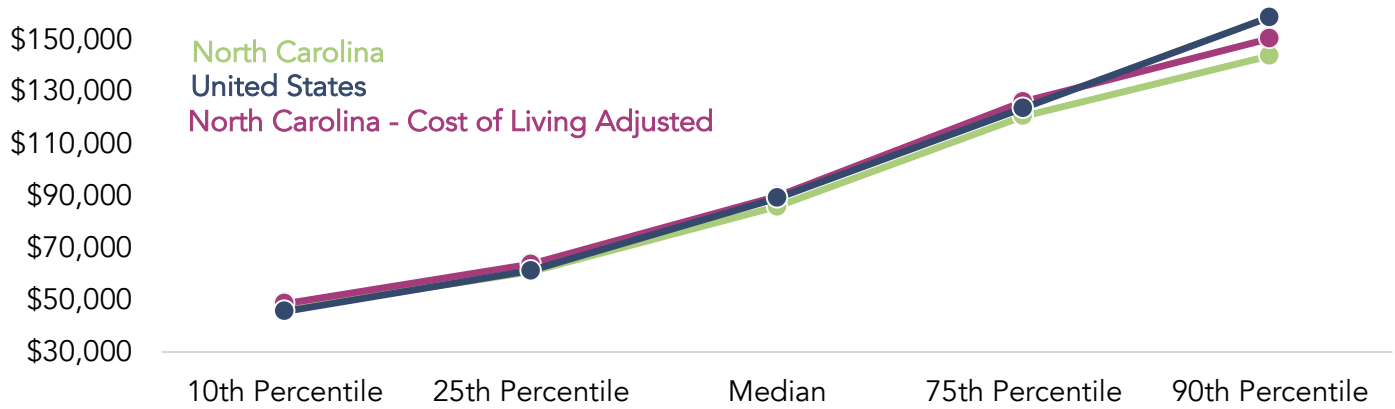
While the median earnings for a tech occupation are around \$85,800, the true earnings can range based on industry and experience. The lowest percentile earns about \$46,340 and the highest can earn about \$143,700 a year. North Carolina’s wages are competitive with the national average – particularly when accounting for cost of living – except for the highest-skilled positions.

Wage Distribution of Tech Occupations in North Carolina, 2021



Source: EL estimates based on Lightcast 2022.4

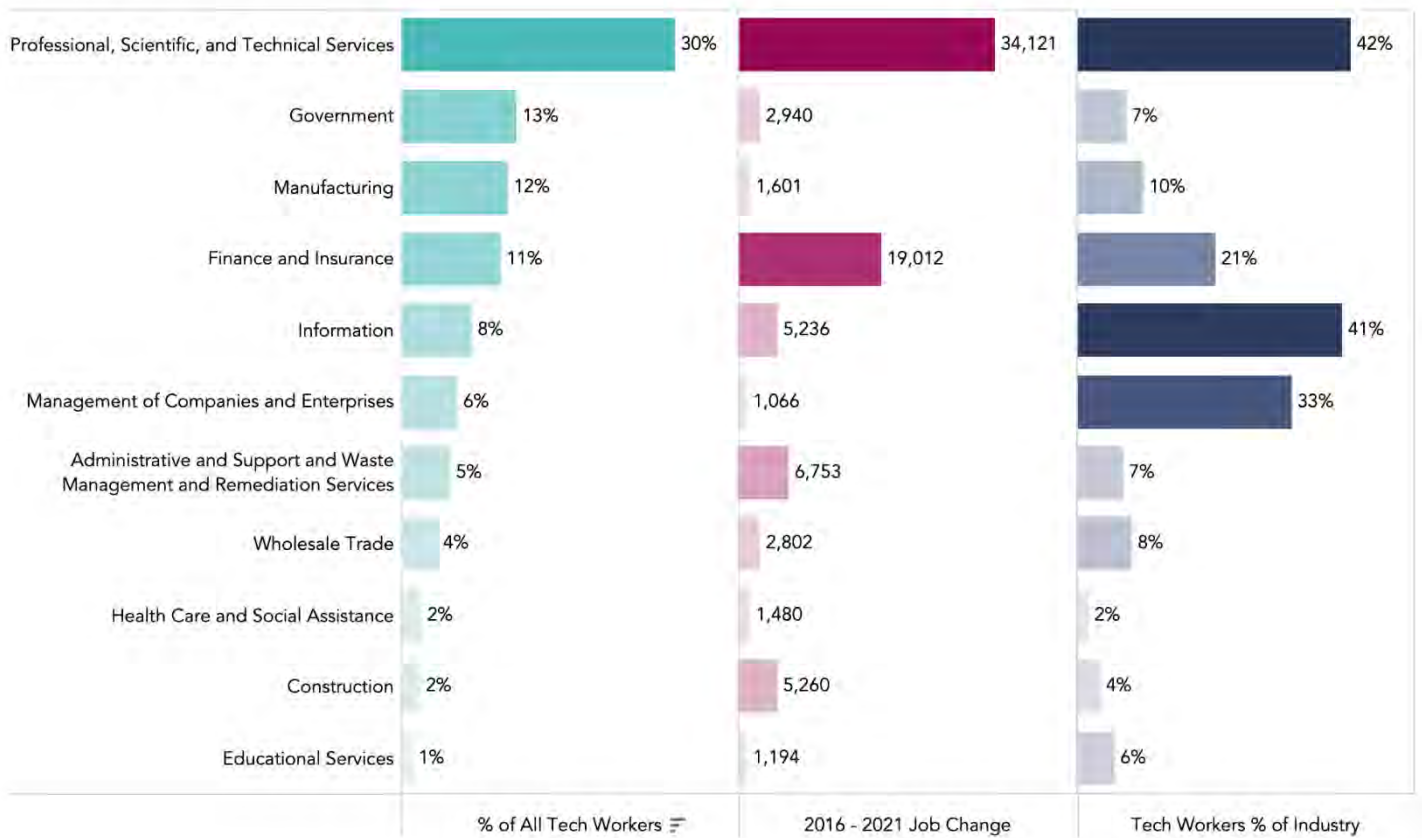
Tech Occupation Wage Distribution Comparison by Location, 2021



Source: EL estimates based on Lightcast 2022.4

As mentioned, these tech occupations exist across many different industries. The chart below demonstrates which industries (two-digit level) employ tech workers in North Carolina. Beyond the expected Professional Services and Information industries, tech workers are also present and growing strongly in manufacturing, finance, government, and healthcare. In finance and insurance about 21 percent of all jobs in the industry are tech occupations and added over 19,000 tech workers from 2016 to 2021. Tech workers now account for 10 percent of the manufacturing industry as production become more automated and integrated.

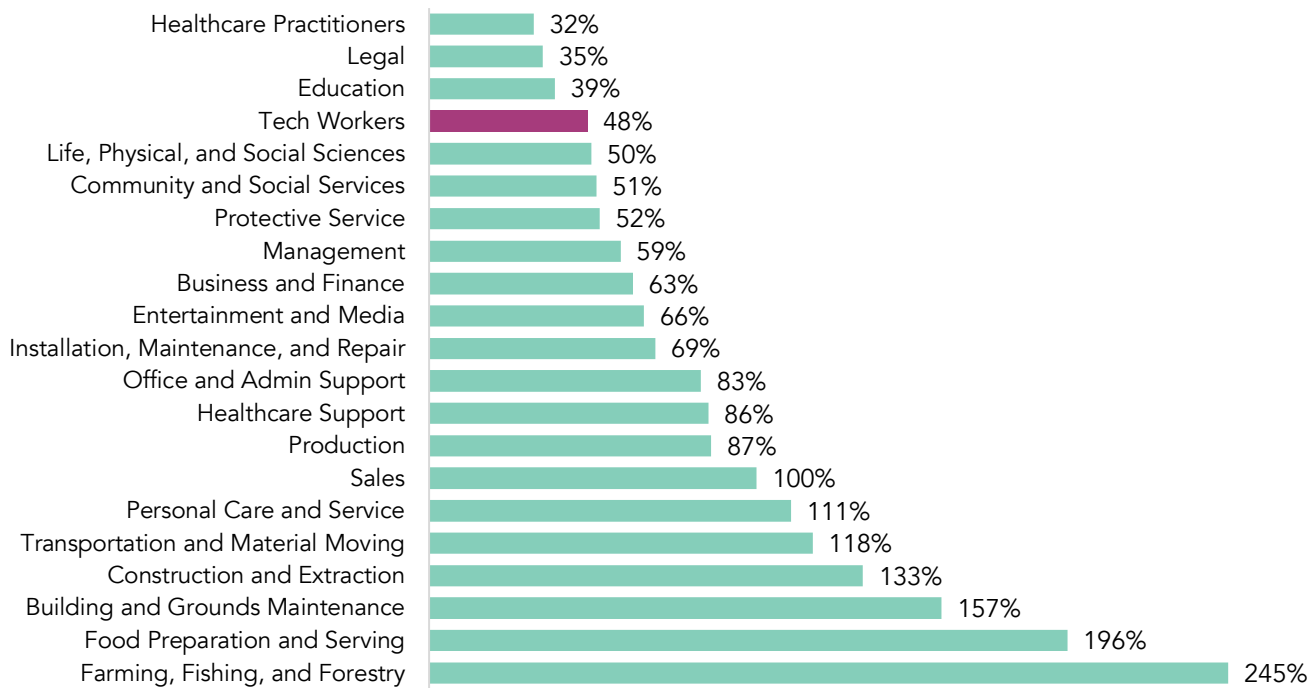
Top Industries Employing Tech Occupations, 2021



Source: EL estimates based on Lightcast 2022.4

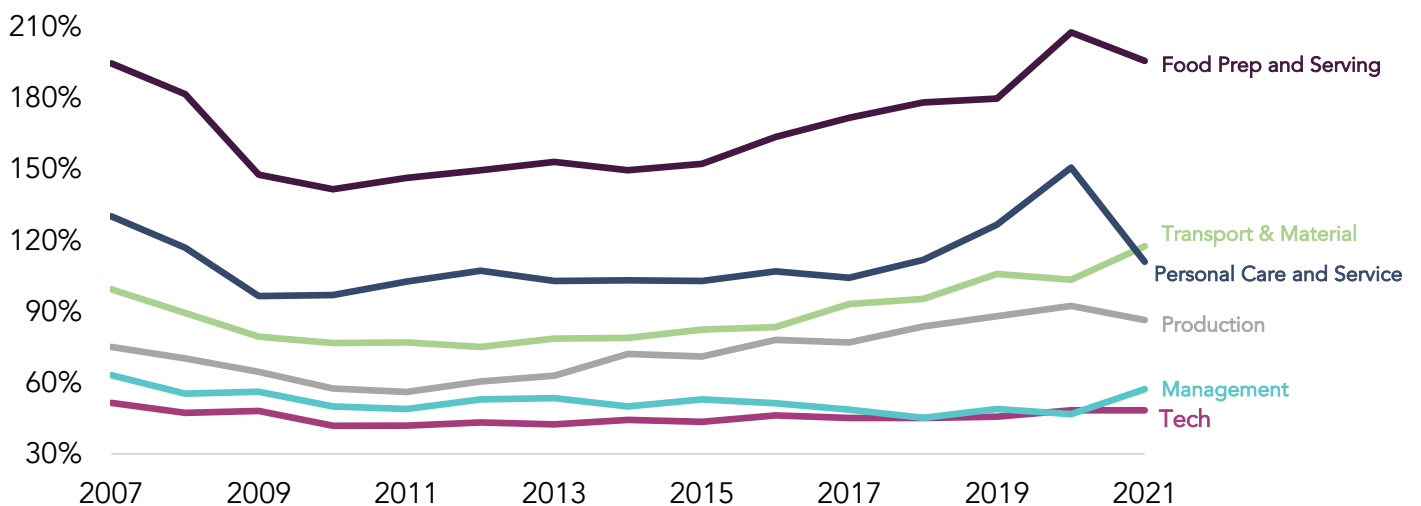
Job quit rates have risen in the wake of the pandemic in North Carolina and the nation. Turnover across occupations can be measured by taking the number of separations (when a social security number is removed from a payroll) by the total number of employees in the field. This turnover rate provides a measure of churn in workers in the field. For tech jobs in North Carolina, the rate was about 48 percent in 2021. This was one of the lowest rates in the state’s economy. The turnover rate in tech has increased slightly in recent years, but not to the same extent as personal service or food service jobs.

North Carolina Turnover Rate by Occupation Type, 2021



Source: EL calculations based on Lightcast 2022.4

North Carolina Turnover Rate by Occupation Type, 2021



Source: EL calculations based on Lightcast 2022.4

Similar to the earlier calculation of the diversity index of the tech industry, we used a similar methodology to assess which demographic groups were underrepresented in tech occupations. Looking at gender, women account for one-third of tech occupations while accounting for one-half of the population. While we know North Carolina has higher rates of women working in the tech industry compared to most other states, women are still well underrepresented in tech occupations.

Gender Distribution of Tech Occupations in North Carolina, 2021

Demographic	Tech Occupations	NC Population	Index
Women	36%	51%	69.9
Men	64%	49%	131.5

Source: EL calculations based on Lightcast 2022.4

In North Carolina, 68 percent of tech workers are white, and they are overrepresented in tech occupations when compared to the state’s population. Workers who are Asian are also well-represented in the tech workforce. Other groups of color do not fare as well. Black people accounted for 15 percent of tech occupations but make up 21 percent of the state’s total population. The representation rates for the Latino or Native communities in the tech workforce were very low in North Carolina. As the tech market continues to grow in the state, it is important that many parts of the population benefit.

Race/Ethnicity Distribution of Tech Occupations in North Carolina, 2021

Demographic	Tech Occupations	NC Population	Index
White	68%	62%	110.4
Black or African American	15%	21%	70.5
Asian	10%	3%	315.0
Hispanic or Latino	4%	10%	40.3
Two or More Races	2%	2%	84.6
American Indian or Alaska Native	0.36%	1.10%	33.2
Native Hawaiian or Other Pacific Islander	0.05%	0.07%	73.1

Source: EL calculations based on Lightcast 2022.4

The age of the tech workforce was also compared against the age breakdown of the overall workforce. Tech occupations tend not to rely on the very young, but have a higher level of young and middle-aged workers.

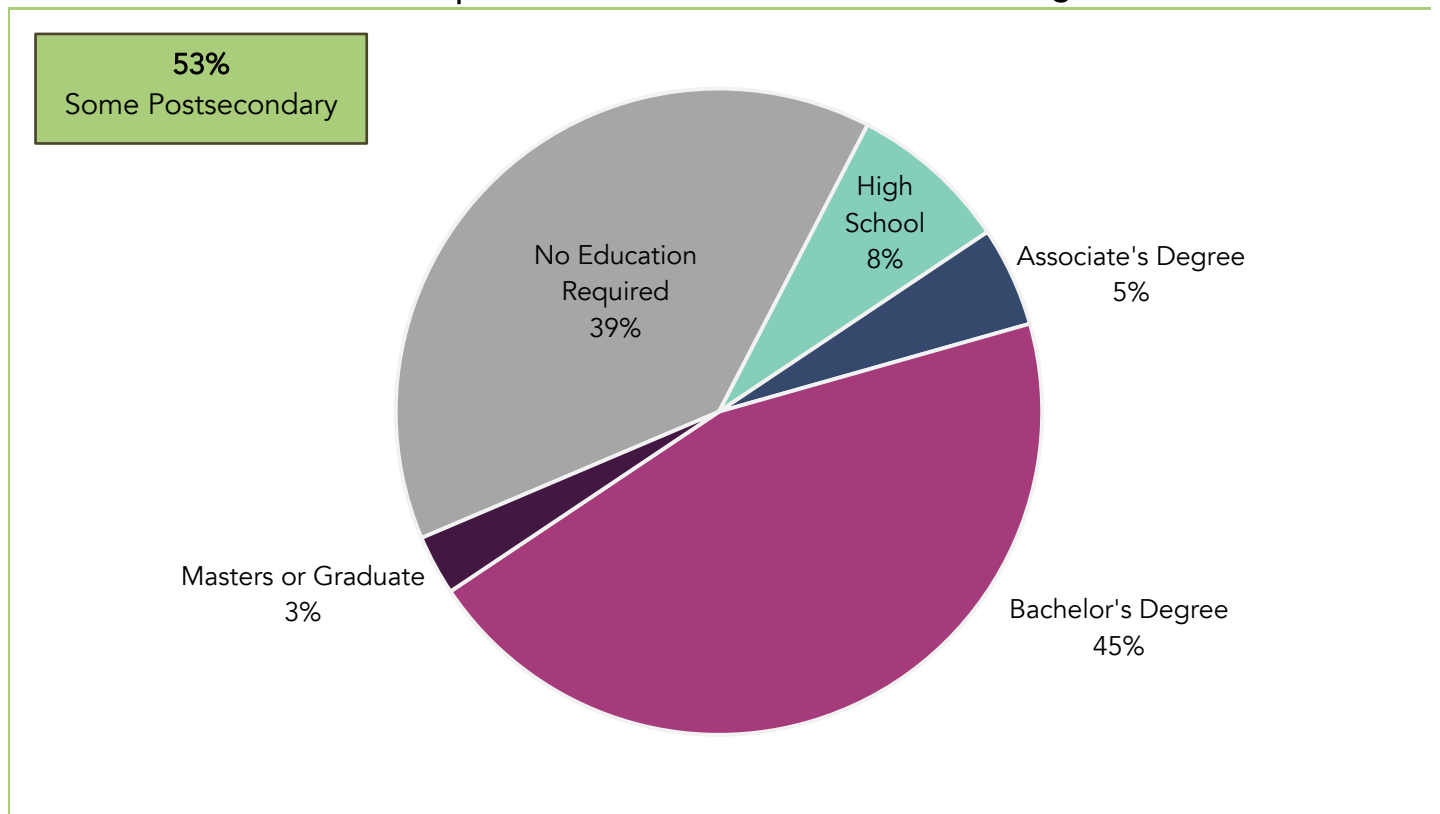
Age Distribution of Tech Occupations in North Carolina, 2021

Demographic	Tech Occupations	NC Workforce	Index
Age 21 and Below	1%	8%	15.8
Age 22 to 34	29%	27%	109.4
Age 35 to 54	50%	43%	117.3
Age 55+	20%	23%	84.8

Source: EL calculations based on Lightcast 2022.4

One of the ways to increase the equity of tech jobs is to focus on skills-based hiring. While many companies have started to remove education requirements to expand applicant pools, a review of job postings in the last two years reveals that about 53 percent of postings for tech jobs required some form of postsecondary education.

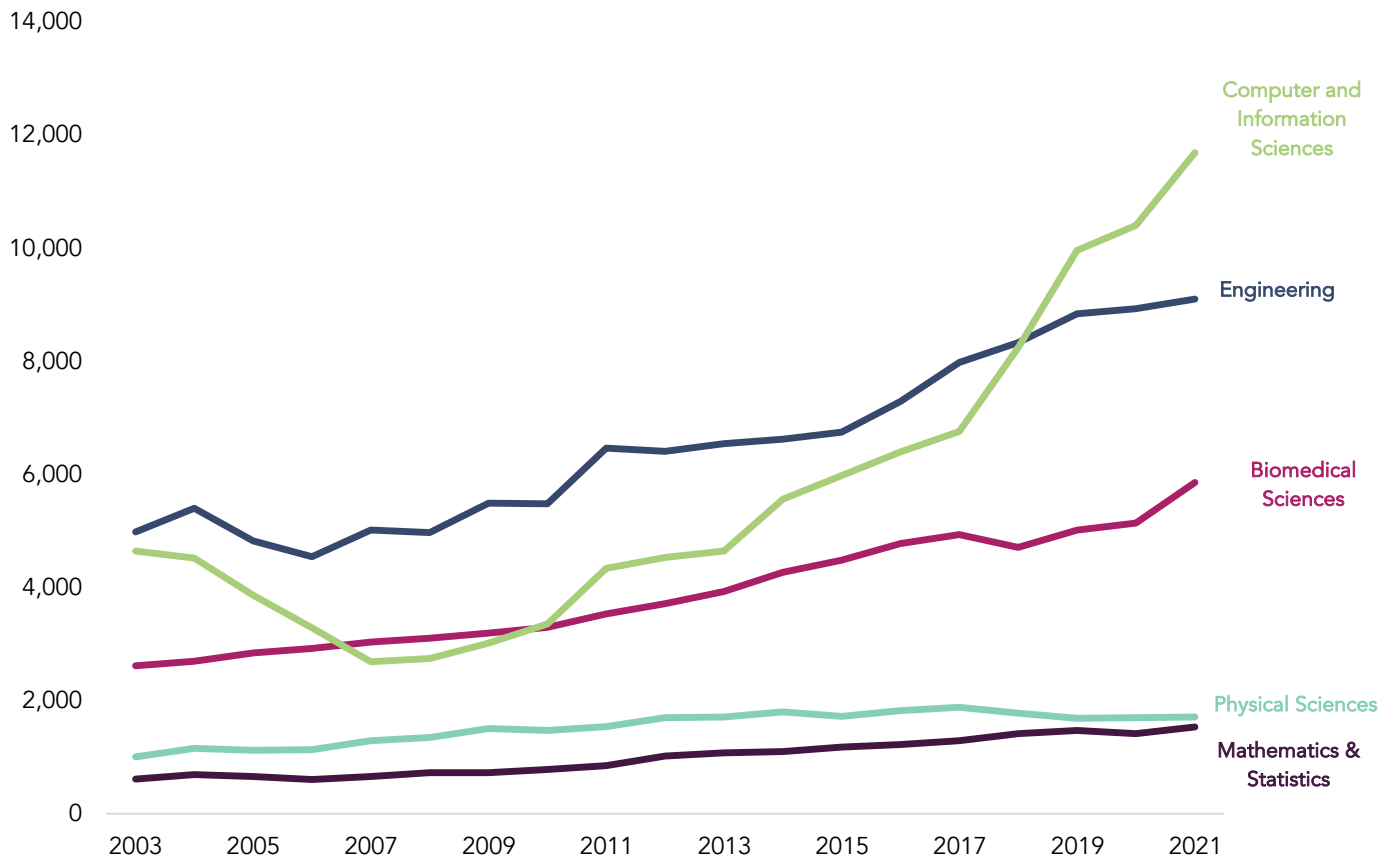
Minimum Education Level Required in North Carolina Tech Job Postings, Nov 2019 – Nov 2022



Source: EL estimates based on Lightcast 2022.4

When looking at the data for educational completions, which includes degrees, certificates and awards from postsecondary institutions, there has been an increase in tech related fields. The fact that the state produced over 11,680 education completions in computer and information sciences in 2021 is a big help for supplying the needed talent for tech companies choosing to locate in the state.

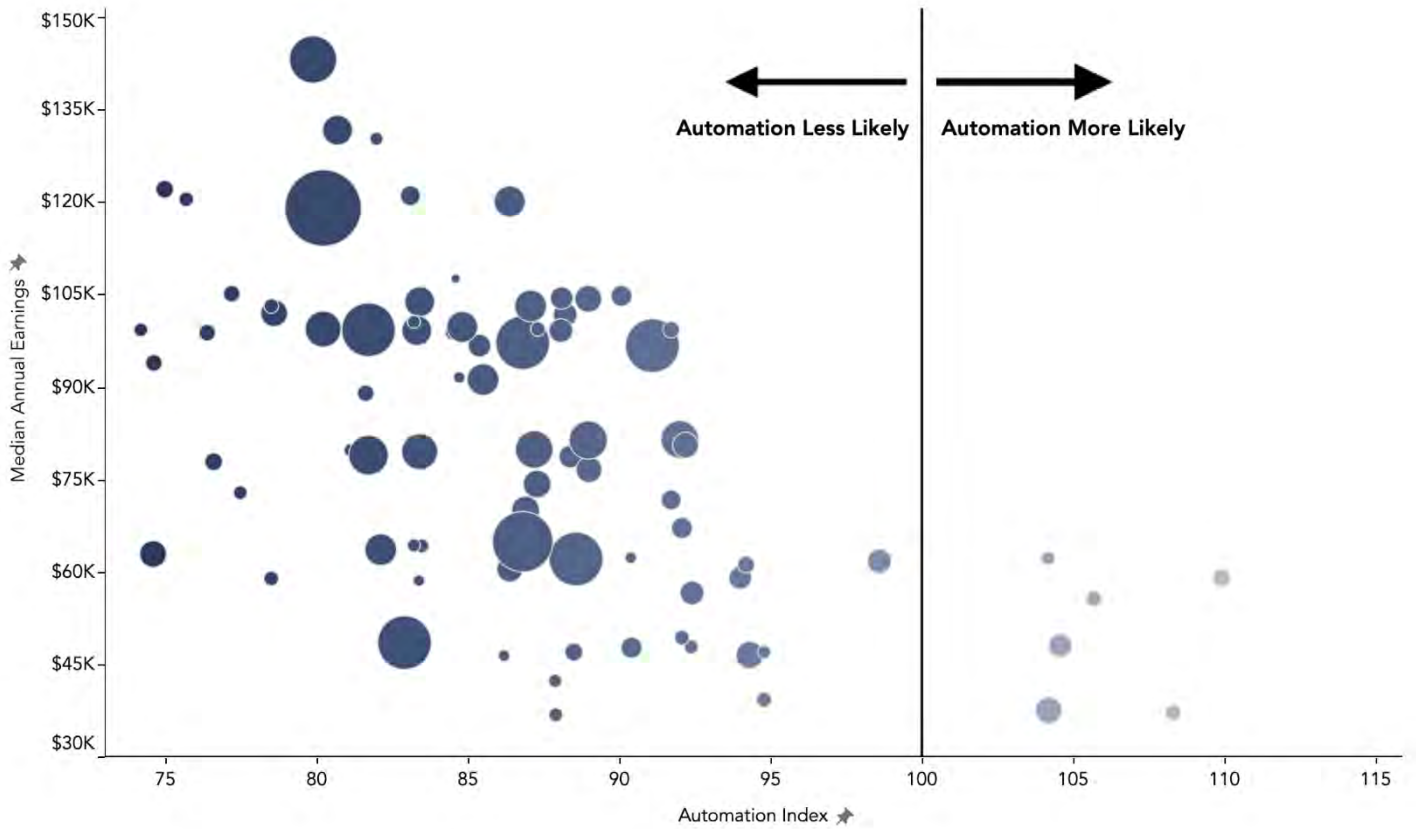
Annual Education Completions in North Carolina for Selected Programs, 2003-2021



Source: EL estimates based on Lightcast 2022.4

These postsecondary programs offer pathways to tech jobs that offer high wages and have lower risk of being automated in the future. We evaluated North Carolina's mix of tech occupations and their likelihood of being automated. Lightcast created an automation index that is based on research determining which jobs are at the highest risk of automation. If the index is greater than 100, the job is at a higher risk of being automated. As the chart below shows, the vast majority of North Carolina's tech occupations fall on the less likely end of the spectrum. Most of these jobs are high-skill and not routine work that can easily be replaced with machines. The ability of tech workers to work remotely throughout the pandemic, and their low likelihood of automation, helps make these among the most resilient jobs in the economy.

North Carolina Tech Occupations by Automation Index and Median Wage, 2021

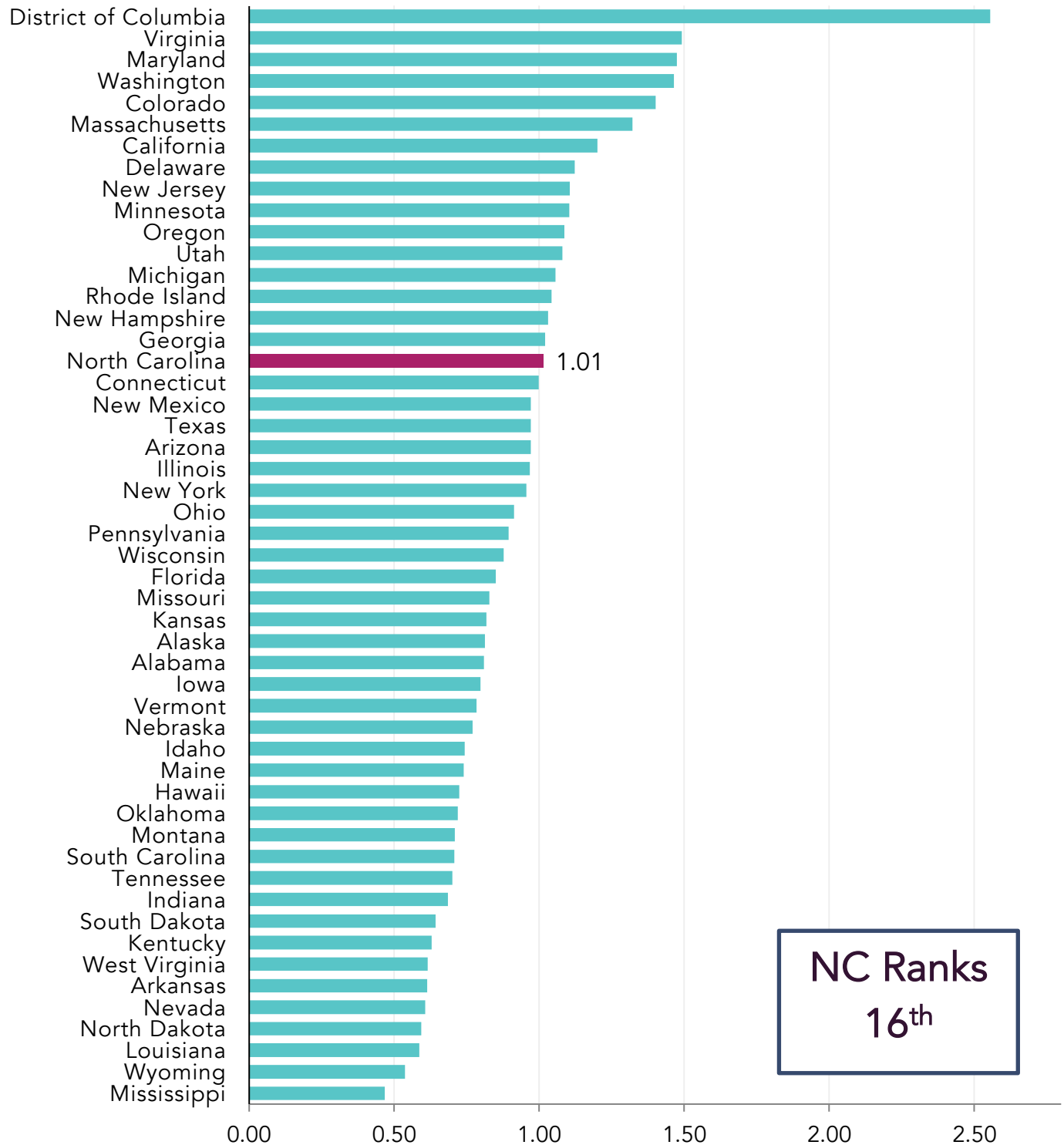


Source: EL estimates based on Lightcast 2022.4

Tech Occupation State Comparisons

When compared to the other states and the national average, North Carolina ranks 16th in tech occupations. Nationally, tech occupations make up for 8.7 percent of the workforce. North Carolina falls just above this level at 8.8 percent, a location quotient of 1.01. Again, this indicates a diverse economy that includes but is not intensively dependent on tech workers.

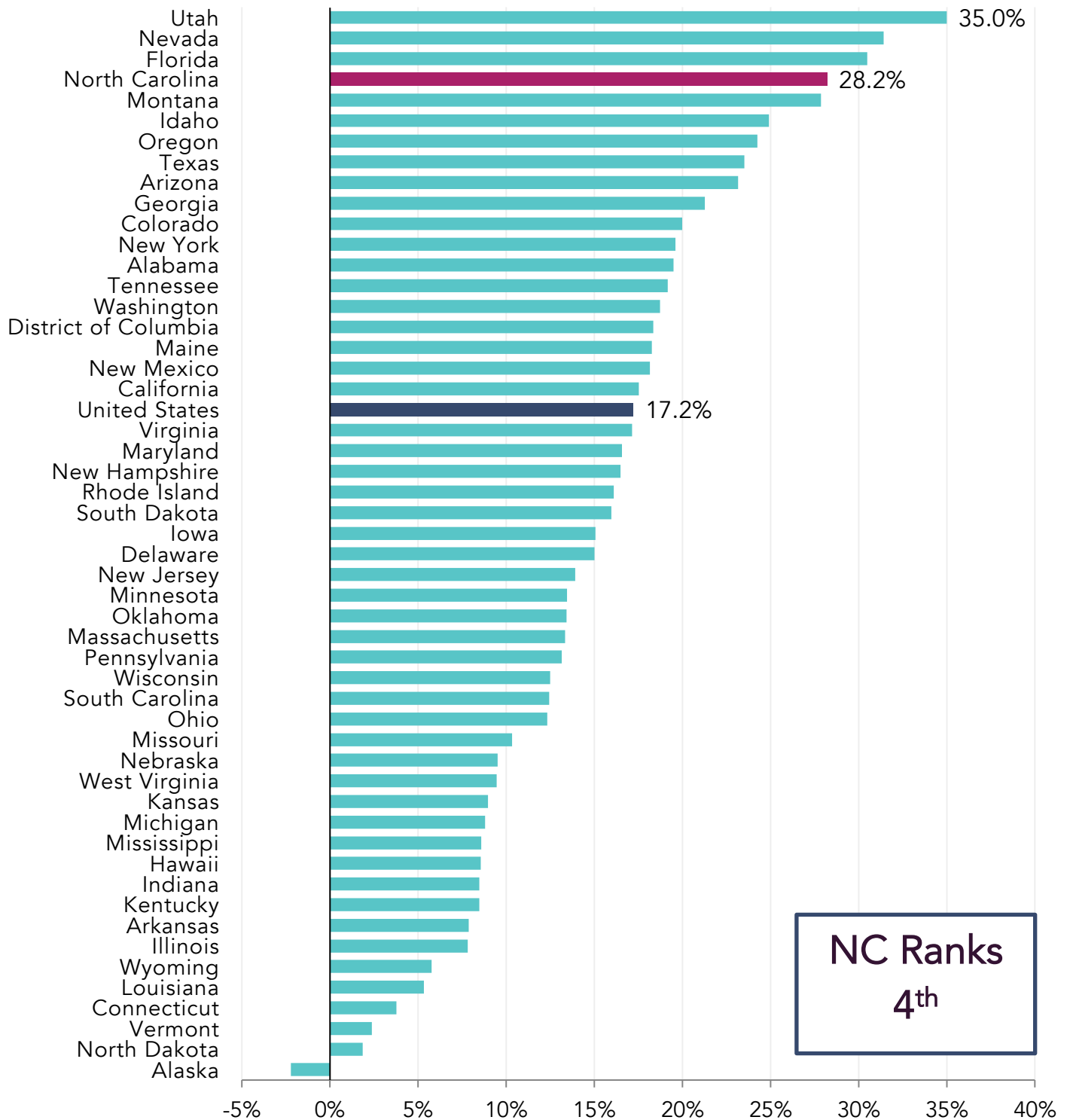
Tech Occupations Location Quotient, 2021



Source: EL estimates based on Lightcast 2022.4

Similar to the data for the tech and IT industries, growth in state employment for tech occupations was very robust from 2016 to 2021. Tech occupations grew by 28 percent, over 11 percentage points above the national average. With this high growth, North Carolina ranking moved up from last year's ranking of 7th and 11th two years ago to the 4th spot.

Tech Occupations Growth, 2016-2021

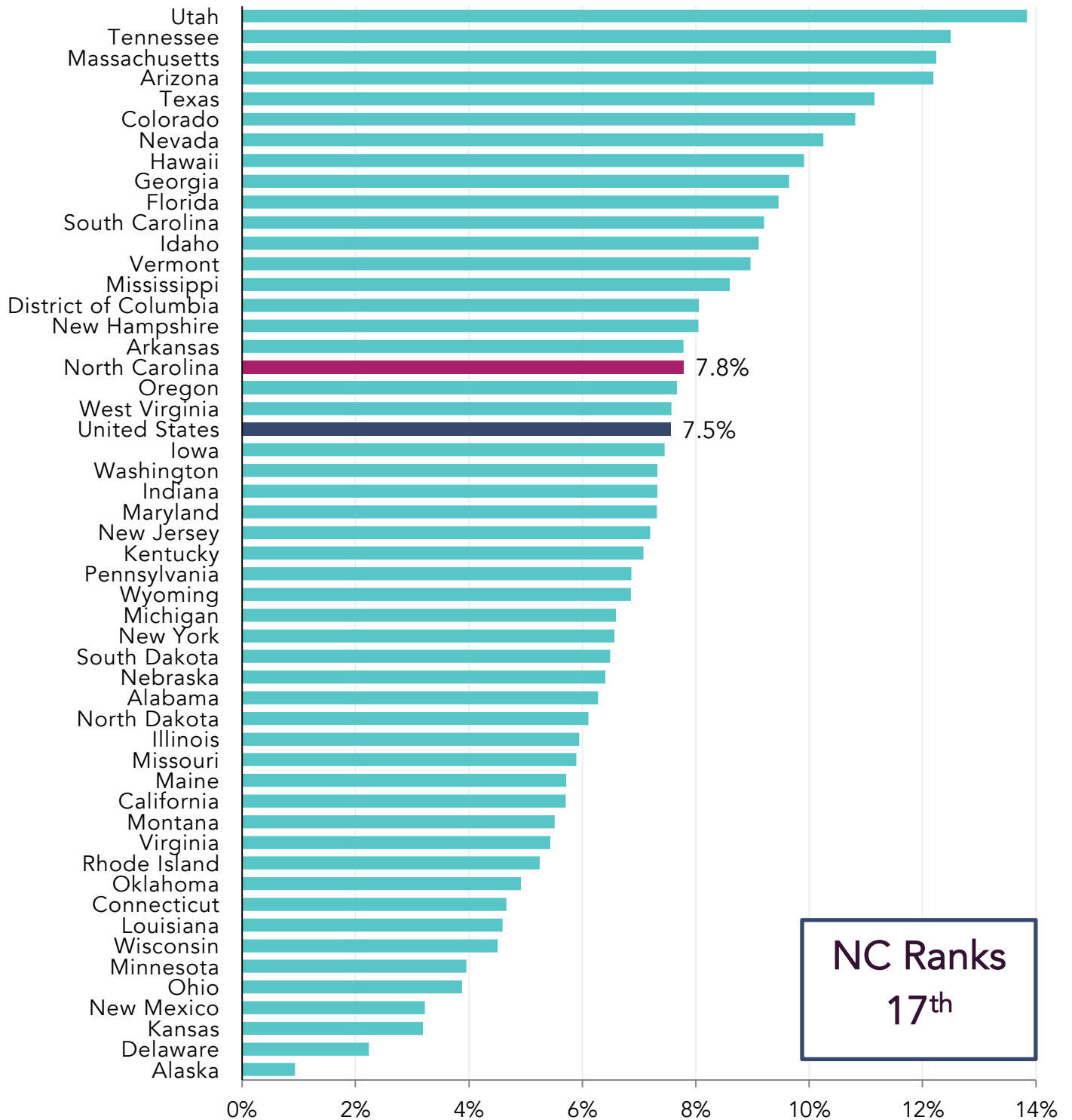


Source: EL estimates based on Lightcast 2022.4

Using Lightcast’s models of forecasted growth, North Carolina is expected to grow its tech occupations by 7.8 percent by 2027. This ranks the state 17th in predicted growth. North Carolina’s expected growth rate is just above the national average.

**NC Ranks
4th**

Expected Tech Occupations Growth, 2022-2027



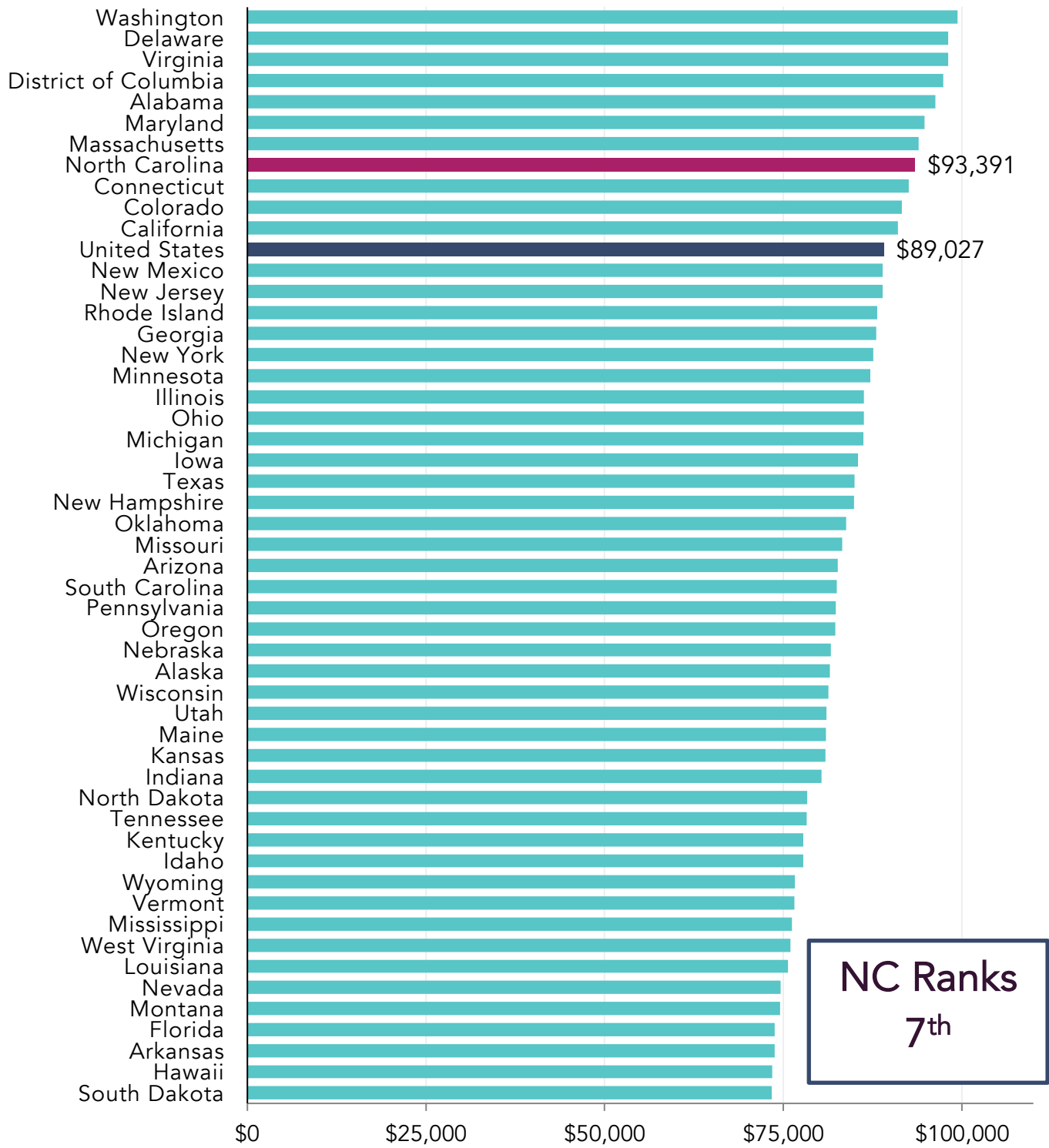
**NC Ranks
17th**

Source: EL estimates based on Lightcast 2022.4

When evaluating tech occupations, median annual earnings data is available. For the tech industry analysis, only average annual earnings data is available, which can be skewed by the presence of outliers. This median estimate provides us with the middle of the bell curve measure on wages. The typical tech worker in North Carolina earns around \$85,700 a year, while a tech worker in California

earns about \$100,400 a year. This discrepancy however is eliminated when we account for purchasing power by state. When adjusted, the state ranks 7th across the country.

Median Annual Earnings for Tech Occupations Adjusted for Purchasing Power, 2021



Source: EL estimates based on Lightcast 2022.4

SECTION 6. STATE COMPARISON OF TECHNOLOGY INFRASTRUCTURE METRICS

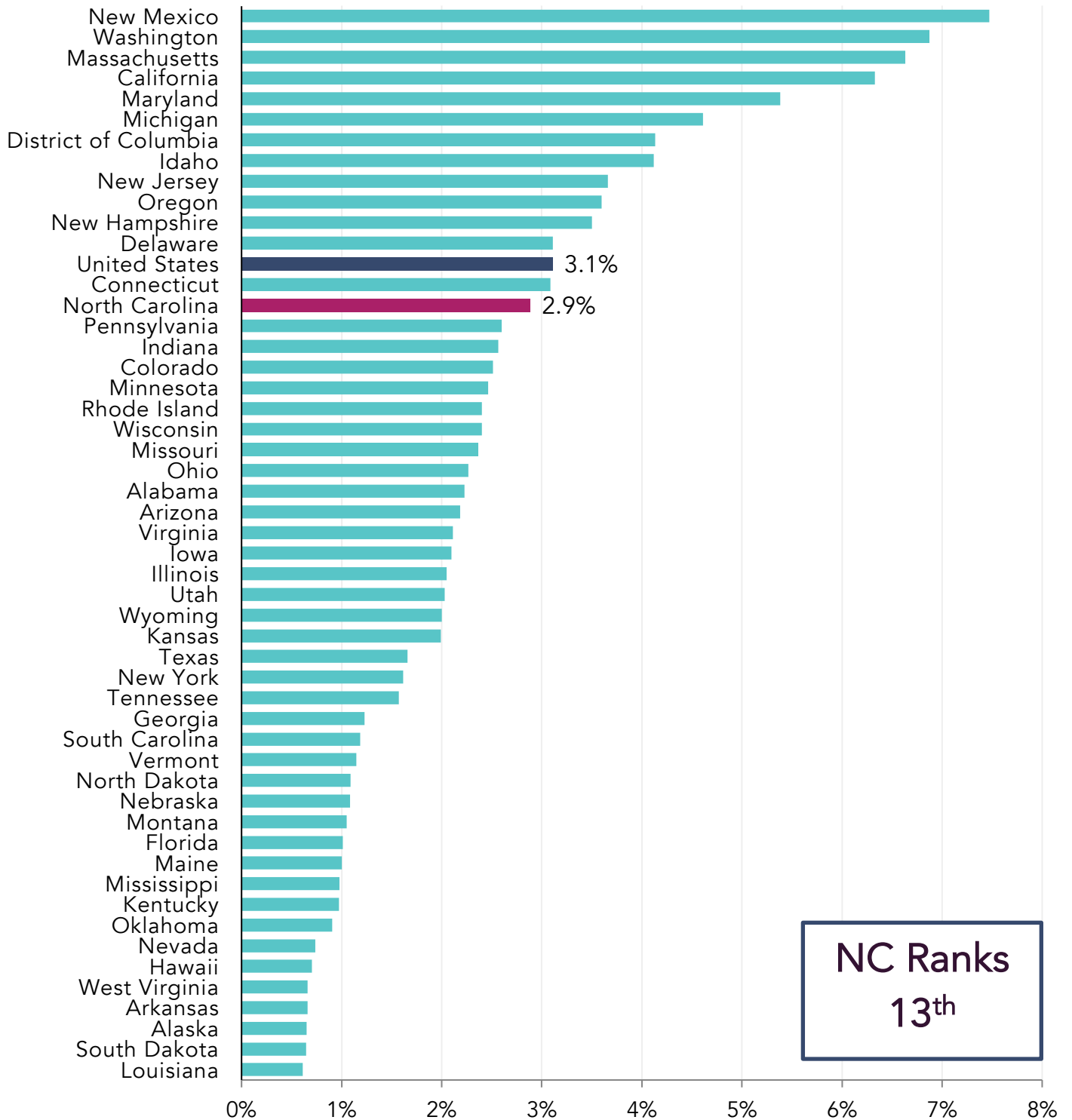
Similar to other parts of the economy, the technology sector needs a solid infrastructure to flourish. Logistics firms must have good highways to conduct their business, agriculture needs good ports for export, and many manufacturers need robust water systems. A strong technology infrastructure can be essential to a “knowledge-based economy”. The World Bank defines strong knowledge-based economies on four pillars:

- Entrepreneurship incentives
- Skilled and educated labor force
- Physical infrastructure access for technology and communications
- Innovation ecosystem that fosters collaboration between academia, private sector, and government

Using this framework, we evaluated the technology infrastructure of North Carolina by comparing factors such as funding access, patents, STEM education, and university technology transfer. This section compares indicators that reflect a state’s technology infrastructure and assesses North Carolina’s position amongst other states.

Research & Development (R&D) funding is a major component of a technology sector’s infrastructure. R&D funding helps companies and universities develop new technologies that can be commercialized and spur tech growth. We looked at the total R&D obligations, including federal, state, and private funding sources, across all states and found that North Carolina ranks 13th across the states in this indicator. This is the same ranking as last year but the level of R&D as a percentage of GSP increased from 2.7 to 2.9 percent. As the chart shows, significant amounts of federal R&D is concentrated in the states with large federal facilities. New Mexico understandably ranks first in this list with its high levels of funding to federal labs, Los Alamos National Lab and the Sandia National Laboratory, relative to the state’s gross product.

Total R&D as a Percentage of GSP, 2019



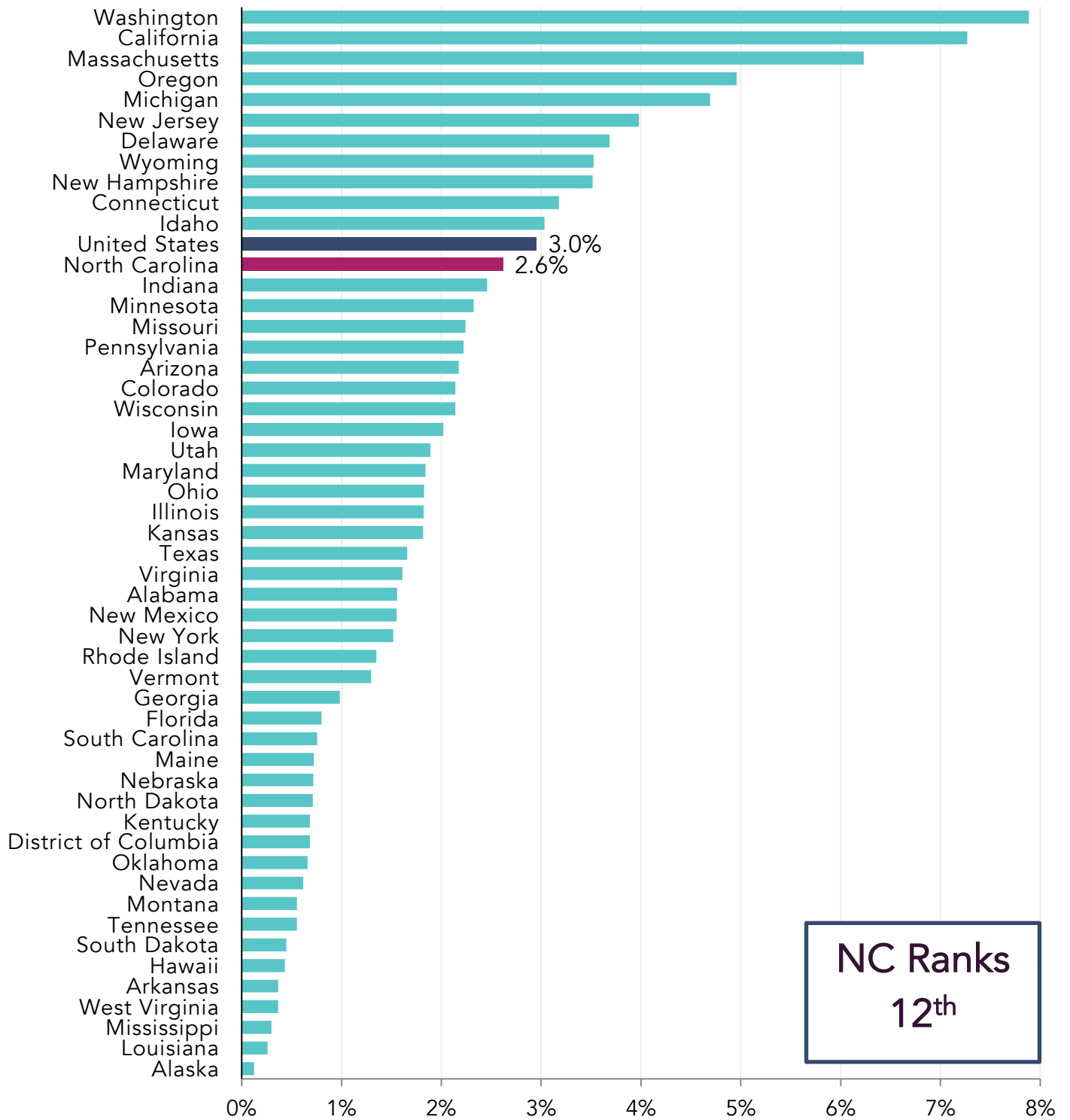
**NC Ranks
13th**

Source: National Science Foundation (2022)

Another indicator of technology development atmosphere is the amount of private R&D spending as a percentage of the state’s private output. This demonstrates R&D driven by companies themselves for profit driven innovation. Business performed R&D funding made up for 2.6 percent of North Carolina’s private GSP in 2020, ranking it 12th among the states. Ranking in the top 15 states is an

accomplishment considering that in the first State of the Technology Sector report, North Carolina ranked 37th.

Business Performed R&D as a Percentage of Private Industry Output, 2020

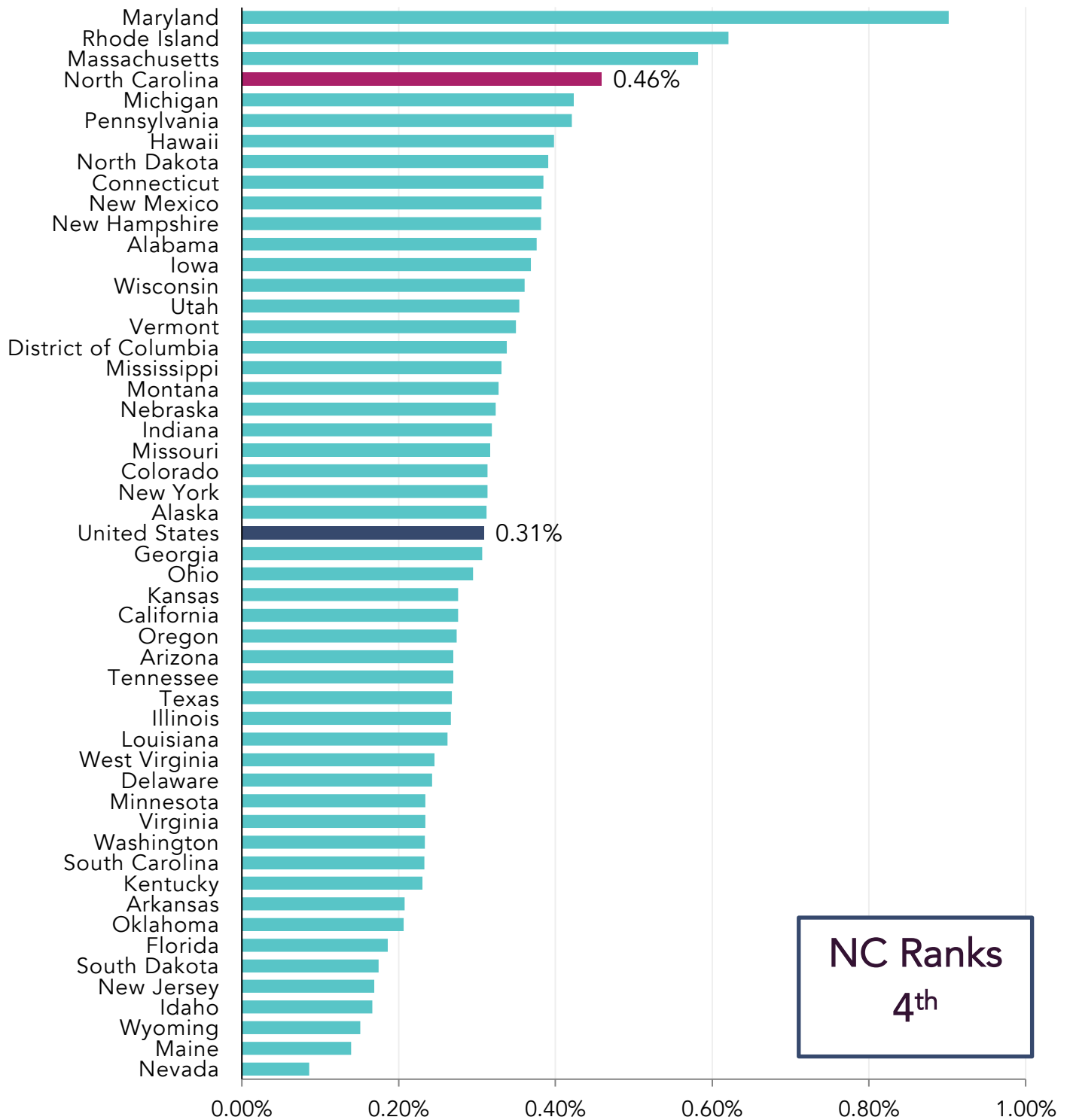


Source: National Science Foundation (2022)

**NC Ranks
12th**

Another indicator of relevant R&D funding is science & engineering funding in higher education. The technology that comes from this research can be spun off to create new companies. North Carolina ranked 4th amongst all states in 2020.

Higher Education R&D in Science & Engineering as a Percentage of GSP, 2020

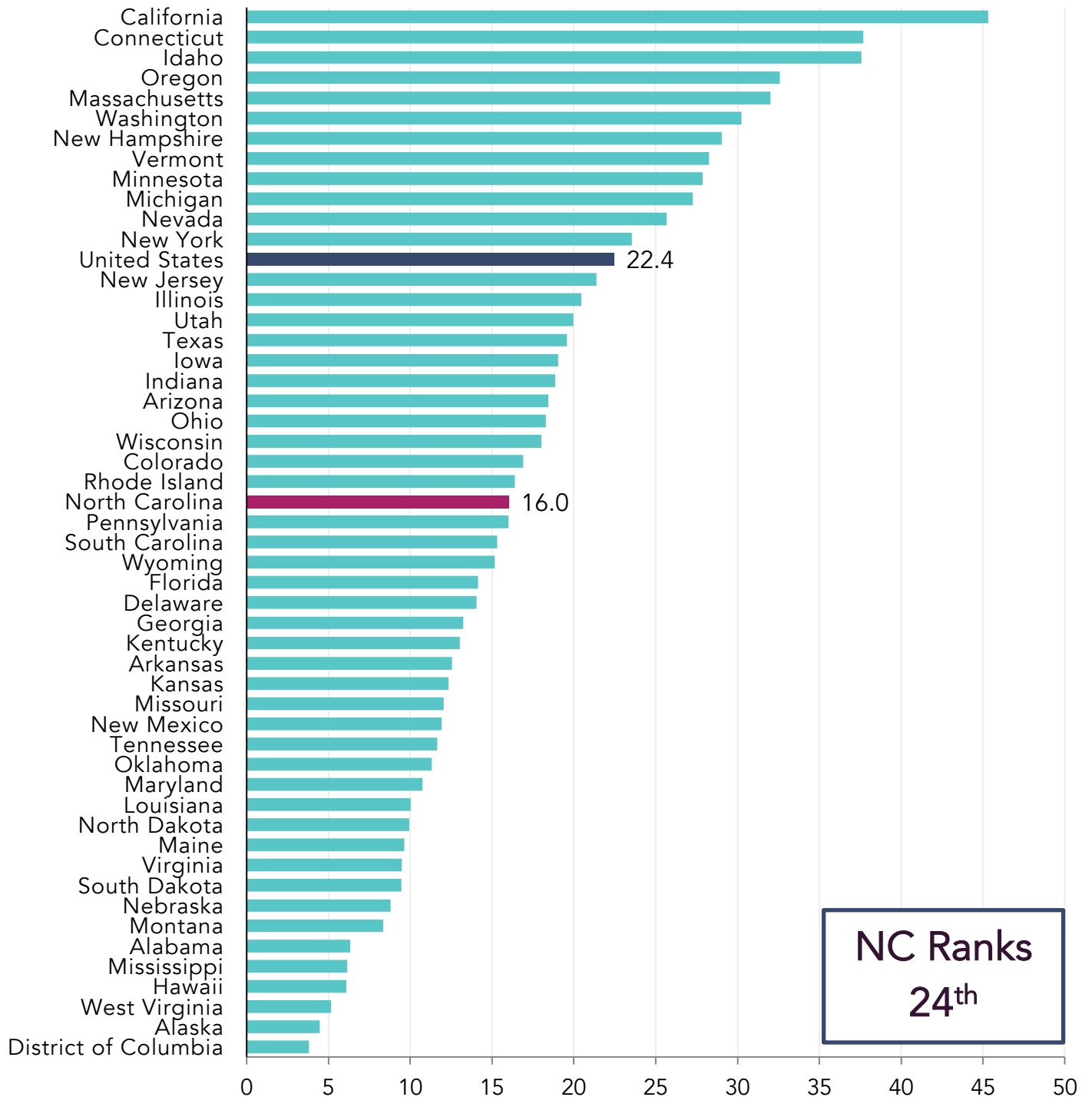


Source: National Science Foundation (2022)

**NC Ranks
4th**

Patents are another indicator of the level of innovation occurring in a place. Patents usually spur growth, particularly in high-cost industries like pharmaceuticals. For this metric, patents are standardized by the number of science and engineering workers. North Carolina averaged about 16.0 patents per 1,000 science and engineering workers in 2020. This ranks North Carolina 24th among all states, the same ranking as the previous year.

Patents Issued per 1,000 Science & Engineering Workers, 2020



Source: National Science Foundation (2022)

Venture capital is often an essential tool for start-up companies to grow into a tech leader and to get to market quickly. Traditional tech economies like California, Massachusetts, and Washington are still accumulating much of the nation’s venture capital. This year the state dropped one ranking to 9th place, but the overall value of venture capital funding per GSP rose from \$3,250 to \$3,975. Additional research shows the breakdown of the state’s venture capital funding. Funding research conducted by the Council for Entrepreneurial Development found there was \$4.6 billion in equity funding in 2021, up significantly from \$1.5 billion in 2019 and the most of any year in history. Companies Epic Games, Prescient, and Insightsoftware were major players in 2021’s numbers. Most of the venture capital funding is going to tech companies in the state.

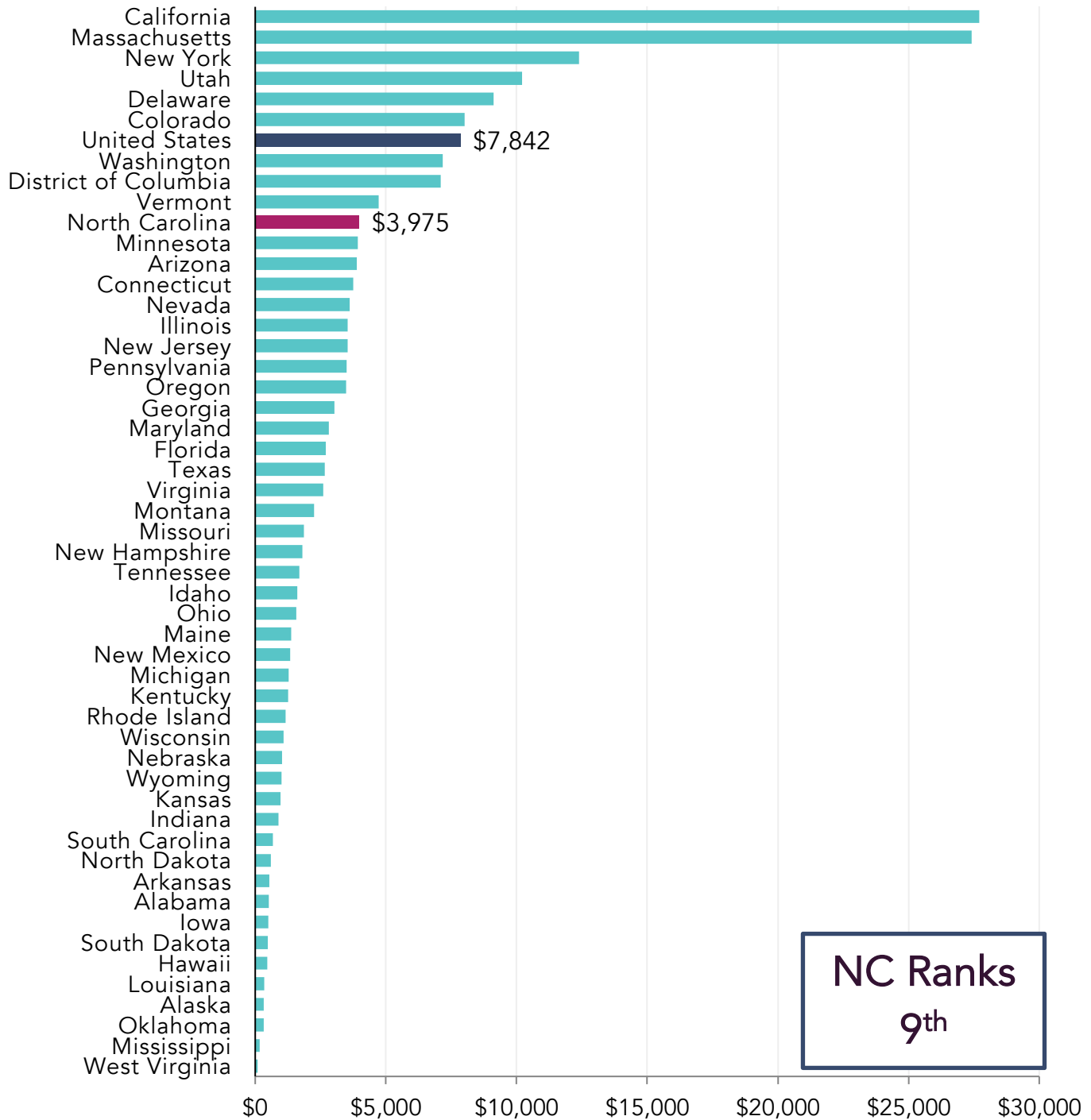
North Carolina Equity Funding (in millions)

Company Type	2021 Funding	2020 Funding
Tech Companies	\$3,199	\$2,695
Life Sciences	\$1,071	\$523
Advanced Manufacturing	\$282	\$136
Cleantech	\$28	\$20
Makers	\$43	\$58
All NC Entrepreneurs	\$4,623	\$3,432

Source: Council for Entrepreneurial Development (2022)

The report also highlights that in 2021, tech companies did the largest number of deals (129) followed by the life science sector (76), makers (18), cleantech (14), advanced manufacturing and materials (13). North Carolina companies attracted over 300 investors in 2021 from across the globe. North Carolina’s 2021 entrepreneurial exit activity included five IPOs and 47 mergers or acquisitions.

Venture Capital Invested Per \$1 Million of GSP, 2016-2021

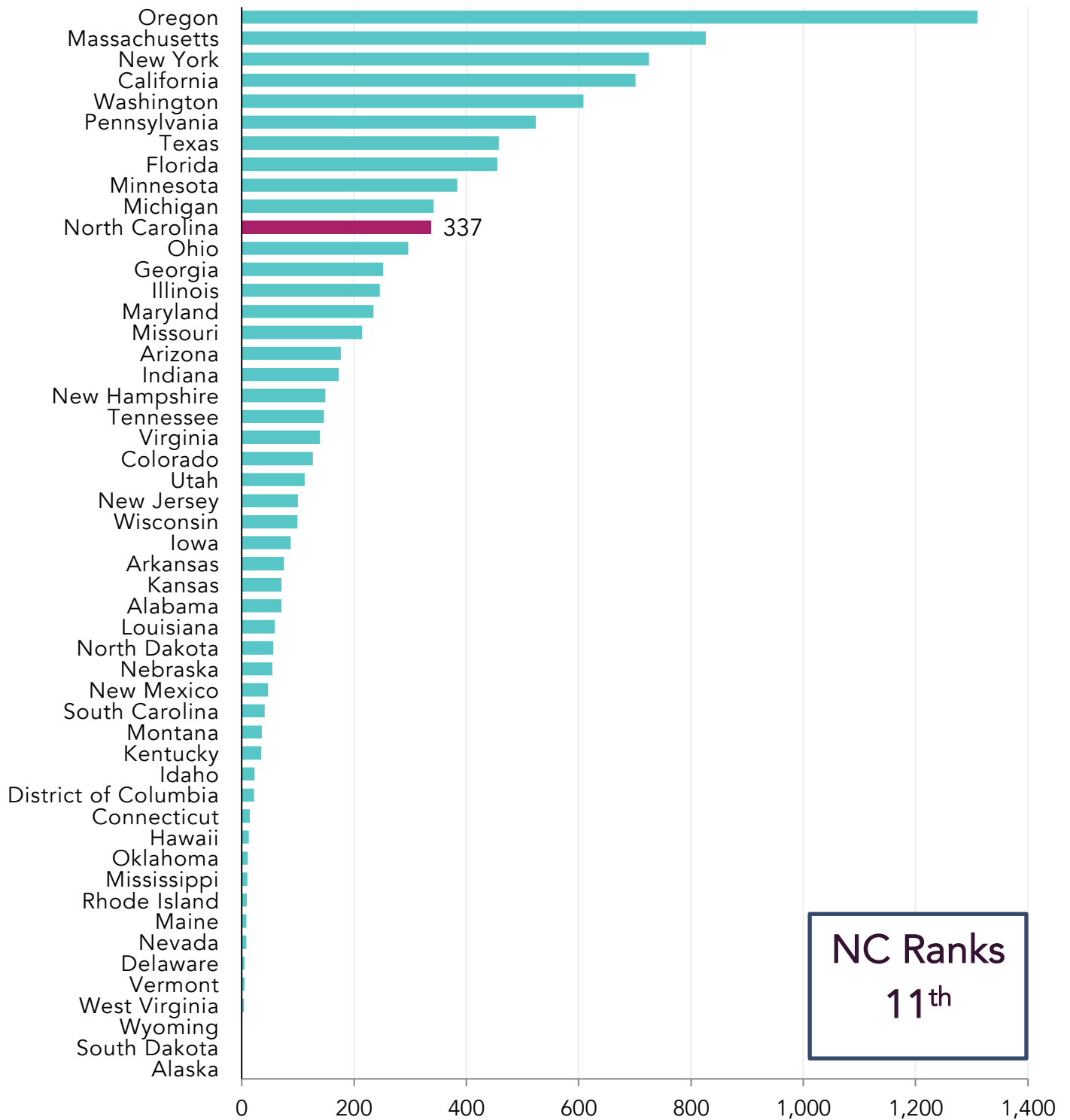


Source: National Venture Capital Association (2022) and BEA (2022)

One of North Carolina's major strengths in its tech infrastructure is the high quality of research universities across the state. North Carolina rates strongly in the indicators that measure technology transfers from universities. Technology transfer utilizes the innovation assets at universities and turns them into commercialized opportunities. The ability of a state to capitalize on its research capabilities and turn them into marketable concepts means more tech start-ups and jobs. In 2020,

North Carolina ranked 11th among states in terms of options and licenses that its universities were able to execute.

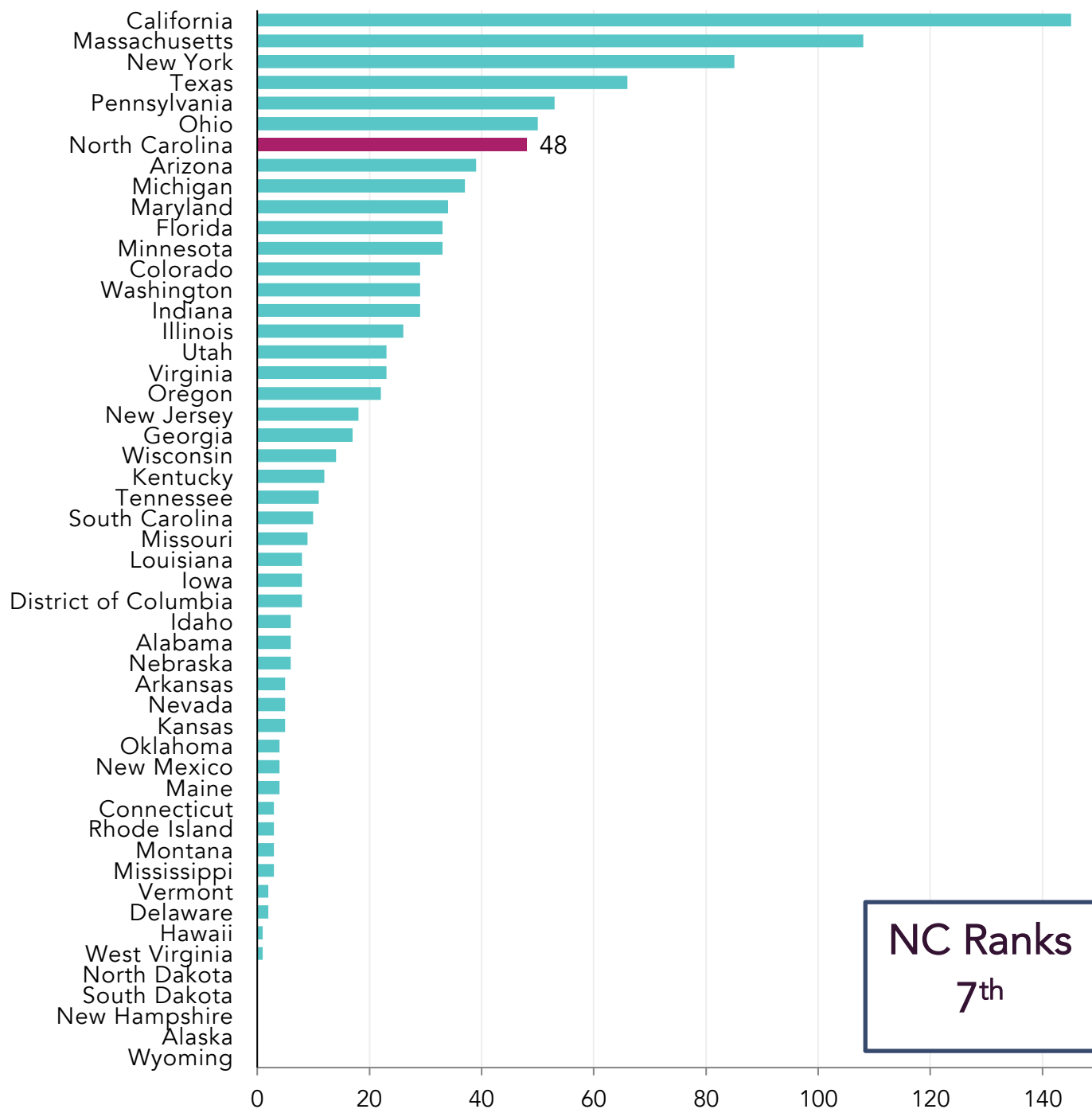
Technology Licenses and Options Executed from Universities, 2020



Source: Association of University Technology Managers [AUTM] (2021)

Another measure of technology transfer, the number of start-ups from universities, can indicate the level of entrepreneurship interest within a state's universities as well as its ability to convert research assets and public funding into economic opportunities. North Carolina had the 7th highest number of start-ups spun off from its universities in 2020 with 48 new companies established. Across all universities that AUTM tracks data for startup creation, NCSU and Duke ranked tied for 13th in the nation.

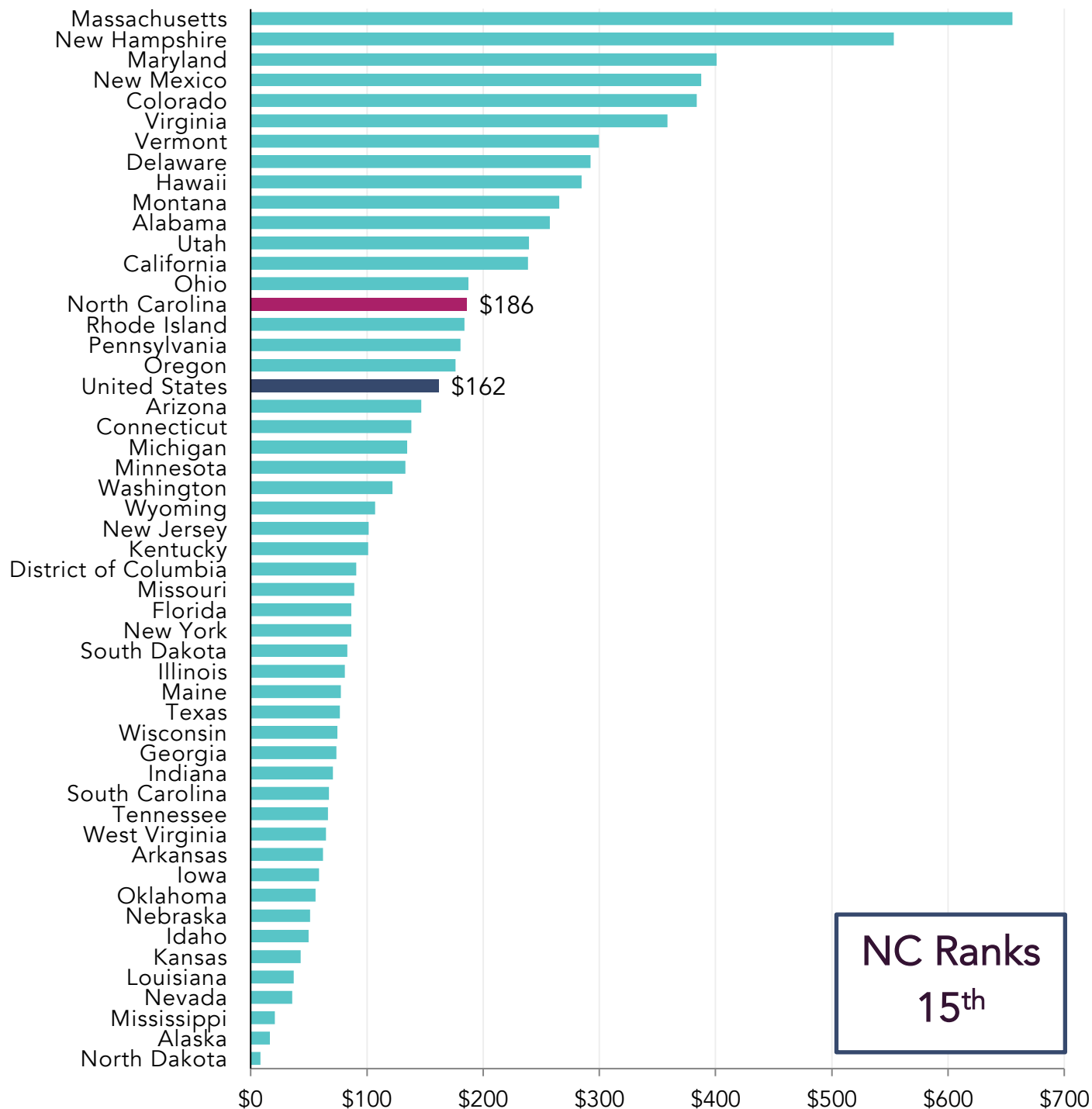
Start-Ups from Universities, 2020



Source: AUTM (2021)

The federal government's SBIR/STTR funding program supports and encourages innovation in small business. North Carolina moved back up to 15th in the rankings from 18th. The rate of funding per \$1 million in GSP also increased from \$167 to \$186. North Carolina is just above the national average. Helping local startups apply and receive SBIR/STTR funding can lead to critical early-stage funding for high-reward concepts.

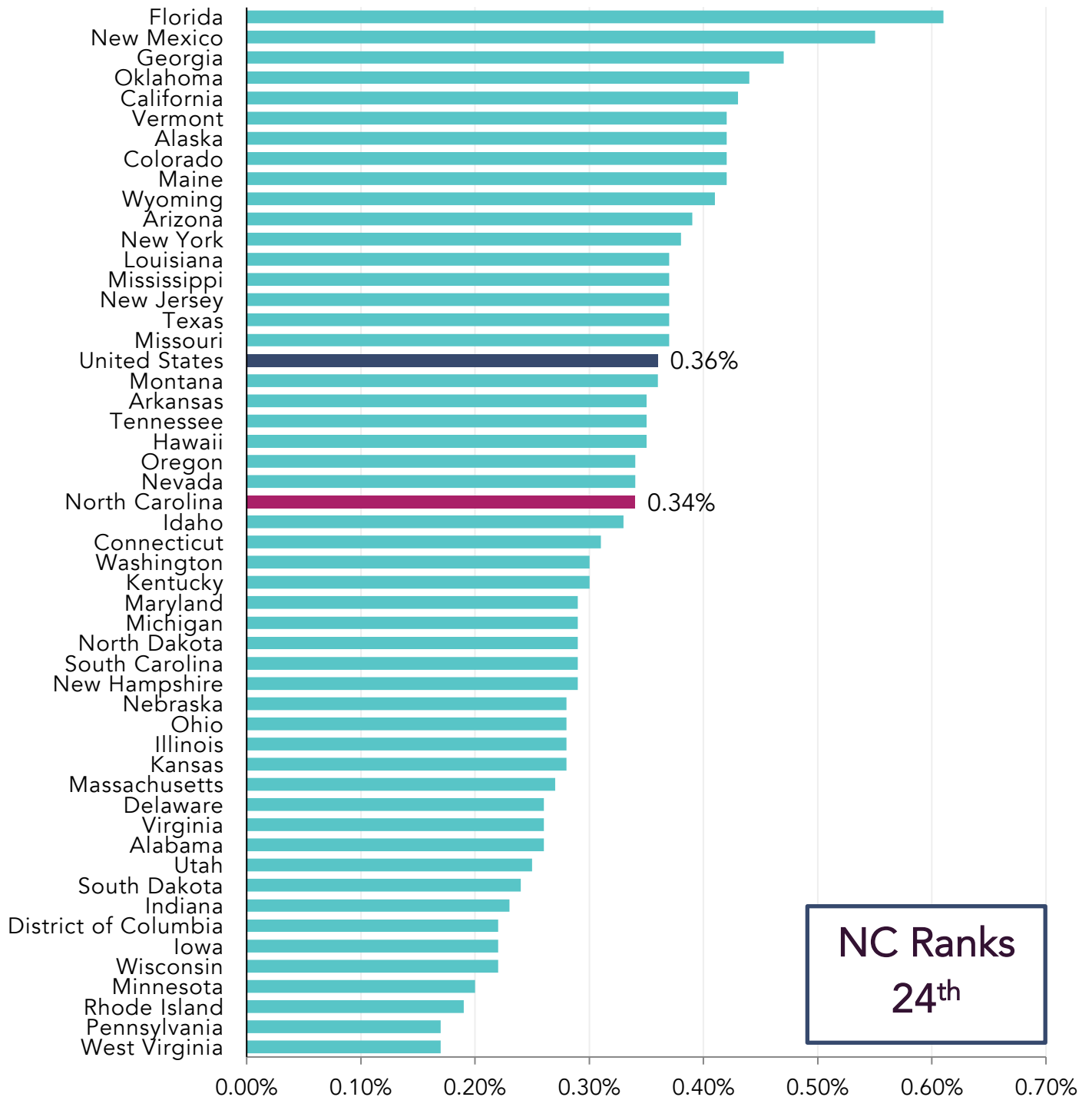
SBIR and STTR Funding Per \$1 Million of GSP, 2016-2021



Source: EL estimates based on Small Business Innovation Research [SBIR] (2022) and BEA (2022).

Entrepreneurs are the lifeblood of a knowledge-based economy. Each year the economy is replenished and reenergized by entrepreneurial activity. Businesses that originate in one location often look to grow in that same region. In 2021, out of 100,000 people about 340 people started a new business in North Carolina, up from 310 in 2020. North Carolina ranks 24th across the nation. This rank is up from 26th in last year's report.

Rate of New Entrepreneurs, 2021

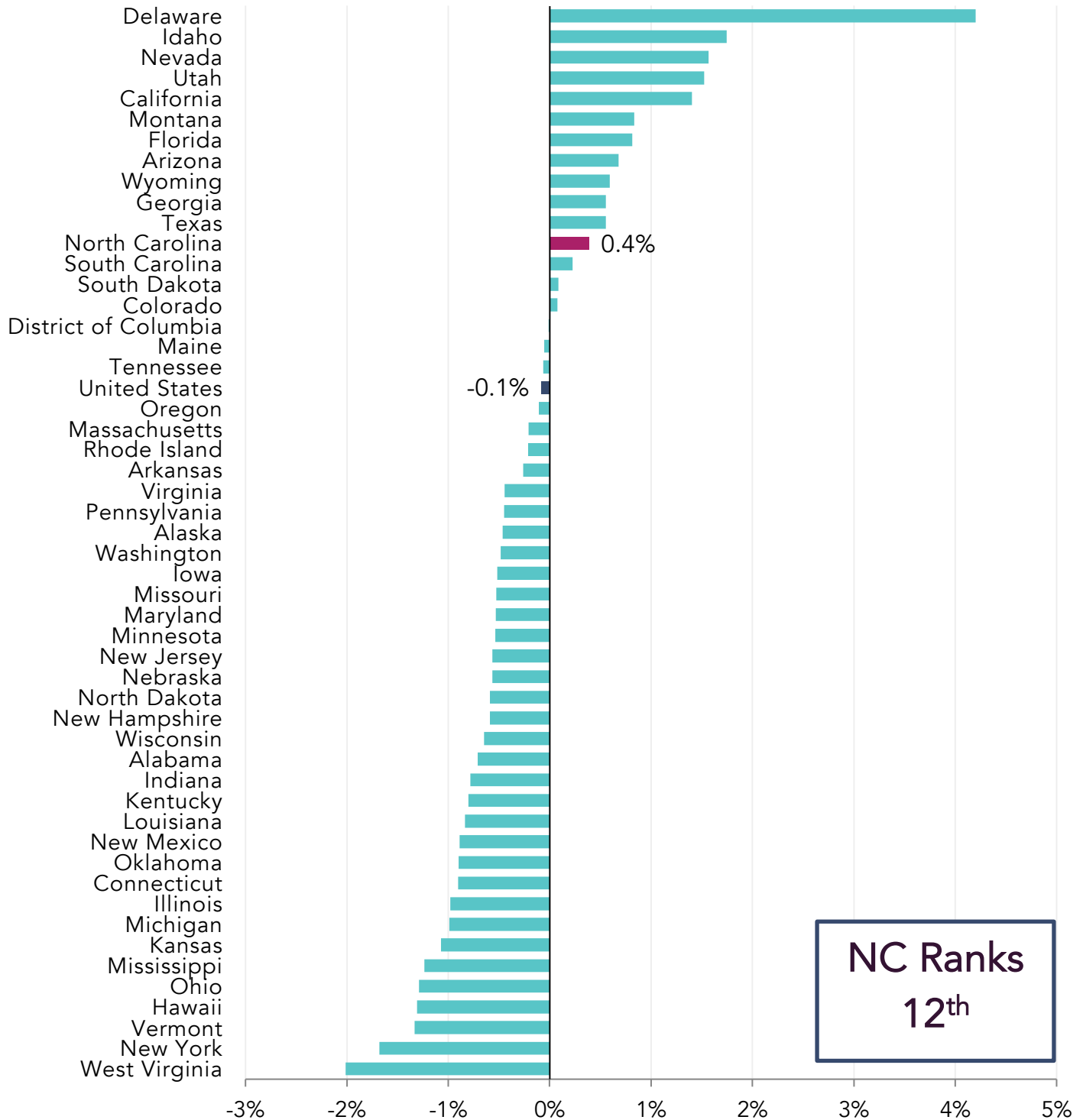


**NC Ranks
24th**

Source: Kauffman Foundation (2022)

The US Census Bureau tracks the number of companies opening and those who close. Comparing the rates of entrance and exit can provide a measure of business dynamism, an indicator of churn and innovation in an economy. North Carolina remained ranked at 12th although overall dynamism fell during 2020 with COVID turbulence.

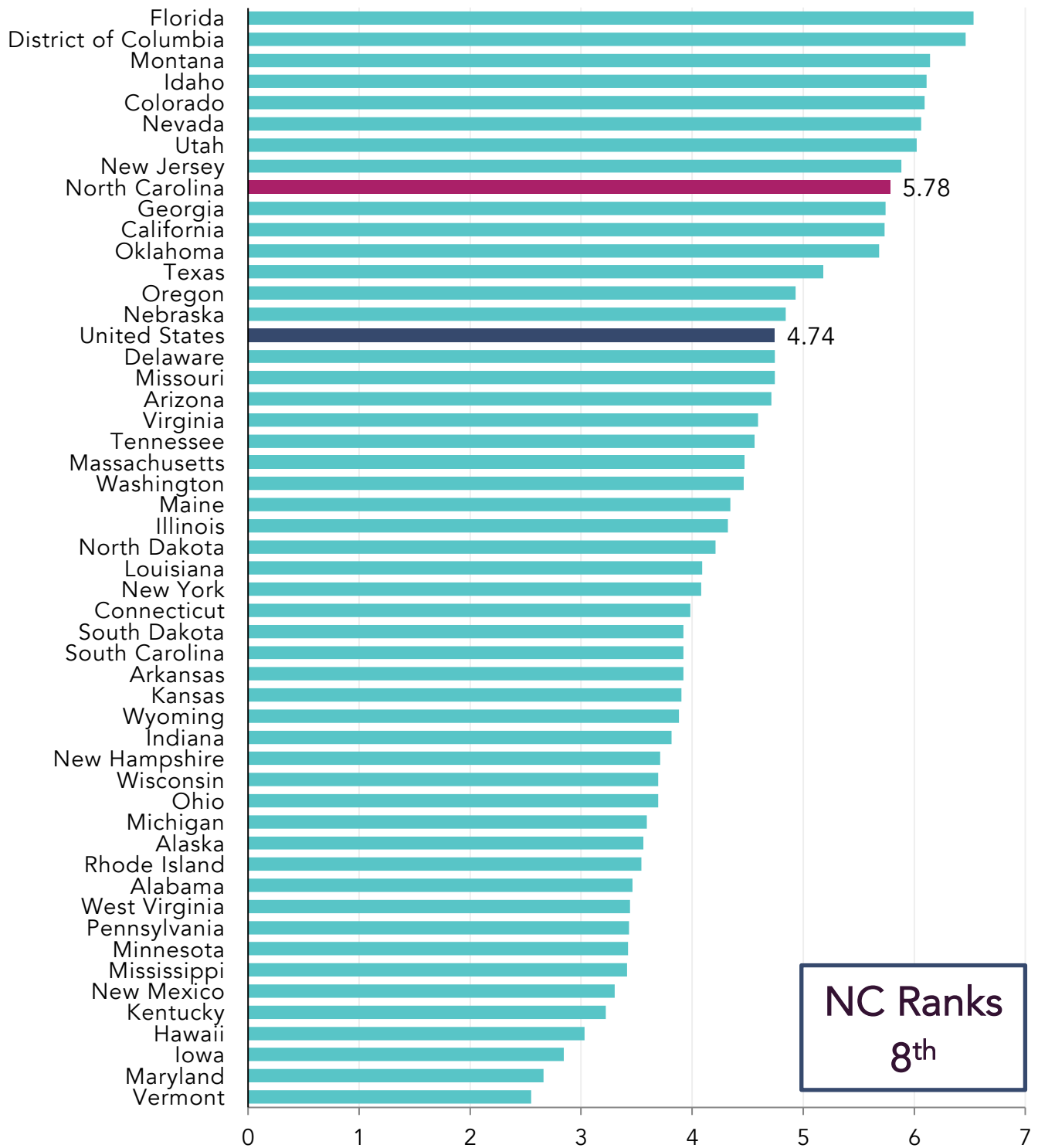
Business Opening vs Closing Rate, 2020



Source: US Census Bureau (2022)

Another metric for the churn of new companies is the start-up job creation rate. This is the average number of jobs created by a start-up in their first year. For North Carolina, this rate was an average of 5.78 employees for each start-up. This level is an increase from the previous year's level of 4.89. The state also moved up in the rankings from 20th to 8th place.

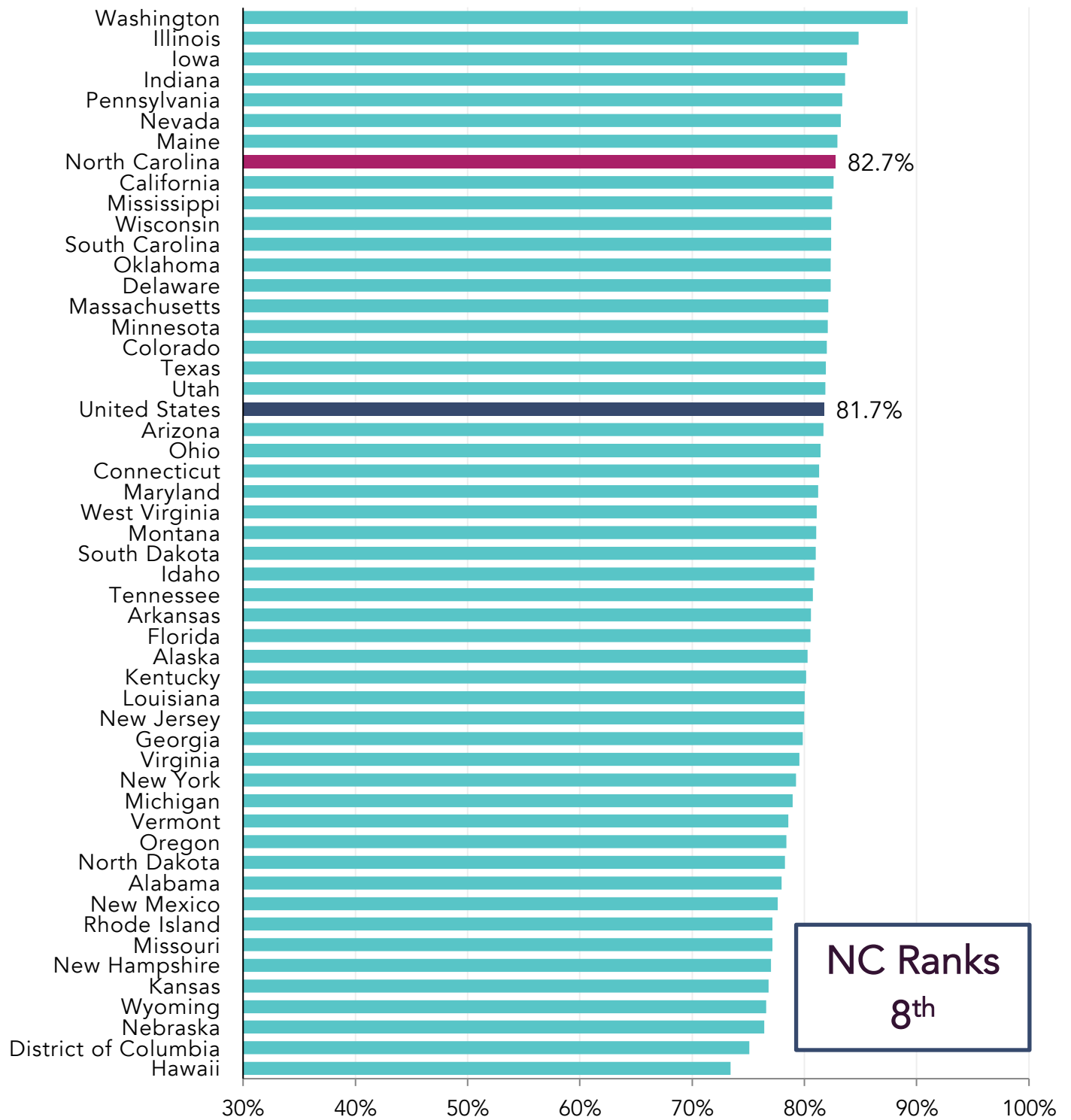
Start-Up Early Job Creation Rate, 2021



Source: Kauffman Foundation (2022)

The final entrepreneurial indicator looks at the one-year survival rate of start-ups. In 2021, North Carolina's survival rate increased from 78.2 percent to 82.7 percent. This increase led to a jump in the rankings from 20th last year to 8th this year.

Start-Up Early Survival Rate, 2021

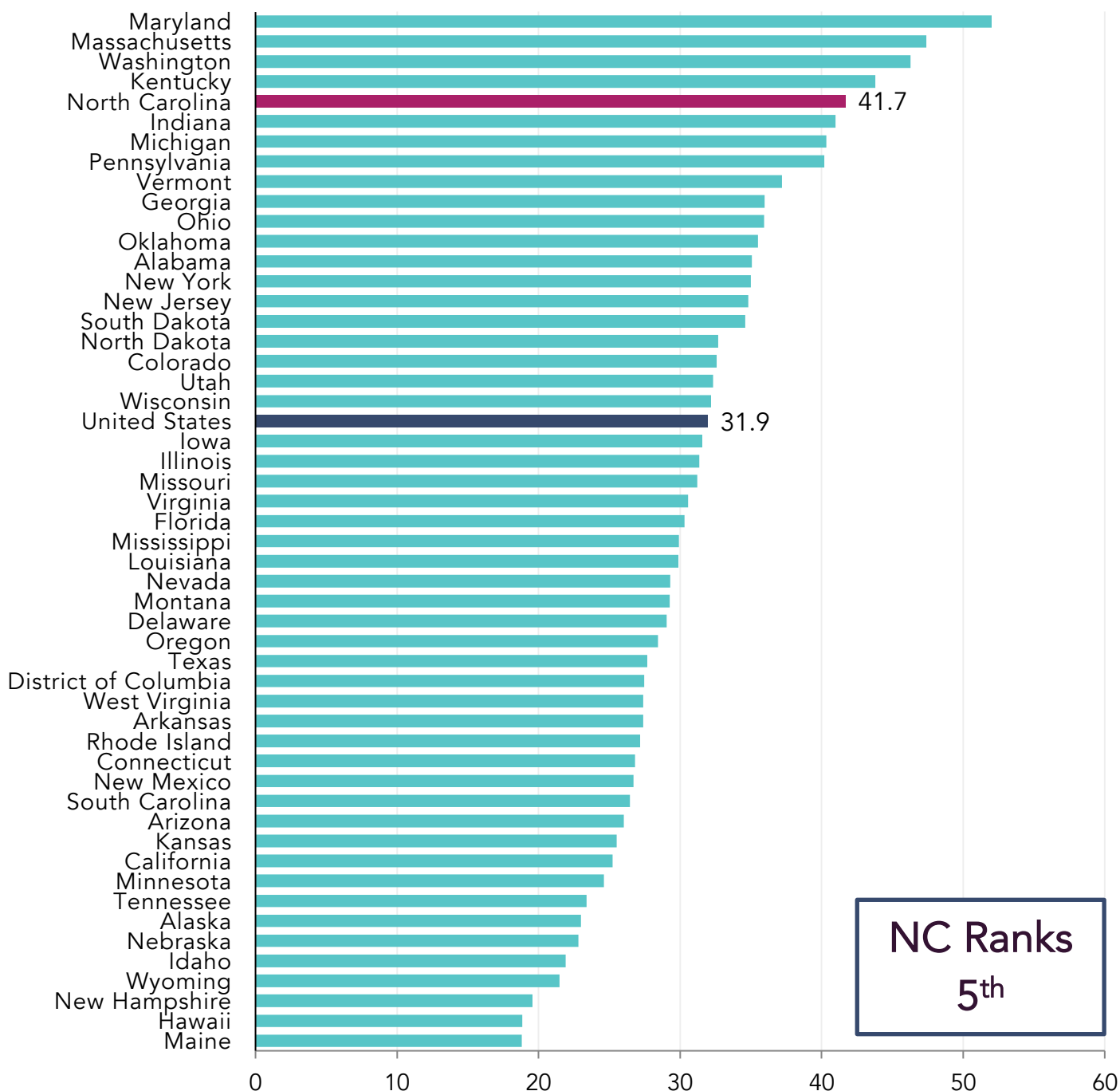


Source: Kauffman Foundation (2022)

**NC Ranks
8th**

One of the essential components of infrastructure for a knowledge-based economy is a skilled labor force. Tech occupations often require science & engineering (S&E) bachelor's degrees for entry-level positions. In 2021, North Carolina saw its students complete 23,440 education programs that were focused on computer technology, science, and engineering. We standardized this value by accounting for the number of enrolled postsecondary students in each state. North Carolina averaged about 42 completed STEM programs per one thousand students. This rate is well above the national average and the state ranks 5th.

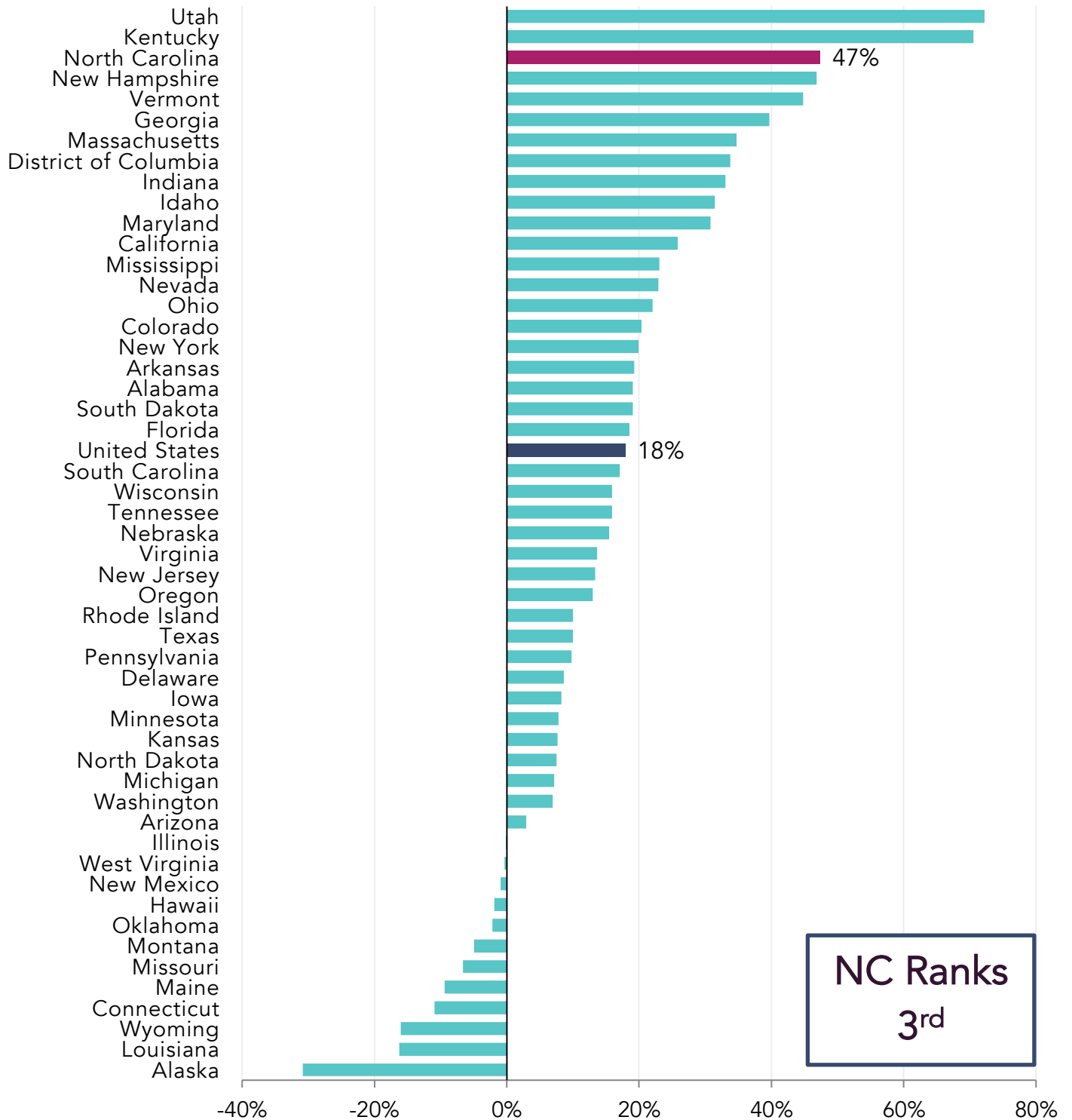
Completed STEM Education Programs per 1,000 Enrolled Students, 2021



Source: EL estimates based on Lightcast 2022.4 and National Center for Education Statistics (2022)

Over the past few years, many states have focused their efforts on growing the number of STEM students in their educational systems. We looked at the growth of STEM program completions from 2016 to 2021 and found that North Carolina has experienced an increase of 47 percent. The state continues its growth in this metric, rising another spot this year to 3rd place.

Percent Change in STEM Education Program Completions, 2016-2021

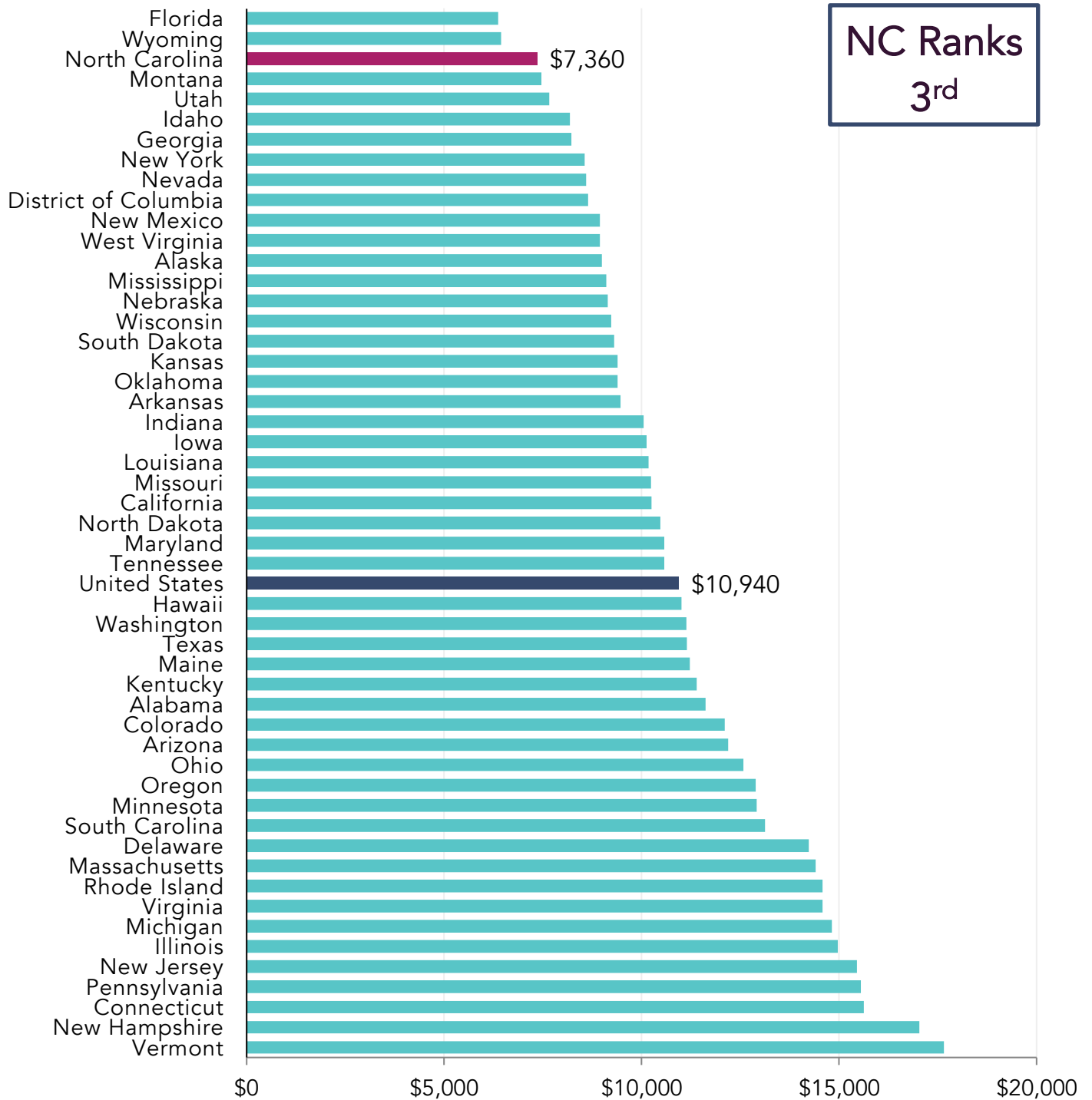


Source: EL estimates based on Lightcast 2022.4

**NC Ranks
3rd**

Students now are looking to achieve their education with the lowest debt burden. North Carolina ranks high in terms of providing low-cost quality higher education. Despite tuition increases nationally in recent years, for the 2022-2023 school year, one year of in-state tuition cost \$7,360 on average in North Carolina. North Carolina has consistently ranked in the top ten for this metric throughout the production of this report.

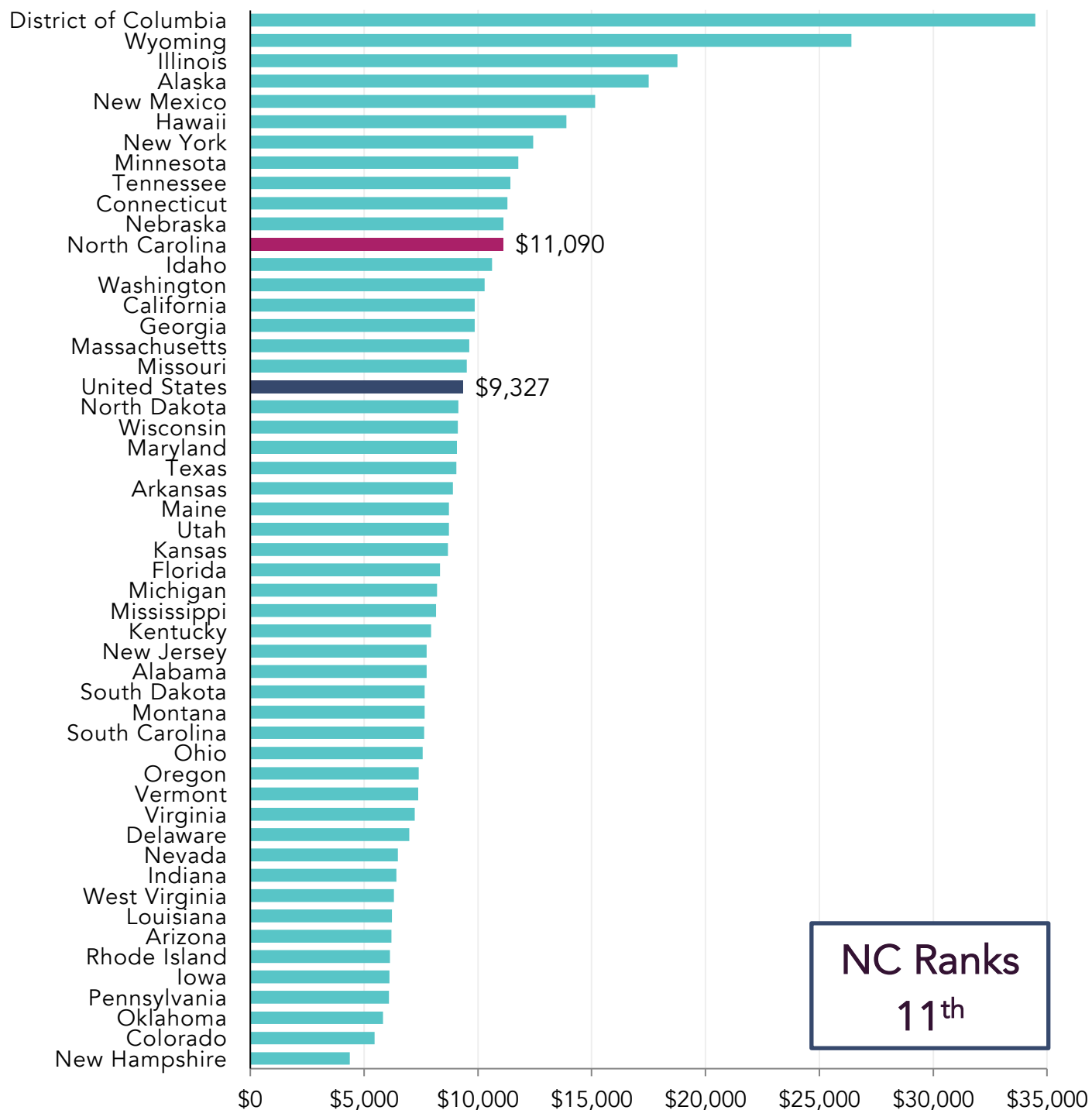
Average In-State Tuition, 2022-2023



Source: College Board (2022)

One of the reasons tuition costs are rising across all states is that funding for higher education was reduced during the Great Recession. Tuition increases have not been able to offset decreases in funding, resulting in reduced offerings at colleges and reduced research faculty. Still, North Carolina boasts the 11th highest level of higher education funding per student. The state has often ranked in the top ten in this metric, but its ranking has slipped in recent years.

State Spending on Higher Education Per FTE Student (2021)

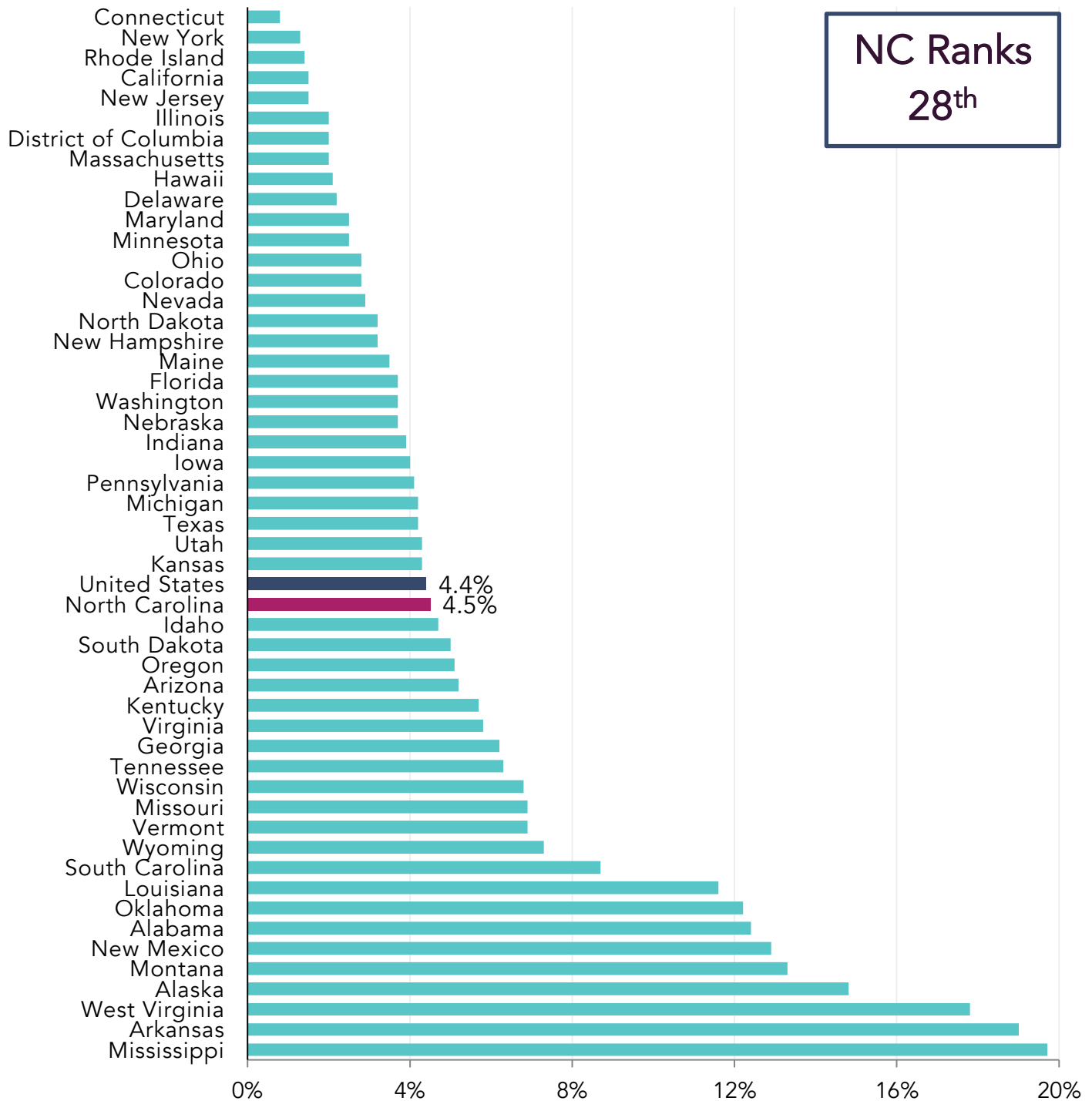


Source: State Higher Education Executive Officers (SHEEO) [2022]

**NC Ranks
11th**

High-speed broadband internet is a leading priority and a good indicator of connectivity for a knowledge economy. Access is the first step in making sure everyone can be plugged into the information economy. The FCC measures the population without access to high-speed broadband of at least 25 Mbps download and 3 Mbps upload speed. In North Carolina, 4.5 percent of the population lacks access to this service, ranking the state 28th in the nation.

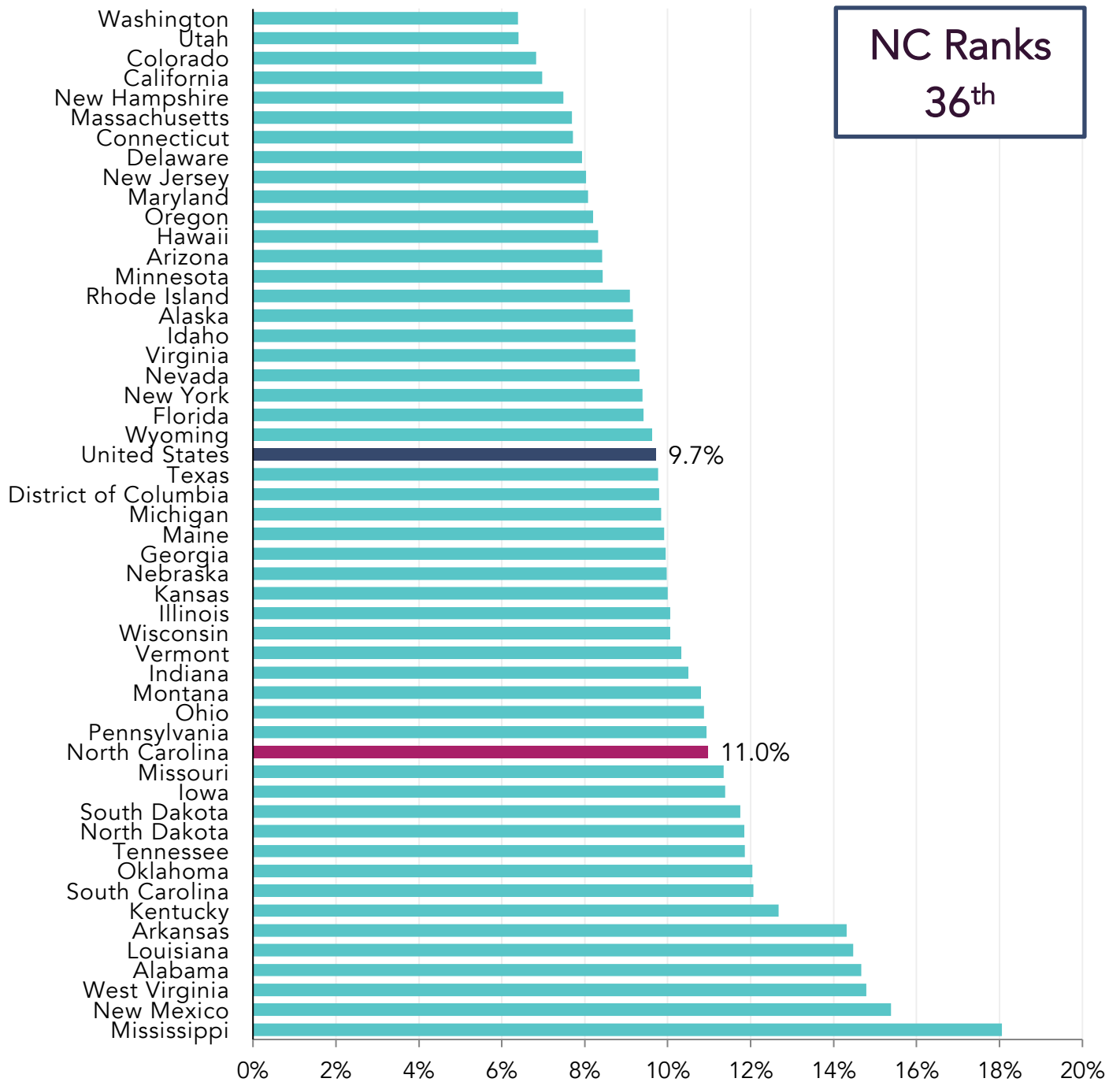
Percentage of Population Without High-Speed Broadband, 2019



Source: Federal Communications Commission (2021)

The availability of broadband must be paired with adoption by households that connect to the internet. Research has shown that adoption has a stronger link to economic benefit than just broadband availability. The Census Bureau surveys whether households have internet subscription services. In North Carolina, 11 percent of the population is estimated to lack an internet subscription; this ranks 36th in the nation. This rate is higher than the national average and puts North Carolina among the bottom 15 states.

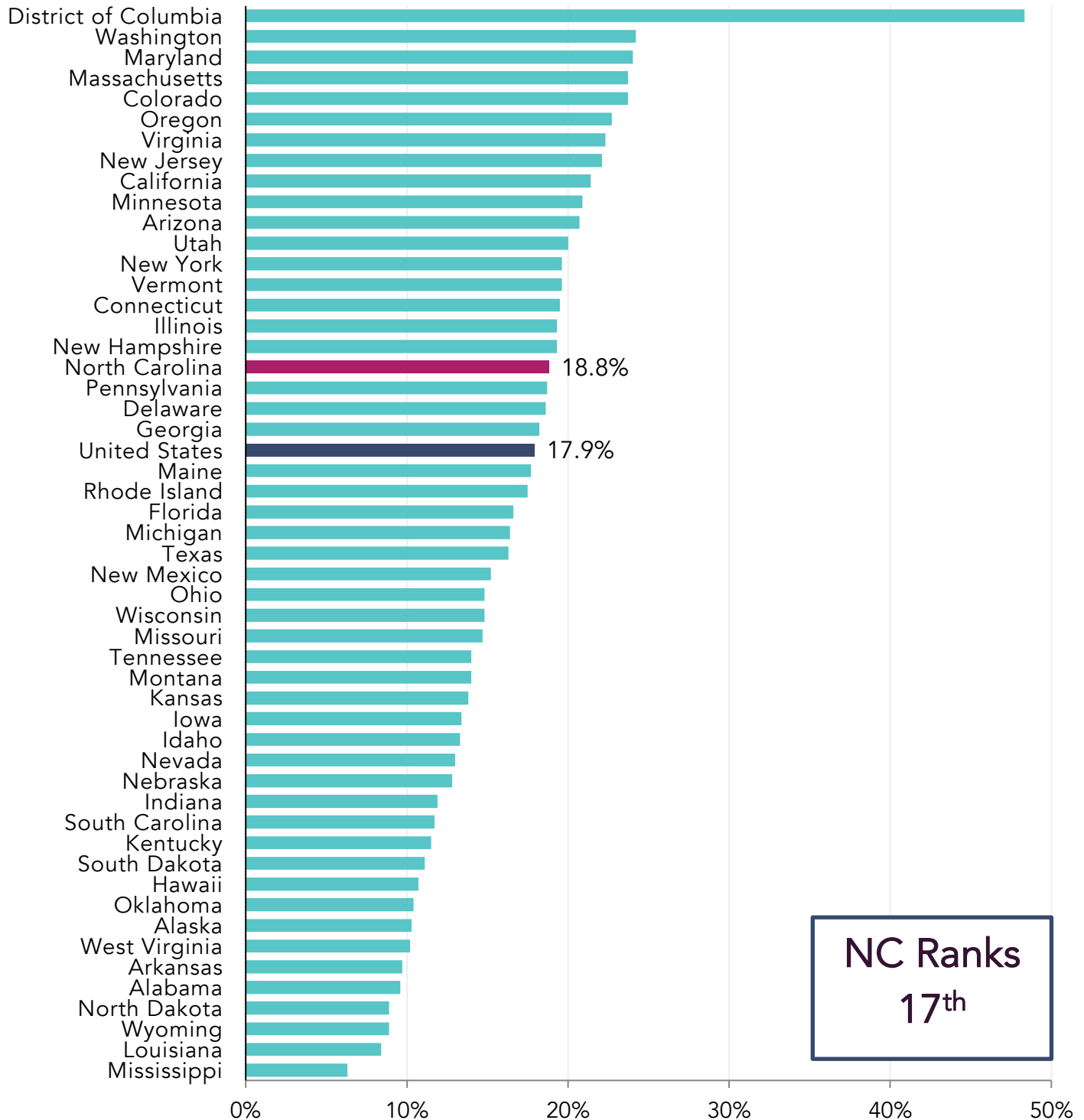
Percentage of Households Without Internet Subscription, 2021



Source: US Census Bureau (2022)

The availability and adoption of broadband can expand employment opportunities for residents in rural areas and increase opportunities for remote work. The expansion of remote work during the pandemic can also bring new talent to an area regardless of the local employment situation. According to Census surveys, North Carolina had almost 19 percent of its workers who said they worked from home. This was the 17th highest state in 2021.

Percentage of Workers Working at Home, 2021

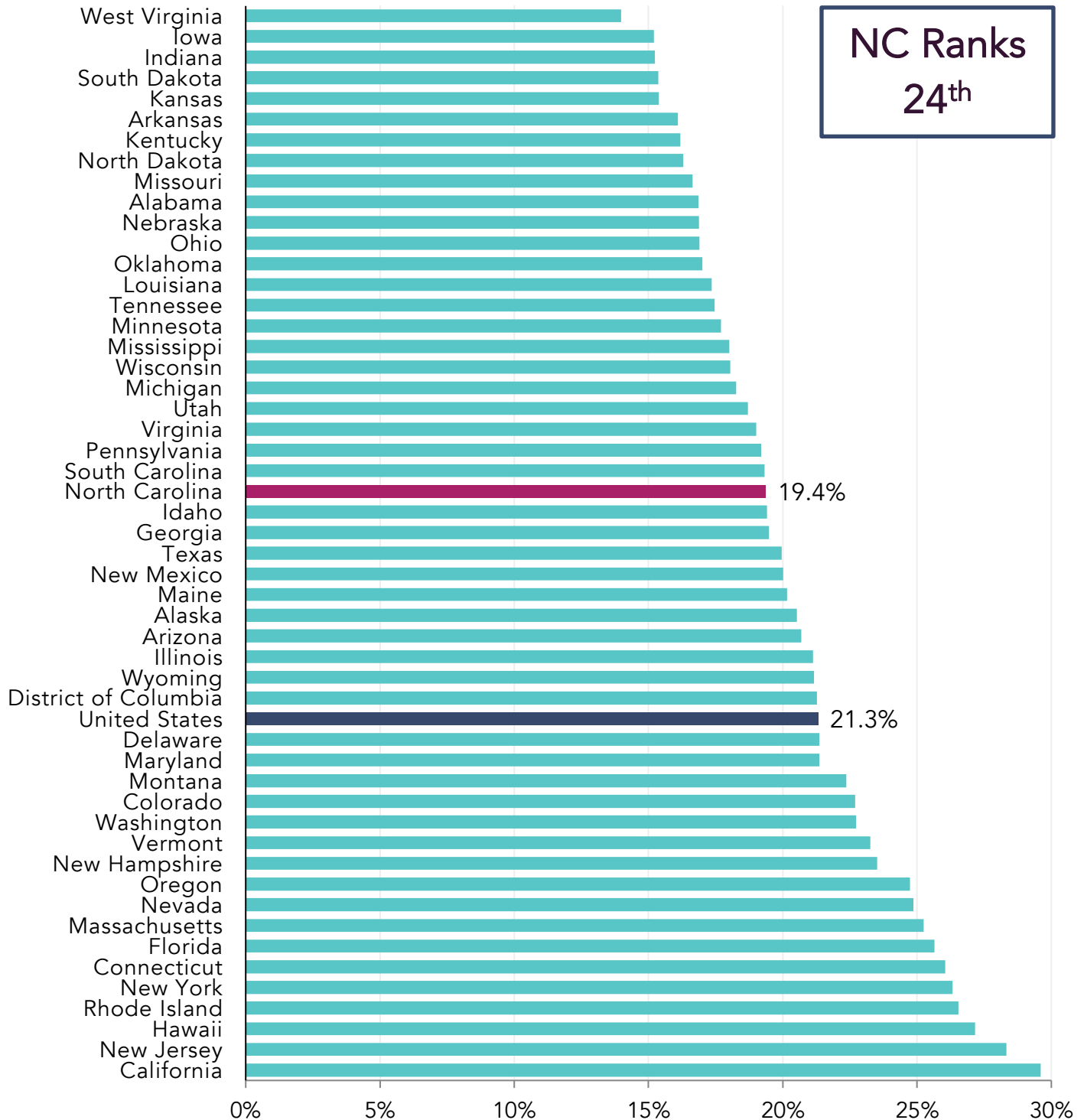


**NC Ranks
17th**

Source: US Census Bureau (2022)

North Carolina has attracted many new residents to the state in recent years. One downside of this growth is the impact to cost of living. Housing prices rose sharply in recent years and that has put increasing pressure on affordability. In 2020, over 19 percent of households were considered housing burdened (paying more than 30 percent of household income on housing). This rate is lower than the national average, but could become a greater problem with increasing in-migration.

Share of Housing Burdened Households, 2020



Source: Harvard Joint Center for Housing Studies (2022)

SECTION 7. KEY TAKEAWAYS FOR TECH SECTOR

The following chart lists all the metrics we have measured for North Carolina's tech sector and its corresponding ranking among the other states and the District of Columbia. North Carolina ranks in the best 15 of all states for 21 out of the 34 indicators we evaluated. North Carolina ranked in the bottom 15 for just one of the indicators.

	Indicates a state ranking of 15th or higher
	Indicates a state ranking between 16th and 35th
	Indicates a state ranking of 35 th or greater

Tech Industry		
Metric	Value	Rank
Technology Sector Location Quotient (2021)	0.96	17
Technology Sector Employment Growth (2016-2021)	17.6%	9
Expected Technology Sector Employment Growth (2022-2027)	7.2%	17
Average Annual Wage for Technology Sector Employees with Purchasing Power (2021)	\$146,951	12
Percentage of Women in the Technology Workforce (2021)	36.5%	2
Tech Industry Diversity Index (2021)	82.9	22

IT Industry		
Metric	Value	Rank
IT Sector Location Quotient (2021)	0.95	16
IT (Tech Core) Employment Growth (2016-2021)	14.4%	15
Expected IT Sector Employment Growth (2022-2027)	8.0%	25
Average Annual Wage for IT Sector Employees with Purchasing Power (2021)	\$156,191	11

Tech Occupations		
Metric	Value	Rank
Tech Occupations Location Quotient (2021)	1.01	16
Tech Occupations Growth (2016-2021)	28.2%	4
Expected Tech Occupations Growth (2022-2027)	7.8%	17
Median Annual Earnings Adjusted for Purchasing Power (2021)	\$93,391	7

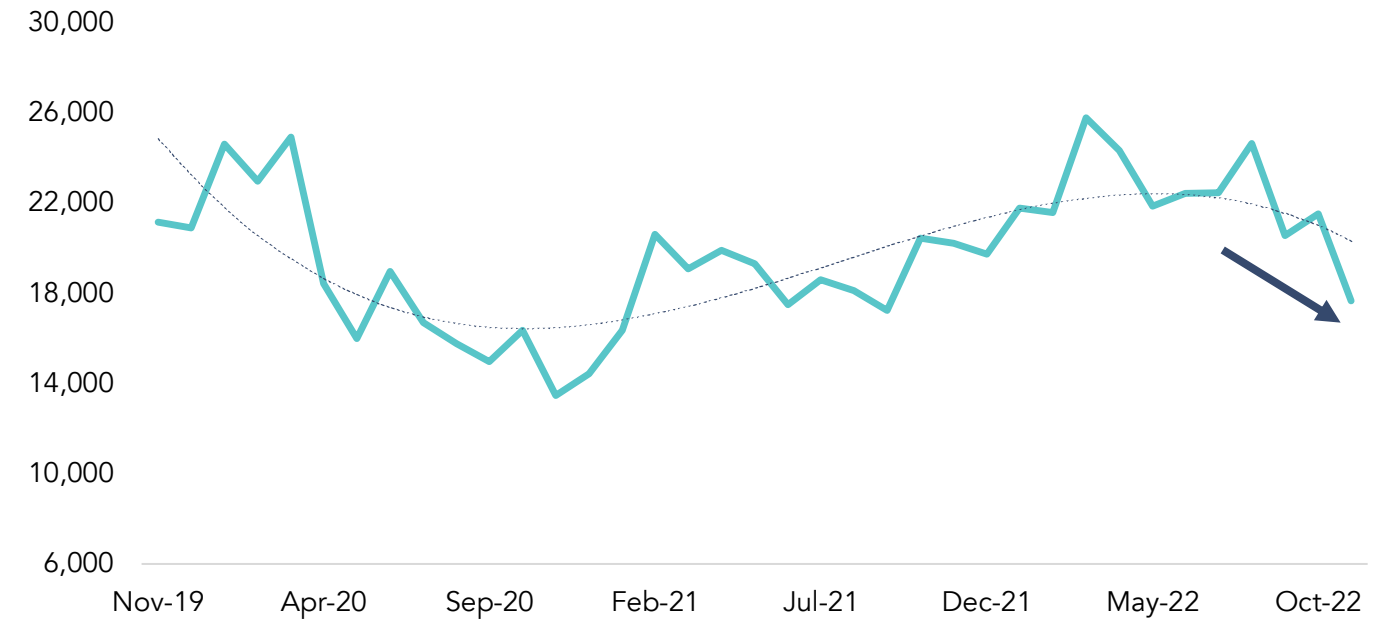
Tech Infrastructure		
Metric	Value	Rank
Total R&D as a Percentage of GSP, 2019	2.9%	13
Business Performed R&D as a Percentage of Private Industry Output, 2020	2.6%	12
Higher Education R&D in Science & Engineering as a Percentage of GSP, 2020	0.46%	4
Patents Issued per 1,000 Science & Engineering Workers, 2020	16.0	24
Venture Capital Invested Per \$1 Million of GSP, 2016-2021	\$3,975	9
Technology Licenses and Options Executed from Universities, 2020	337	11
Start-Ups from Universities, 2020	48	7
SBIR and STTR Funding Per \$1 Million of GSP, 2016-2021	\$186	15
Rate of New Entrepreneurs, 2021	0.34%	24
Business Opening vs Closing Rate, 2020	0.39%	12
Start-Up Early Job Creation Rate, 2021	5.78	8
Start-Up Early Survival Rate, 2021	82.7%	8
Completed STEM Education Programs per 1,000 Enrolled Students, 2021	41.7	5
Percent Change in STEM Education Program Completions, 2016-2021	47.4%	3
Average In-State Tuition, 2022-2023	\$7,360	3
State Spending on Higher Education Per FTE Student, 2021	\$11,090	11
Percentage of Population Without High-Speed Broadband, 2019	4.5%	28
Percentage of Households Without Internet Subscription, 2021	11.0%	36
Percentage of Workers Working at Home, 2021	18.8%	17
Share of Housing Burdened Households, 2020	19.4%	24

North Carolina is now frequently ranked among the top emerging tech states. Investment dollars are following this trend. If we look back to the 2016 State of the Technology Sector Report, North Carolina was already a high-growth tech state with impressive tech transfer occurring at its universities. Metrics on private innovation and investment, however, were not as strong, as we found that the state ranked 36th and 23rd in private business R&D and venture capital funding, respectively. In this year's report, we see that these numbers have improved. North Carolina is now ranked 9th in venture capital funding and 12th in business funded R&D. The state has improved its position and national reputation as a major player in technology.

Some opportunities still exist for improvement and support for the tech sector. Based on the rankings above, North Carolina's lowest scores were on metrics focusing on broadband adoption, diversity in the tech workforce, entrepreneurship, housing affordability, and patent rates.

The challenge for the tech industry moving forward will be continuing to meet the need for skilled talent which has only become more prevalent in the wake of the pandemic, and making sure that rural areas share in the benefits of the tech boom. As of the writing of this report in December 2022, the Federal Reserve has tightened the economy to combat inflation and major tech companies like Facebook and Netflix have announced layoffs. The job postings data in recent months have shown a slight reduction in tech job demand in the state. The pace of acceleration might slow. However, research shows that the areas that are recruiting talent are the top performers in tech. If North Carolina can keep expanding its talent base, it can continue to be competitive in tech.

North Carolina Tech Occupation Monthly Jobs Postings, Nov 2019 – Nov 2022



Source: EL calculations based on Lightcast 2022.4

The report was written by Skylar Elliott Casey and Ted Abernathy of Economic Leadership LLC.

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APPENDIX

Total Technology Industry 6-digit NAICS Code Breakdown

NAICS	Industry	Super Sub-Category	Sub-Category	Manufacturing or Services
325411	Medicinal and Botanical Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
325412	Pharmaceutical Preparation Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
334516	Analytical Laboratory Instrument Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
334517	Irradiation Apparatus Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
339112	Surgical and Medical Instrument Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
339113	Surgical Appliance and Supplies Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
339114	Dental Equipment and Supplies Manufacturing	Life Sciences Manufacturing	Life Sciences	Manufacturing
541330	Engineering Services	Engineering, Environmental, & Clean Tech	Life Sciences	Services
541380	Testing Laboratories	R&D and Testing	Life Sciences	Services
541690	Other Scientific and Technical Consulting Services	R&D and Testing	Life Sciences	Services
541713	Research and Development in Nanotechnology	R&D and Testing	Life Sciences	Services
541714	Research and Development in Biotechnology (except Nanobiotechnology)	R&D and Testing	Life Sciences	Services
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	R&D and Testing	Life Sciences	Services
333242	Semiconductor Machinery Manufacturing	Electronics Hardware	IT	Manufacturing
333314	Optical Instrument and Lens Manufacturing	Electronics Hardware	IT	Manufacturing
333316	Photographic and Photocopying Equipment Manufacturing	Electronics Hardware	IT	Manufacturing
334111	Electronic Computer Manufacturing	Electronics Hardware	IT	Manufacturing
334112	Computer Storage Device Manufacturing	Electronics Hardware	IT	Manufacturing
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing	Electronics Hardware	IT	Manufacturing

334210	Telephone Apparatus Manufacturing	Electronics Hardware	IT	Manufacturing
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Electronics Hardware	IT	Manufacturing
334290	Other Communications Equipment Manufacturing	Electronics Hardware	IT	Manufacturing
334310	Audio and Video Equipment Manufacturing	Electronics Hardware	IT	Manufacturing
334412	Bare Printed Circuit Board Manufacturing	Electronics Hardware	IT	Manufacturing
334413	Semiconductor and Related Device Manufacturing	Electronics Hardware	IT	Manufacturing
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing	Electronics Hardware	IT	Manufacturing
334417	Electronic Connector Manufacturing	Electronics Hardware	IT	Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	Electronics Hardware	IT	Manufacturing
334419	Other Electronic Component Manufacturing	Electronics Hardware	IT	Manufacturing
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	Electronics Hardware	IT	Manufacturing
334519	Other Measuring and Controlling Device Manufacturing	Electronics Hardware	IT	Manufacturing
335921	Fiber Optic Cable Manufacturing	Electronics Hardware	IT	Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	Electronics Hardware	IT	Manufacturing
511210	Software Publishers	Software	IT	Services
517311	Wired Telecommunications Carriers	Internet & Telecommunications	IT	Services
517312	Wireless Telecommunications Carriers (except Satellite)	Internet & Telecommunications	IT	Services
517410	Satellite Telecommunications	Internet & Telecommunications	IT	Services
517911	Telecommunications Resellers	Internet & Telecommunications	IT	Services
517919	All Other Telecommunications	Internet & Telecommunications	IT	Services
518210	Data Processing, Hosting, and Related Services	Internet & Telecommunications	IT	Services
519130	Internet Publishing and Broadcasting and Web Search Portals	Internet & Telecommunications	IT	Services
541511	Custom Computer Programming Services	Software	IT	Services
541512	Computer Systems Design Services	Software	IT	Services
541513	Computer Facilities Management Services	Software	IT	Services

541519	Other Computer Related Services	Software	IT	Services
221310	Water Supply and Irrigation Systems	Engineering, Environmental, & Clean Tech	Environmental Technology	Services
221320	Sewage Treatment Facilities	Remediation and Waste Management	Environmental Technology	Services
221330	Steam and Air-Conditioning Supply	Engineering, Environmental, & Clean Tech	Environmental Technology	Services
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	Engineering, Environmental, & Clean Tech	Environmental Technology	Manufacturing
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	Engineering, Environmental, & Clean Tech	Environmental Technology	Manufacturing
334514	Totalizing Fluid Meter and Counting Device Manufacturing	Engineering, Environmental, & Clean Tech	Environmental Technology	Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	Engineering, Environmental, & Clean Tech	Environmental Technology	Manufacturing
335911	Storage Battery Manufacturing	Engineering, Environmental, & Clean Tech	Environmental Technology	Manufacturing
541620	Environmental Consulting Services	Engineering, Environmental, & Clean Tech	Environmental Technology	Services
562111	Solid Waste Collection	Remediation and Waste Management	Environmental Technology	Services
562112	Hazardous Waste Collection	Remediation and Waste Management	Environmental Technology	Services
562119	Other Waste Collection	Remediation and Waste Management	Environmental Technology	Services
562211	Hazardous Waste Treatment and Disposal	Remediation and Waste Management	Environmental Technology	Services
562212	Solid Waste Landfill	Remediation and Waste Management	Environmental Technology	Services
562213	Solid Waste Combustors and Incinerators	Remediation and Waste Management	Environmental Technology	Services
562219	Other Nonhazardous Waste Treatment and Disposal	Remediation and Waste Management	Environmental Technology	Services
562910	Remediation Services	Remediation and Waste Management	Environmental Technology	Services
562920	Materials Recovery Facilities	Remediation and Waste Management	Environmental Technology	Services
562991	Septic Tank and Related Services	Remediation and Waste Management	Environmental Technology	Services
562998	All Other Miscellaneous Waste Management Services	Remediation and Waste Management	Environmental Technology	Services

211120	Crude Petroleum Extraction	Other Energy and Power Generation	Energy Technology	Services
211130	Natural Gas Extraction	Other Energy and Power Generation	Energy Technology	Services
212111	Bituminous Coal and Lignite Surface Mining	Other Energy and Power Generation	Energy Technology	Services
212112	Bituminous Coal Underground Mining	Other Energy and Power Generation	Energy Technology	Services
212113	Anthracite Mining	Other Energy and Power Generation	Energy Technology	Services
213111	Drilling Oil and Gas Wells	Other Energy and Power Generation	Energy Technology	Services
213112	Support Activities for Oil and Gas Operations	Other Energy and Power Generation	Energy Technology	Services
213113	Support Activities for Coal Mining	Other Energy and Power Generation	Energy Technology	Services
221111	Hydroelectric Power Generation	Other Energy and Power Generation	Energy Technology	Services
221112	Fossil Fuel Electric Power Generation	Other Energy and Power Generation	Energy Technology	Services
221113	Nuclear Electric Power Generation	Other Energy and Power Generation	Energy Technology	Services
221114	Solar Electric Power Generation	Renewable Energy	Energy Technology	Services
221115	Wind Electric Power Generation	Renewable Energy	Energy Technology	Services
221116	Geothermal Electric Power Generation	Renewable Energy	Energy Technology	Services
221117	Biomass Electric Power Generation	Renewable Energy	Energy Technology	Services
221118	Other Electric Power Generation	Renewable Energy	Energy Technology	Services
221121	Electric Bulk Power Transmission and Control	Other Energy and Power Generation	Energy Technology	Services
221122	Electric Power Distribution	Other Energy and Power Generation	Energy Technology	Services
221210	Natural Gas Distribution	Other Energy and Power Generation	Energy Technology	Services
324110	Petroleum Refineries	Other Energy and Power Generation	Energy Technology	Services

Tech Occupations SOC Code Breakdown

Occupation SOC Code	Occupation Description
11-3021	Computer and Information Systems Managers
11-9041	Architectural and Engineering Managers
13-1081	Logisticians
13-1082	Project Management Specialists
13-1111	Management Analysts
13-1141	Compensation, Benefits, and Job Analysis Specialists
13-1161	Market Research Analysts and Marketing Specialists
13-1199	Business Operations Specialists, All Other
13-2031	Budget Analysts
13-2041	Credit Analysts
13-2051	Financial and Investment Analysts
13-2054	Financial Risk Specialists
13-2099	Financial Specialists, All Other
15-1211	Computer Systems Analysts
15-1212	Information Security Analysts
15-1221	Computer and Information Research Scientists
15-1231	Computer Network Support Specialists
15-1232	Computer User Support Specialists
15-1241	Computer Network Architects
15-1242	Database Administrators
15-1243	Database Architects
15-1244	Network and Computer Systems Administrators
15-1251	Computer Programmers
15-1252	Software Developers
15-1253	Software Quality Assurance Analysts and Testers
15-1254	Web Developers
15-1255	Web and Digital Interface Designers
15-1299	Computer Occupations, All Other
15-2011	Actuaries
15-2021	Mathematicians
15-2031	Operations Research Analysts
15-2041	Statisticians
15-2051	Data Scientists
15-2099	Mathematical Science Occupations, All Other
17-1021	Cartographers and Photogrammetrists
17-2011	Aerospace Engineers
17-2021	Agricultural Engineers
17-2031	Bioengineers and Biomedical Engineers
17-2041	Chemical Engineers
17-2051	Civil Engineers
17-2061	Computer Hardware Engineers
17-2071	Electrical Engineers
17-2072	Electronics Engineers, Except Computer
17-2081	Environmental Engineers

17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
17-2112	Industrial Engineers
17-2121	Marine Engineers and Naval Architects
17-2131	Materials Engineers
17-2141	Mechanical Engineers
17-2151	Mining and Geological Engineers, Including Mining Safety Engineers
17-2161	Nuclear Engineers
17-2171	Petroleum Engineers
17-2199	Engineers, All Other
17-3021	Aerospace Engineering and Operations Technologists and Technicians
17-3022	Civil Engineering Technologists and Technicians
17-3023	Electrical and Electronic Engineering Technologists and Technicians
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians
17-3025	Environmental Engineering Technologists and Technicians
17-3026	Industrial Engineering Technologists and Technicians
17-3027	Mechanical Engineering Technologists and Technicians
17-3028	Calibration Technologists and Technicians
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other
17-3031	Surveying and Mapping Technicians
19-1021	Biochemists and Biophysicists
19-1031	Conservation Scientists
19-1042	Medical Scientists, Except Epidemiologists
19-1099	Life Scientists, All Other
19-2021	Atmospheric and Space Scientists
19-2031	Chemists
19-2032	Materials Scientists
19-2041	Environmental Scientists and Specialists, Including Health
19-2042	Geoscientists, Except Hydrologists and Geographers
19-2043	Hydrologists
19-2099	Physical Scientists, All Other
19-4012	Agricultural Technicians
19-4013	Food Science Technicians
19-4021	Biological Technicians
19-4031	Chemical Technicians
19-4042	Environmental Science and Protection Technicians, Including Health
19-4043	Geological Technicians, Except Hydrologic Technicians
19-4044	Hydrologic Technicians
19-4051	Nuclear Technicians
43-9111	Statistical Assistants
49-2011	Computer, Automated Teller, and Office Machine Repairers
51-9141	Semiconductor Processing Technicians

ABOUT THE REPORT

In January 2015, the North Carolina Technology Association (NC TECH) released its first State of Technology Industry Report, and annually thereafter. The full report is housed online at NCSTIR.com and this Key Findings summary features some of the highlights from the research.

The valuable information in the report has a variety of uses:

- ▶ Repository of facts, statistics, trends, narratives + insights into NC's tech sector
- ▶ Guide for companies considering headquarters relocation or operations establishment
- ▶ Source of data + trends for policy makers
- ▶ Collection of stories that highlight the vibrancy of the state's tech sector
- ▶ Resource for innovation sector organizations, economic development community, + media

For more information about NC TECH and the State of Technology Industry Report, visit nctech.org.

ABOUT THE RESEARCHER

Ted Abernathy is the managing partner at Economic Leadership LLC, an information curation consultancy firm that provides leadership to various organizations including local and state governments, chambers of commerce and private organizations. Prior to starting Economic Leadership, Ted had 30 years of experience as an economic development director for city, county and regional economic development programs. More information at econleadership.com.

