



# LEAP 2020: IN-DEMAND OCCUPATIONS

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**Interact with the data via an interactive dashboard by clicking [here](#).**

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## FORWARD

“Uncertain times brings out the very best of people, and we have certainly seen that happen in our state. Tennessee has dug in with a spirit of resilience, and they rolled up their sleeves to serve.”

Governor Bill Lee  
September 3, 2020

Tennessee began 2020 with an indisputable strong economy having had unprecedented job growth over the previous years while boasting the lowest debt per capita of any state. With a surge of investment in advanced manufacturing, health sciences, and headquarters, any economic developer would have anticipated this year as being another record-breaking growth year, but that is not what happened.

Governor Bill Lee has led Tennessee through a year that was previously unimaginable. Due to the impact of COVID-19, more than 860,000 Tennesseans have applied for unemployment between March and September of 2020, creating a statewide high of 15% unemployment in the month of April. In addition to individual claims, Tennessee businesses have also been greatly affected by COVID-19. Tourism and hospitality, retail, and the music industry all fell silent for a period of time, creating great uncertainty in the viability of their future. Students were sent home, parents became teachers, and Tennesseans struggled to know what to do.

Tennessee was not alone, as the entire country went through this together. And Tennesseans did not go through this alone, as neighbors, families, churches, and total strangers came together to help. Volunteers of all backgrounds provided food, childcare, and a listening ear within their communities. Even with the heartache, it really was a time that Tennesseans shined.

Governor Bill Lee and the Tennessee General Assembly continuously focused on ensuring Tennesseans had access to the resources they needed to adjust to the impacts of Covid-19, and Tennessee is now one of the fastest recovering economies in the nation. The Tennessee State Department of Labor and Workforce Development has provided in excess of \$5 billion dollars in state and federal aid to help individuals through an incredibly challenging time, and business recovery has been a focal point of the administration.

Governor Bill Lee and the Financial Stimulus Accountability Group announced an initial \$200 million in funds for the Tennessee Business Relief Program June 2<sup>nd</sup>, 2020 and an additional \$83.5 million on August 14<sup>th</sup>, 2020. These no cost funds were made available to businesses across the state, and an additional \$50 million of funding was just announced October 7<sup>th</sup>, 2020.

The unemployment rate is now 6.3% statewide as of September 2020, with many individuals returning to previous work or finding new careers. There are valid concerns about what this recovery means for the workforce, especially specific demographics such as young males, minorities, and women, which is why there must be an increased focus on short term training and workforce readiness programs.

Governor Bill Lee has made it clear that education and workforce are priority for Tennessee, and many quality workforce programs are already in operation. Attached in Appendix A are a few highlighted programs provided by the State of Tennessee to support the alignment of labor and education, thus creating the workforce needed for economic development and business success.

Most importantly, Governor Bill Lee continues to bring focus to increasing opportunity in rural and economically distressed counties, strengthening career and technical training, pursuing criminal justice reform, improving public safety and sharpening the effectiveness of government for all Tennesseans. That commitment to mission is what will continue to drive Tennessee toward a full recovery and beyond.

The 2020 LEAP Report outlines the in-demand occupations in Tennessee and creates a roadmap to opportunities. The following are specific examples of how this report can assist in the alignment of education, training and employment.

- 1) **Community Education:** This report can be used as a teaching resource to inform youth, adults, traditional and non-traditional students, teachers, guidance counselors, parents, chambers of commerce and economic development professionals about in-demand occupations in Tennessee.
- 2) **Increase in Postsecondary Offerings:** This report, in addition to the *Academic Supply and Occupational Demand Report*<sup>1</sup> prepared annually by THEC and TDLWD, can be used to identify gaps in educational programming connected to in-demand occupations and depict opportunities to develop postsecondary programs aligned to the established need.
- 3) **Increase in K-12 Offerings:** This report can be used to identify gaps in secondary education programs connected to in-demand opportunities. Companies can increase partnerships with school systems through career exploration courses, guest speaker events, facilitating industry tours, pre-apprenticeship programs and work-based learning experiences for K-12 students.
- 4) **Education and Industry Partnerships:** This report highlights the need and opportunities for increased education and industry alignment. Both partners can proactively approach one another to explore strategies, and economic development professional organizations are wonderful conduits for this work.
- 5) **Expanded Education and Work Experiences:** The best way to learn about an occupation is to experience it firsthand. Programs such as work-based learning, internships, co-ops and apprenticeships are valuable opportunities for the company and student, as well as the educational institution. In addition, there are state and federal resources available to support the expansion of these programs.

Now, more than ever, it is essential to align education with employment opportunity, ensure workforce training is accessible, and guarantee that graduation is attainable for ALL Tennesseans. Tennessee has an outstanding education infrastructure, and by continuing to build relationships with business, Tennessee will continue to have one of the best workforces in the nation.

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<sup>1</sup> THEC, *Academic Supply and Occupational Demand Report*, <https://www.tn.gov/thec/research/supply-and-demand.html>

# INTRODUCTION

Pursuant to Section 49 of Public Chapter 7 of the Tennessee Code Annotated, the Tennessee Department of Economic & Community Development (TNECD) will submit a report to partner agencies on demonstrated workforce needs within existing and prospective businesses across the state. The following 2020 Labor and Education Alignment Program (LEAP) Report fulfills this requirement.

The Center for Economic Research in Tennessee (CERT), with support from the Tennessee Department of Labor & Workforce Development (TDLWD) and the Tennessee Higher Education Commission (THEC), conducted an analysis to identify occupations throughout the state that are in high demand by Tennessee’s business community. For the State and each of the state’s nine Local Workforce Development Areas (LWDAs), CERT analyzed occupations with high numbers of job postings, hires and/or projected annual job openings relative to the total number of individuals employed in an occupation.

CERT partnered with researchers from the TDLWD and THEC over the last year to build a collaborative approach to identifying Tennessee business’ demand for specific job types. The agencies studied alignment in data and methodology to prioritize cohesive statewide messaging on the topic of in-demand occupations. THEC and TDLWD release an annual report in January—the *Academic Supply and Occupational Demand Report*—which will build upon the results of this evaluation. For the first time, the two reports provide a jointly-defined list of in-demand positions. Importantly, the *Academic Supply and Occupational Demand Report* will identify postsecondary programs that support the workforce pipeline for in-demand jobs. Both reports are meant to be used as tools to aid in local, regional, and state policy decision-making with regard to alignment of workforce, education and industry.

The cross-agency evaluation identified 227 unique job classifications<sup>2</sup> with high employer demand in one or more Tennessee regions. There was a total of 720 occupation classifications<sup>3</sup> that were analyzed for employer demand.

**Table 1** shows there were 104 unique occupations identified as in-demand statewide. Of the nine LWDAs, the East region had the most diverse set of occupations that were identified as in-demand with 97 occupations, and the Northwest region had the least diverse set of occupations that were identified as in-demand with 55 occupations.

**Table 1: Number of Occupations with High Employer Demand per Region**

Region	No. of Occupations with High Employer Demand	For Job Classifications in High Demand:		
		Unique Job Postings (2019)	Hires (2019)	Projected Annual Openings <sup>4</sup>
Statewide	104	145,087	762,565	122,748
Greater Memphis	81	31,113	99,436	16,410
Northwest	55	2,133	11,010	2,220
Southwest	69	3,750	20,105	3,880
Northern Middle	89	64,289	207,030	38,835

<sup>2</sup> The 227 unique occupations with high employer demand in one or more Tennessee regions are provided in Appendix B on page 38.

<sup>3</sup> There is a total of 790 occupation classifications. Forty-eight out of 790 occupations do not have employment figures released for Tennessee; and 22 occupations had confidential employment figures for Tennessee. Data source: TDLWD, Occupational Employment Statistics (OES)

<sup>4</sup> Projected Annual Openings were sourced from the most recently available data from the TDLWD: for Statewide that is the 2018 – 2028 Long Term Projections, and for the LWDA regions that is the 2016 – 2026 Long Term Projections.

Region	No. of Occupations with High Employer Demand	For Job Classifications in High Demand:		
		Unique Job Postings (2019)	Hires (2019)	Projected Annual Openings <sup>4</sup>
Southern Middle	67	5,513	30,485	5,245
Upper Cumberland	67	2,994	15,826	3,220
East	97	22,313	104,337	19,880
Southeast	89	13,938	73,838	12,990
Northeast	83	6,610	37,589	6,915

This report highlights in-demand positions that fall into **priority occupation groups** and **target industry clusters** that are related to Tennessee’s business recruitment and expansion strategy. **Science Technology Engineering and Mathematics (STEM)** occupations are highlighted in a column throughout this report because a robust STEM workforce is critical to Tennessee’s continued growth of advanced industries.<sup>5</sup>

For all positions with high employer demand, see Appendix B and Appendix C. More information is available in an interactive dashboard and a data download, both of which are hyper-linked on page 1.

## Report Highlights

- The 2020 LEAP Report highlights jobs that are in-demand across Tennessee.
- Occupations within Tennessee’s regions can differ in concentration based on the industries that call the region home, creating distinct habitats for workforce development efforts. The report offers regional and statewide analysis of occupations, highlighting regional uniqueness and overlap of occupations that are in demand.
- The report focuses on a set of priority occupation groups; however, the full set of in-demand occupations is available in Appendix B. The data is also available for [download](#) and for viewing in an interactive [dashboard](#).
- The report calls attention to occupations that are strategically important to TNECD’s expansion and recruitment efforts. These key occupations support TNECD’s targeted industry clusters, and thereby support the department’s efforts to become No. 1 in the Southeast for high-quality jobs.
- STEM occupations with high employer demand are indicated throughout the report. Tennessee is making great strides in building STEM opportunities. A strong STEM workforce pipeline will strengthen Tennessee’s competitiveness in business development, especially in the growth of advanced industries.
- In several places, this report comments on potential new trends that could emerge due to the COVID-19 pandemic on Tennessee’s industries. The report also highlights where in-demand occupations identified in this report intersect with high levels of unemployment insurance claims in 2020.
- The Center for Economic Research in Tennessee (CERT) partnered with researchers from the Tennessee Department of Labor and Workforce Development (TDLWD) and the Tennessee Higher Education Commission (THEC) to align methodology and jointly identify in-demand positions. The *Academic Supply and Occupational Demand* report, released annually in January by THEC and TDLWD, will report the same list of in-demand jobs and will build upon the results of this study.

<sup>5</sup> The Advanced Industries Sector is a group of 50 industries characterized by research and development (R&D) and STEM workers. The list of industries can be found on page 3 of the Brookings *America’s Advanced Industries* report. (<https://www.brookings.edu/research/americas-advanced-industries-what-they-are-where-they-are-and-why-they-matter/>)

# COVID-19 AND IMPLICATIONS FOR SUPPLY AND DEMAND ANALYSIS

This report highlights occupations that are in demand for Tennessee and the nine local workforce development areas (LWDAs) using three metrics: projected job openings, recent job postings, and recent hiring patterns. These data measure demand in 2019; and notably pre-date the COVID-19 pandemic.

The COVID-19 pandemic has had a tremendous impact on the economy and continues to do so. This section is special to our report this year and highlights areas where the in-demand occupations listed in this report intersect with high levels of unemployment insurance claims in 2020 as reported by the TDLWD in large part due to business closures arising from the COVID-19 pandemic.

In March 2020 the Tennessee economy experienced significant changes due to the COVID-19 pandemic. Business closures, related to stay at home orders and declines in customers, forced many Tennesseans out of work. Unemployment in Tennessee grew to 15 percent in April 2020, up from 3.2 percent in March 2020.<sup>6</sup> Many of these layoffs were temporary, as cities attempted to keep people home and enforce social distancing through short-term stay-at-home orders.

Data from the Federal Reserve Bank of St. Louis shows that real personal consumption expenditures (PCE) in the U.S., a measure of consumer spending, fell 18.1 percent nationally between February and April of 2020, and have yet to return to pre-recession levels.<sup>7</sup> In Tennessee, consumer spending has made gains in some sectors however remains down in some sectors such as Healthcare, Restaurants & Hotels, Entertainment & Recreation, and Transportation.<sup>8</sup>

The effect of stay-at-home orders and reduced consumer spending was experienced disproportionately across industries. While the unemployment rate has improved to 6.3 percent in September 2020, it remains notably higher than pre-COVID-19 unemployment rates at 3.2 percent.<sup>9</sup> Job losses particularly impacted the leisure and hospitality industry.

The COVID-19 pandemic has changed the Tennessee economy significantly in a short amount of time. This section is included to highlight areas where in-demand occupations, as identified in this report, have been disproportionately affected by complications from the COVID-19 pandemic. Future supply and demand reports will encompass 2020 data reflecting the COVID-19 period and will thereby address the influence of the pandemic on in demand analyses.

## ***In-Demand Occupations Affected by COVID-19***

Below we highlight occupations that have been disproportionately affected by the COVID-19 pandemic, as seen in TDLWD's unemployment insurance claims data.

**Table 2** highlights the occupations that are in-demand at the statewide level, as defined in this report, that also had a high number of unemployment insurance claims for the week ending June 27, 2020. In-demand

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<sup>6</sup> TDLWD, *2019-2020 Reference Guide: Tennessee's Economy*, Short Term Trends in the Tennessee Economy: March 2020 to April 2020,

<https://www.tn.gov/content/dam/tn/workforce/documents/majorpublications/reports/TennesseeEconomyGrowthFALLDOCUMENT2019-2020.pdf>

<sup>7</sup> The Federal Reserve Bank of St. Louis, *Real Personal Consumption Expenditures*, Retrieved September 2020

<https://fred.stlouisfed.org/series/PCEC96>

<sup>8</sup> Opportunity Insights, *Economic Tracker*, Retrieved September 2020, <https://tracktherecovery.org/>

<sup>9</sup> TDLWD, *Labor Force Estimates*, <https://www.tn.gov/workforce/general-resources/major-publications0/major-publications-redirect/public-reports-redirect/labor-force-estimates.html>

occupations that have experienced a high numbers of claims include laborers, customer service representatives, heavy and tractor-trailer drivers, and inspectors.

**Table 2: Highest Number of Claims Filed by In-Demand Occupation<sup>10</sup>**

SOC Code	Occupation Title	Estimated 2020 Employment	Entry Level Education	Job Training Needed	Total Claims <sup>11</sup>
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	99,080	No formal education	Short-term on-the-job	8,331
43-4051	Customer Service Representatives	65,420	High School	Short-term on-the-job	6,056
53-3032	Heavy and Tractor-Trailer Truck Drivers	72,800	Postsecondary non-degree award	Short-term on-the-job	2,929
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	14,650	High School	Moderate-term on-the-job	2,659

**Table 3** displays the in-demand occupations with the highest percent of claims as a percent of estimated 2020 employment. This table highlights occupations that may have lower overall employment than those highlighted in **Table 2** but had high claims numbers relative to the occupational size. This applied to only one occupation in our statewide in-demand analysis – Chefs and Head Cooks.

**Table 3: Highest Percent of Claims Filed to 2020 Employment for In-Demand Occupations<sup>12</sup>**

SOC Code	Occupation Title	Estimated 2020 Employment	Claims Filed as % of 2020 Employment
35-1011	Chefs and Head Cooks	2,250	82.50%

For a more detailed report on the subject, or to see the full tables listed here, please see the Tennessee Department of Labor & Workforce Development's [2019-2020 Reference Guide: Tennessee's Economy](#).

<sup>10</sup> This table provides information from Table 2 in TDLWD, *2019-2020 Reference Guide: Tennessee's Economy*. Occupations that were not highlighted as in-demand at the statewide level in this report have been removed from the table. Estimated 2020 employment must be >100. This data is current through the week ending June 27, 2020.

<sup>11</sup> Total initial and continued claims on June 27, 2020

<sup>12</sup> This table provides information from Table 3 in TDLWD, *2019-2020 Reference Guide: Tennessee's Economy*. Occupations that were not highlighted as in-demand at the statewide level in this report have been removed from the table. Estimated 2020 employment must be >100. This data is current through the week ending June 27, 2020.

## PRIORITY OCCUPATION GROUPS

Of the 227 unique job classifications identified as having high employer demand in one or more regions, the report highlights those positions in the following occupation groups:

- Information technology occupations (page 13),
- Production occupations (page 17),
- Engineering and engineering-related occupations (page 20),
- Healthcare occupations (page 23),
- Business and financial operations occupations (page 26)
- Transportation and material moving occupations (page 28).

While six occupation groups<sup>13</sup> are highlighted in this report, nearly every occupation group has positions in high demand. **Table 4** reflects the total number of occupations within each group with employment and the share of those occupations identified as in-demand.

**Table 4: In-Demand Occupations by Occupation Group**

Occupation Group	Occupations with High Employer Demand in One or More Regions	All Occupations <sup>14</sup>
Management (11-0000)	16	32
<b>Business and Financial Operations (13-0000)</b>	15	26
<b>Computer and Mathematical (15-0000)</b>	8	15
<b>Architecture and Engineering (17-0000)</b>	8	31
Life, Physical, and Social Science (19-0000)	4	41
Community and Social Service (21-0000)	7	17
Legal (23-0000)	1	7
Education Instruction and Library (25-0000)	4	63
Arts, Design, Entertainment, Sports, and Media (27-0000)	7	36
<b>Healthcare Practitioners and Technical (29-0000)</b>	9	52
<b>Healthcare Support (31-0000)</b>	9	17
Protective Service (33-0000)	3	18
Food Preparation and Serving Related (35-0000)	2	16
Building and Grounds Cleaning and Maintenance (37-0000)	6	9
Personal Care and Service (39-0000)	5	24
Sales and Related (41-0000)	12	21
Office and Administrative Support (43-0000)	29	53
Farming, Fishing, and Forestry (45-0000)	1	11
Construction and Extraction (47-0000)	20	51
Installation, Maintenance, and Repair (49-0000)	19	44
<b>Production (51-0000)</b>	29	99
<b>Transportation and Material Moving (53-0000)</b>	13	37
TOTAL	227	720

<sup>13</sup> See occupation groups in bold font in Table 4

<sup>14</sup> This is a count of non-confidential occupations with Tennessee employment. Source: TDLWD, Occupational Employment Statistics (OES).

## TARGET INDUSTRY CLUSTERS

TNECD is committed to supporting the growth of industry clusters in Tennessee through targeted business development efforts.

An industry cluster is a regional concentration of related industries, consisting of companies, suppliers, service providers, government agencies, and other institutions that provide specialized training, education, information, research, and technical support. Industry clusters enhance the competitiveness of businesses by creating a strong network of local suppliers. TNECD's industry cluster strategy focuses on clusters with a strong presence and/or growth potential in Tennessee.

Cluster strategy presents opportunities for strengthened and strategic workforce development efforts. The presence of an industry cluster often coincides with a regional workforce that specializes in supporting fields of study and skill sets. Employers within a cluster may seek to fill many of the same or similar occupations, consequently creating a collective employer demand for supporting programs of study. Recruitment of new companies into the cluster or expansion of existing companies further contributes to a collective employer demand for supporting programs of study. A feedback loop of co-locating company growth and workforce training leads to high-quality employment for local graduates.

TNECD prioritizes nine industry clusters in which Tennessee has demonstrated a strong competitive advantage. Tennessee has experienced significant company expansion and recruitment in the nine sectors listed below, and continually develops strategies that facilitate sustained growth.

- **FOOD & AGRICULTURE** focuses on the processing and manufacture of food and beverage products. Service industries such as the restaurant sector are not included.
- **HEALTHCARE & LIFE SCIENCES** includes the production of medical equipment, supplies, and pharmaceuticals, as well as medical research. Healthcare providers such as hospitals and doctors' offices are not included.
- **RUBBER, CERAMICS, & GLASS** involves manufacturing of heat-treated materials, sometimes called vulcanized or fired materials.
- **AUTOMOTIVE** includes industries that produce motor vehicles and vehicle parts.
- **ELECTRICAL EQUIPMENT & APPLIANCES** includes businesses that manufacture household appliances as well as electrical components like switchboards.
- **HEADQUARTERS, FINANCE, & TECH** includes headquarters, business support services like accounting and logistics consulting, IT services, and research and development.
- **DISTRIBUTION & LOGISTICS** involves product distribution and transportation services.
- **AEROSPACE & DEFENSE** includes businesses that manufacture aircraft, aircraft parts such as engines, and weaponry ranging in size from small arms to nuclear weapons.
- **CHEMICALS** includes manufacturers that produce a wide range of products such as petroleum, coal products, basic chemicals, paints, adhesives, soaps, cleaning solutions, resins, fibers, and agricultural

chemicals like fertilizers and pesticides.

Occupations that are key to the workforce composition of TNECD's target industry clusters are indicated in a column named "Key to Industry Clusters" in the tables of this report. These key occupations represent a high share of the staffing patterns of one or more of TNECD's clusters. Appendix C on page 45 shows the industry cluster(s) that in-demand occupations support.

To learn more about Tennessee's target industry clusters, please visit <https://tnecd.com/>, where you can find interactive dashboards, research papers and other resources.

## SCIENCE, TECHNOLOGY, ENGINEERING AND MATH (STEM):

Science, Technology, Engineering and Math (STEM) occupations are high-wage jobs with many openings in Tennessee. Most of the regionally in-demand STEM occupations are in IT, engineering, and healthcare fields. In-demand STEM positions are highlighted throughout the tables of this report.<sup>15</sup>

In this report, STEM is defined using the U.S. Bureau of Labor Statistics (BLS) list of STEM occupations.<sup>16</sup> This definition includes the following types of occupations: computer and mathematical, architecture and engineering, and life and physical science occupations, as well as managerial and postsecondary teaching occupations related to these functional areas and sales occupations requiring scientific or technical knowledge at the postsecondary level.

TDLWD published *The Demand for STEM Occupations in Tennessee*<sup>17</sup> in July of 2019. This report suggests that Tennessee will experience significant growth in STEM occupations over the next decade. Most of these jobs will be computer and engineering occupations.

Tennessee is making great strides in building STEM training opportunities. The state's workforce initiatives outlined in Appendix A will strengthen Tennessee's workforce in STEM and other in-demand fields. Additional STEM training opportunities include, but are not limited to:

- Governor Lee's Future Workforce Initiative and the Tennessee Department of Education announced in May 2020 that 22 STEM-Designated<sup>18</sup> schools will receive an award of \$10,000. This initiative aims to put Tennessee in the top 25 states for creating technology jobs through launching new CTE, STEM-focused programs in public schools.<sup>19</sup>
- The U.S. Department of Energy announced a \$20 million investment<sup>20</sup> in the University of Tennessee to advance workforce development in emerging energy fields. Secretary of Energy Dan Brouillette said, "This expanded partnership between the University of Tennessee and Oak Ridge National Laboratory supports the Administration's Strategy for STEM Education by developing a more diverse energy workforce with the skills needed by 21st century employers."
- The National Science Foundation has awarded<sup>21</sup> a \$1 million grant to the Tennessee State University College of Engineering to recruit minority transfer students from regional community colleges. The award will provide 45 scholarships over five years to students who want to earn bachelor's degrees in

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<sup>15</sup> The May 2019 OES uses a hybrid version of SOC Codes. STEM occupations using this version of SOC Codes can be downloaded at this website: <https://www.bls.gov/oes/additional.htm>.

<sup>16</sup> <https://www.bls.gov/oes/topics.htm#stem> ; <https://www.bls.gov/oes/additional.htm>

<sup>17</sup> TDLWD, *The Demand for STEM Occupations in Tennessee*,

<https://www.jobs4tn.gov/admin/gsipub/htmlarea/uploads/LMI/Publications/STEMReport2019Updated.pdf>

<sup>18</sup> Tennessee STEM School Designation was developed by the Tennessee Department of Education in partnership with the Tennessee STEM Innovation Network. STEM Designated Schools are recognized for their commitment to integrating quality STEM teaching and learning practices for all students within a school building. The Tennessee Department of Education honors Tennessee STEM Designated Schools each year at the STEM Innovation Summit. STEM Designated Schools are provided early access to STEM initiatives statewide. To learn more visit: <https://www.tsin.org/current-designated-stem-schools>.

<sup>19</sup> Tennessee Department of Education, Press Release, <https://www.tn.gov/education/news/2020/5/11/tdoe-announces-new-stem-designated-schools-will-receive--10k-award-from-governor-lee-s-future-workforce-initiative.html>.

<sup>20</sup> U.S. Department of Energy, Press Release, <https://www.energy.gov/articles/doe-invests-20-million-workforce-development-emerging-fields-university-tennessee>

<sup>21</sup> Tennessee State University, Press Release, <https://tnstatenewsroom.com/archives/26708>

engineering, math, or computer science.

- Tennessee Tech's Millard Oakley STEM Center<sup>22</sup> began offering a new initiative called STEM at HOME to provide parents/guardians with STEM activities that can help engage K-8<sup>th</sup> students while many schools are closed due to COVID-19.

STEM occupations with high employer demand are indicated in a column named "STEM" in the tables of this report.

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<sup>22</sup> To learn more visit: <https://www.tnitech.edu/education/stem/family-community.php>.

## INFORMATION TECHNOLOGY (IT) OCCUPATIONS

Information technology (IT) occupations are in high demand in both Tennessee and the nation. In-demand IT occupations are strongly concentrated in the headquarters, finance, and tech industry cluster. Industries in the headquarters, finance, and tech cluster are not only a significant source of employment in Tennessee, they also provide high average wages and generate substantial earnings.

Computer services includes industries like data processing, hosting and related services, computer programming and systems design services, computer facilities management services, and other computer related services.

TNECD has had significant project growth in the headquarters, finance, and tech sector which relies heavily upon an IT workforce. Company announcements include: [Facebook's](#) \$800 million investment in a new state-of-the-art data center in Gallatin (August 2020); [Amazon's](#) new Operations Center of Excellence which will generate 5,000 new jobs and \$623.0 million investment in downtown Nashville (November 2018); [AllianceBernstein L.P.](#) is expanding its Nashville headquarters (after relocating from NYC in 2018) where more than 1,000 people are employed in tech, operations and compliance functions. Other tech firms announcing recent growth plans in Tennessee include [Thnks](#) which provides a digital platform for giving appreciation (Nashville, March 2020); cybersecurity company [DEVCON](#) (Memphis, October 2019); software-based bookkeeping company [Pilot.com, Inc.](#) (Nashville, June 2019); and healthcare services company [Prospero Health](#) (Memphis, September 2019).

### ***Trends in IT***

Future demand for an IT workforce may continue to rise because of emerging work-from-home trends and needs for technological support in both the public and private sectors. According to the U.S. Bureau of Labor Statistics, about 1 in 4 people employed in August 2020 teleworked<sup>23</sup> or worked from home for pay at some point during the last four weeks because of the COVID-19 pandemic. Pricewaterhouse Cooper conducted a survey in June 2020 called the U.S. Remote Work Survey<sup>24</sup>, which had respondents from public and private companies in three sectors: financial services (42%), technology, media and telecommunications (29%) and retail and consumer products (29%). According to this survey, before the COVID-19 pandemic approximately 39% of these sectors employees worked remotely at least one day a week, but during the pandemic 77% of employees in these sectors have done so.

Remote work and work-from-home trends will continue after the pandemic, and the need for IT support and infrastructure will likely stay at heightened levels.

Dr. Samuel Jator, chair of the Department of Mathematics and Statistics at Austin Peay University, recently said of the Computer Science and Quantitative Methods master's program, "This program is resistant to COVID-19 whether it's in internships or it's in jobs. Enrollment in APSU's computer science and quantitative methods graduate program is up about 10% for fall 2020."<sup>25</sup>

Many types of public and private sector operations will need to increase information security

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<sup>23</sup> U.S. Bureau of Labor Statistics, *The Economics Daily*, September 2020, <https://www.bls.gov/opub/ted/2020/one-quarter-of-the-employed-teleworked-in-august-2020-because-of-covid-19-pandemic.htm>

<sup>24</sup> PricewaterhouseCooper, *U.S. Remote Work Survey*, June 2020, <https://www.pwc.com/us/en/library/covid-19/us-remote-work-survey.html>

<sup>25</sup> Austin Peay State University, Press Release, <https://www.apsu.edu/news/june-2020-grad-enrollment.php>

because of the shift to virtual offerings of services. Across the country, school districts<sup>26</sup> that have shifted to virtual learning are becoming more vulnerable to and have been attacked by hackers through data breaches, ransomware, and phishing. Prior to the COVID-19 pandemic the need for IT workers was already increasing very rapidly, however because of the incredible shift across the country to virtual services since COVID-19, the demand for IT professionals will likely be strengthened.

Growing the talent pipeline in Tennessee for software and web development is necessary. TheCo in Jackson, Tennessee stepped up to begin to fill this need with their Dev Catalyst<sup>27</sup> training platform. Dev Catalyst began in 2013 with the mission of providing online and industry-current coding education to build the tech talent pipeline through skill development in web development, physical computing, user experience (UX), and data management.

Software developers and software quality assurance analysts and testers are in demand across the state are crucial for the growth of computer services industries and headquarters industries. Companies postings job opportunities online for software development jobs in Tennessee right now include: Amazon.com, Inc., Deloitte, HCA Holdings, Inc., FedEx Corporation, AutoZone, Asurion, Inc., St. Jude Children's Research Hospital, Inc., and AllianceBernstein Holding L.P., among others.

Computer user support specialists are important to industries that include direct-to-consumer services, such as medical wholesaling, computer wholesaling, and e-commerce. Private sector Tennessee industries with the largest number of computer user support specialists employed<sup>28</sup> include: the computer systems design and related services industry (1,350 employed); the management of companies and enterprises industry (944 employed); and the management, scientific, and technical consulting services industry (504 employed).

Computer programmers are instrumental for research and development programs as well as the manufacture of technical products for medical use and electrical equipment. In-demand skills listed on online job postings for computer programmers in Tennessee include: SQL, .NET Framework, C#, JavaScript, Java, Agile Software Development, Application Programming Interface (API), C++, and Cascading Style Sheets (CSS). Students do not need to know every programming language prior to employment, but rather have proficiencies to quickly adapt.

The table below outlines IT occupations that have high employer demand in one or more Tennessee regions.

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<sup>26</sup> The K-12 Cybersecurity Resource Center, *The K-12 Cyber Incident Map*, <https://k12cybersecure.com/map/>

<sup>27</sup> Dev Catalyst, <https://www.devcatalyst.com/>

<sup>28</sup> TDLWD, Jobs4TN, Labor Market Information, Occupation Profile, Occupation Summary, Computer User Support Specialists

Table legend:

- An "X" denotes regions in which the occupation has high employer demand;
- A "\*" denotes the occupation is key to one or more of TNECD's target industry clusters;
- A "#" denotes the occupation is a STEM occupation.

## IN-DEMAND IT OCCUPATIONS

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
15-1212	Information Security Analysts									X		1	*	#
15-1232	Computer User Support Specialists		X	X	X			X			X	5	*	#
15-1244	Network and Computer Systems Administrators							X				1	*	#
15-1251	Computer Programmers		X						X	X		3	*	#
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	X	X		X	X		X		X	X	7	*	#
15-1257	Web Developers and Digital Interface Designers		X							X		2	*	#
15-1299	Computer Occupations, All Other				X							1	*	#

## PRODUCTION OCCUPATIONS

Production occupations are in high demand across Tennessee. Although Tennessee has one of the strongest<sup>29</sup> specialized production workforces in the country, having a technically competent and growing pipeline of production workers is key to the expansion and recruitment of manufacturing companies, especially in the advanced manufacturing sector. Tennessee's advanced manufacturing workforce<sup>30</sup> has grown by nearly 16,000 jobs in the last five years<sup>31</sup>, the 6<sup>th</sup> largest increase of any state. Advanced manufacturing industry wages are approximately 30 percent<sup>32</sup> above the wages for all industries in Tennessee.

Nearly every in-demand production occupation identified in Tennessee is key to the workforce of TNECD's target industry clusters—including Automotive; Electrical Equipment & Appliances; Food & Agriculture; and Rubber, Ceramics & Glass.

Manufacturers seek assemblers, fabricators, and machine setters, operators, and tenders<sup>33</sup> to successfully develop product. Assemblers and fabricators primarily work in the automotive industry in Tennessee: 22 percent of assemblers and fabricators work in motor vehicle parts manufacturing and 13 percent work in motor vehicle manufacturing.

Assemblers are also necessary for household appliance manufacturing. Tennessee has the second largest household appliance industry in the nation. Tennessee is home to some of the world's most recognized consumer brands, including Monogram Refrigeration, Whirlpool, Thomas & Betts, LG Electronics and Electrolux. Since 2015, household appliance manufacturers made approximately 1,500+ new job commitments in Tennessee.

Welders are needed across the state and offer highly competitive wages to jobseekers. A Tennessee welder's median wage is greater than the median wage for all occupations in every region of the state. Statewide, the median wage for welders is \$40,194; the median wage is greater in some regions, such as in the Greater Memphis LWDA where a welder's median wage is \$48,492<sup>34</sup>. Many of Tennessee's welders work in automotive manufacturing: 10 percent of welders work in the motor vehicle parts manufacturing industry and 7 percent work in the motor vehicle body and trailer manufacturing industry.

### ***Production Workforce and Tennessee's Automotive Sector***

The automotive industry drives substantial production demand in Tennessee. Tennessee is home to approximately 920 automotive suppliers and three original equipment manufacturers (OEM)—Nissan in Smyrna, General Motors in Spring Hill, and Volkswagen in Chattanooga. Nissan's Smyrna location is the most productive automotive plant in North America, producing approximately 640,000 vehicles annually. Tennessee has been *Business Facilities* magazine's top state in automotive manufacturing for five of the last ten years, thanks in large part to our highly trained workforce and their unwavering commitment to

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<sup>29</sup> Tennessee's concentration of production jobs is 43 percent above the national average. Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics (OES), 2019 location quotient

<sup>30</sup> This workforce is not exclusive to production occupations, but rather includes the entire spectrum of occupations within advanced manufacturing.

<sup>31</sup> 2014 through 2019

<sup>32</sup> Figure computed by CERT; Data source is the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

<sup>33</sup> This list of occupations refers to occupations with SOC Codes that begin as 51-2 or 51-4.

<sup>34</sup> TDLWD, Occupational Employment Statistics (OES), 2019

excellence.

Production of the all-new 2021 Nissan Rogue is officially underway at the Nissan Smyrna Vehicle Assembly Plant. “Our U.S. manufacturing team rallied together like never before to overcome unprecedented challenges that could have impacted this moment,” says Steve Marsh, Senior VP of Manufacturing, Supply Chain Management and Purchasing for Nissan North America.<sup>35</sup> Nissan used augmented training because they could not train technicians in person due to COVID shutdowns.

In September 2020, Volkswagen unveiled their new electric SUV, the ID.4.<sup>36</sup> Volkswagen of America was recently awarded a national honor, the Pledge to America’s Workers Presidential Award for the company’s commitment to workforce training and education opportunities at Volkswagen Chattanooga.<sup>37</sup> Scott Keough, president and CEO of Volkswagen Group of America said, “Our graduating apprentices are well-trained, well-prepared and have the proper skills to seize the opportunities that the transition to electric vehicle production is creating.”

Tennessee is within a day’s drive of nine other automotive OEMs. <sup>38</sup> Tennessee boasts automotive operations in 88 of its 95 counties. Transportation equipment is Tennessee’s top export—accounting for 19.2 percent of Tennessee’s total exports. In 2019, 5.1 percent of all U.S. made cars, light trucks, and SUVs were produced in Tennessee. Occupations like assemblers, tool and die, CNC, machinists, welders and first-line supervisors of production and operating workers are key to the automotive industry’s success in Tennessee.

The table below outlines production occupations that have high employer demand in one or more Tennessee regions.

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<sup>35</sup> Nissan, Press Release, September 2020, <https://usa.nissannews.com/en-US/releases/release-4c87516c6645e7dae3d52e6f830d3a0a-us-production-for-all-new-2021-nissan-rogue-starts-in-tennessee>

<sup>36</sup> Volkswagen, Press Release, September 2020, <http://newsroom.vw.com/vehicles/volkswagen-id4-electric-suv-revealed/>

<sup>37</sup> Volkswagen, Press Release, September 2020, <https://media.vw.com/releases/1396>

<sup>38</sup> The regional assemblers are the Ford Motor Company (KY); General Motors (KY; TN), Toyota (MS; KY), Honda (AL), Nissan (TN; MS), Volvo (SC), Kia (GA), Daimler AG (AL; SC), BMW (SC), Hino (WV), and Volkswagen (TN). Plants within an eight-hour drive are General Motors (IN; OH; MO), Toyota (IN), Chrysler (OH), Honda (OH; OH; IN), and Subaru (IN). Although hiring has begun at the new Mazda Toyota plant in Huntsville, AL, production of the first vehicles will begin next year.

Table legend:

- An "X" denotes regions in which the occupation has high employer demand;
- A "\*" denotes the occupation is key to one or more of TNECD's target industry clusters;
- A "#" denotes the occupation is a STEM occupation.

## IN-DEMAND PRODUCTION OCCUPATIONS

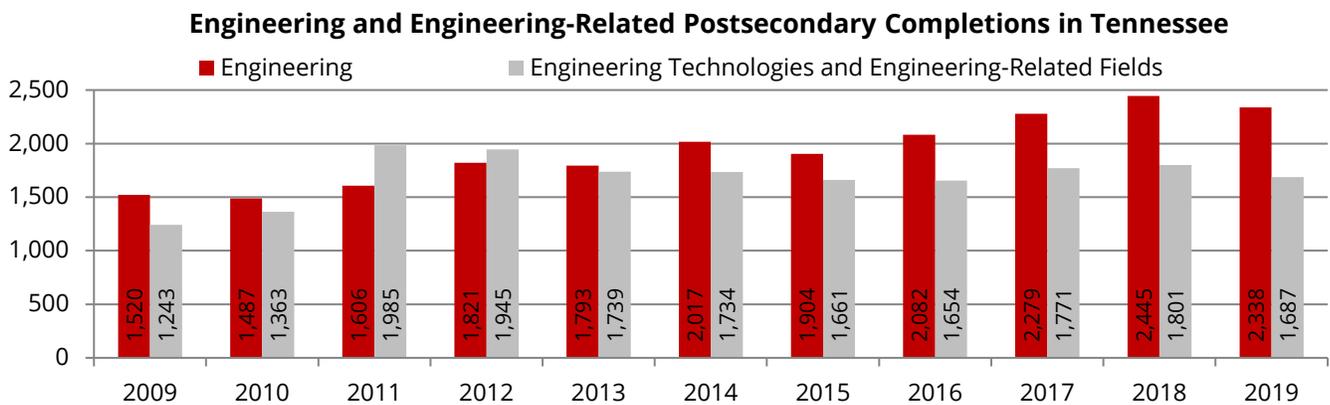
OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper	East	Southeast	Northeast	Number of	Key to Industry Clusters	STEM
51-1011	First-Line Supervisors of Production and Operating Workers				X							1	*	
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	X					X		X			3	*	
51-2041	Structural Metal Fabricators and Fitters								X			1	*	
51-2090	Miscellaneous Assemblers and Fabricators		X		X	X	X	X	X	X	X	8	*	
51-3021	Butchers and Meat Cutters	X			X	X					X	4	*	
51-3092	Food Batchmakers	X								X		2	*	
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic										X	1	*	
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic				X							1	*	
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic										X	1	*	
51-4041	Machinists						X	X		X	X	4	*	
51-4071	Foundry Mold and Coremakers									X		1		
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic									X		1	*	
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic							X				1	*	
51-4121	Welders, Cutters, Solderers, and Brazers	X			X	X	X	X	X		X	7	*	
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders						X		X	X		3	*	
51-4199	Metal Workers and Plastic Workers, All Other			X								1	*	
51-5112	Printing Press Operators						X				X	2		
51-7011	Cabinetmakers and Bench Carpenters								X			1		
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood				X			X				2		
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	X										1		
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	X							X	X		3	*	
51-9032	Cutting and Slicing Machine Setters, Operators, Tenders				X				X			2	*	
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders								X			1	*	
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	X	X				X		X		X	5	*	
51-9111	Packaging and Filling Machine Operators and Tenders	X	X			X	X	X				5	*	
51-9124	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders				X			X				2	*	
51-9161	Computer Numerically Controlled Tool Operators			X					X			2	*	
51-9196	Paper Goods Machine Setters, Operators, and Tenders						X					1		
51-9198	Helpers--Production Workers	X		X		X	X		X	X	X	7	*	

## ENGINEERING AND RELATED OCCUPATIONS

Engineering and engineering-related occupations play an instrumental role in Tennessee’s businesses. Engineers are crucial for product design in aerospace, automotive, defense, electrical equipment, and downstream chemical industries. Engineering technicians are involved in computer facilities management, as well as the manufacturing of aerospace parts, analytical laboratory instruments, and chemical products. The engineering services industry, which depends on engineering and engineering-related occupations, is a key component to TNECD’s headquarters, finance, and tech cluster.

In 2019, Tennessee businesses employed more than 24,900 engineers and more than 14,400 engineering technicians, drafters and mapping technicians. Job growth in these occupation groups continues to rise in Tennessee, with engineers growing by 11% (national avg. is 11%) and engineering technicians, drafters and mapping technicians growing by 6% (national avg. is 1%) over the last five years.

This job growth is fueled by approximately 50 postsecondary institutions in Tennessee that graduated students in these fields of study during the last five years. The top schools producing engineering graduates in Tennessee in 2019 were the University of Tennessee-Knoxville, Tennessee Technological University, Vanderbilt University, University of Tennessee-Chattanooga, the University of Memphis, and Middle Tennessee State University. 13 percent of engineering technologies and engineering-related fields graduates in the last five years were from Pellissippi State Community College. Tennessee postsecondary institutions are graduating **54% more engineers** and **36% more engineering technologies and engineering-related graduates** than they were ten years ago. Future growth will be even further fueled by UT-Martin’s Latimer Engineering & Science Building, scheduled to open in fall 2022.<sup>39</sup>



Source: IPEDS

TDLWD highlighted the growing need for engineering completions in their 2019 STEM report.<sup>40</sup> The STEM occupations with the greatest candidate shortages were electrical engineers and mechanical engineers. The report noted that engineering occupations have some of the highest wages for Tennessee’s STEM jobs.

Engineers are important to numerous industries in Tennessee. Engineers primarily work in the following industries: architectural, engineering, and related services; motor vehicle parts manufacturing; scientific

<sup>39</sup> UT-Martin, Latimer Engineering and Science Building groundbreaking ceremony: <https://www.utm.edu/news/2020/09/14/latimer-science-and-engineering-building-groundbreaking-ceremony-to-be-held-sept-18/>

<sup>40</sup> TDLWD, *The Demand for STEM Occupations in Tennessee*, <https://www.jobs4tn.gov/admin/gsipub/htmlarea/uploads/LMI/Publications/STEMReport2019Updated.pdf>

research and development services; management, scientific, and technical consulting services, motor vehicle manufacturing; among others. Engineering-related occupations, like drafters, engineering and mapping technicians are found in the following industries: architectural, engineering, and related services; motor vehicle parts manufacturing; building equipment contractors; navigational, measuring, electromedical, and control instruments manufacturing; electrical equipment manufacturing; semiconductor and other electronic component manufacturing; rubber product manufacturing; plastic product manufacturing; and machinery, equipment and supplies merchant wholesalers, among others.

### ***Tennessee National Guard's 194th Engineer Brigade***

In addition to industry in Tennessee, engineers support critical governmental functions. In September 2020, approximately 116 soldiers from the Tennessee National Guard's 194<sup>th</sup> Engineer Brigade<sup>41</sup> returned home after a successful deployment to the Middle East. Based out of Jackson, the 194<sup>th</sup> was activated October 2019 and has spent the last 10 months as the U.S. Central Command Theater Engineer Brigade Headquarters, performing functions of a corps level engineering strategic assist. They were responsible for directing the efforts of 3,400 soldiers conducting engineering operations and projects in eight different countries throughout the U.S. Army Central Command area of operations in the Middle East region. They served as an integral part of Operation Inherent Resolve, Operation Spartan Shield and Operation Freedom Sentinel, making this deployment especially historic. With the COVID-19 pandemic peaking during their deployment, daily operations became trickier, but the mission was greatly successful.

The 194<sup>th</sup> Engineer Brigade<sup>42</sup> has 19 units throughout Middle and West Tennessee providing engineer support not only to the military but also to Tennessee State Parks. The 194<sup>th</sup> has two battalions and 4 separate engineer companies and a well drilling detachment that fall under it during peacetime operations. As part of the Tennessee Army National Guard, the 194<sup>th</sup> Engineer Brigade serves a dual purpose. Under state command, the Brigade may be used to provide assistance and support during natural disasters or quell civil disturbances. As a result, the Brigade must train to meet both Federal and State training requirements.

The table below outlines engineering and related occupations that have high employer demand in one or more Tennessee regions.

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<sup>41</sup> Tennessee Department of Military, Press Release, September 2020, <https://www.tn.gov/military/news/2020/9/17/194th-engineer-brigade-returns-from-deployment.html>

<sup>42</sup> Tennessee Department of Military, *194<sup>th</sup> Engineer Brigade*, <https://www.tn.gov/military/who-we-are/army-guard/194th-engineer-brigade.html>

Table legend:

- An "X" denotes regions in which the occupation has high employer demand;
- A "\*" denotes the occupation is key to one or more of TNECD's target industry clusters;
- A "#" denotes the occupation is a STEM occupation.

## IN-DEMAND ENGINEERING AND RELATED OCCUPATIONS

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
<b>Engineering Occupations</b>														
17-2051	Civil Engineers					X			X	X	X	4	*	#
17-2071	Electrical Engineers			X				X				2	*	#
17-2141	Mechanical Engineers			X			X					2	*	#
17-2199	Engineers, All Other			X							X	2	*	#
<b>Engineering-Related Occupations (Drafters, Engineering, and Mapping Technicians)</b>														
17-3023	Electrical and Electronic Engineering Technologists and Technicians				X		X					2	*	#
17-3026	Industrial Engineering Technologists and Technicians		X	X						X		3	*	#
17-3027	Mechanical Engineering Technologists and Technicians						X					1	*	#
17-3098	Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	X	X		X					X	X	5	*	#

## HEALTHCARE OCCUPATIONS

Nationally, employment in healthcare occupations is projected to grow 15 percent from 2019 to 2029—much faster than the average for all occupations.<sup>43</sup> Demand for healthcare will continue to grow due to aging of the baby-boomer generation and an increase in average life expectancy brought on by medical advancements.

Most of Tennessee’s high-demand healthcare jobs are found in local health service industries, such as hospitals, nursing homes, and ambulatory services. Although not included in the healthcare and life sciences industry cluster<sup>44</sup>, the health services industries benefit from the upstream growth of these clusters.

Allied health is a growing need in Tennessee—these are healthcare professionals that do not autonomously practice medicine, nursing, pharmacy, or dentistry. The in-demand occupations listed below primarily fall into this category.

It is important for Tennessee to have a healthcare workforce that can drive innovation, and for Tennessee to support growth of companies that are healthcare-related manufacturers, creating a localized and resilient supply chain for the healthcare industry.

Growing expertise in healthcare fields also supports research and development activity in physical, engineering and life sciences, which encompasses nearly all types of life sciences research except for nanotechnology and biotechnology. Life sciences research includes various branches of medical research, such as genetics, human biology, dental, bacteriological, and veterinary.

Tennessee companies in the healthcare and life sciences sector generate thousands of new jobs each year, as evidenced by TNECD’s project announcements. Aphenia Pharma Solutions<sup>45</sup> in Cookeville announced its expansion in September 2020 to keep up with growing customer demand; their renovated facility will accommodate future growth areas in biologic packaging, cold chain storage, and 3PL distribution services. In August 2020, Engineering Medical Systems in Bartlett announced their expansion—they manufacture surgical instruments, implants and specialty medical devices.<sup>46</sup> In June 2020, TNECD announced that QTC Management<sup>47</sup>, a company that offers a full suite of employment-focused medical exams and diagnostic testing services would establish an operations center in Nashville. QTC’s network is supported by more than 1,700 experienced clinical, corporate and operational associates, over 90 clinic locations, and partnerships with more than 12,000 physicians and allied health professionals. LabConnect announced the relocation of its headquarters and an expansion<sup>48</sup> earlier this year—they plan to expand their Johnson City facility to support growth in cell and gene therapy and immune-oncology studies, while doubling capacity of their biorepository for sample storage and their clinical trial kit building capacity.

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<sup>43</sup> U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook*, Healthcare:

<https://www.bls.gov/ooh/healthcare/home.htm>

<sup>44</sup> The healthcare and life sciences cluster does not include locally-traded healthcare services because medical care providers tend to be equally concentrated in each part of the country and do not compete across regions.

<sup>45</sup> TNECD, Press Release, September 2020, <https://www.tn.gov/ecd/news/2020/9/15/governor-lee--commissioner-rolfe-announce-aphenia-pharma-solutions--llc-to-expand-cookeville-operations.html>

<sup>46</sup> TNECD, Press Release, August 2020, <https://www.tn.gov/ecd/news/2020/8/4/governor-lee--commissioner-rolfe-announce-engineered-medical-systems--llc-to-expand-in-bartlett.html>

<sup>47</sup> TNECD, Press Release, June 2020, <https://tnecd.com/news/governor-lee-commissioner-rolfe-announce-qtc-management-to-establish-operations-in-nashville/>

<sup>48</sup> Trade and Industry Development, *TN: LabConnect Relocates HQ to Johnson City, to Create 200 Jobs*,

<https://www.tradeandindustrydev.com/region/tennessee/news/tn-labconnect-relocates-hq-johnson-city-create-200-17024>

## **Healthcare Mobilization and Trends Related to the COVID-19 Pandemic**

Many of Tennessee's manufacturers were able to pivot quickly to manufacture or use their partnerships to donate PPE since the pandemic began. Radians, a company recruited by TNECD in 2011, donated 14,000 N95 respirator masks to the City of Memphis and Shelby County. Nissan's Smyrna and Decherd machine shops, Eastman Chemical, and Smile Direct Club in Nashville used 3-D printing technology to print face shields. FedEx Logistics donated thousands of face shields to Memphis-area hospitals. Many Tennessee alcohol distilleries produced hand sanitizer. The Carhartt plant in Camden shifted to mask and gown production. Volkswagen of North America in Chattanooga donated thousands of FDA-approved masks and gowns to New York, created by their fabrics supplier, Faurecia, at its facility in Mexico. GM's assembly plant in Spring Hill donated \$65,000 to the Maury County Chamber and Economic Alliance to support the Maury County Small Business Stabilization Fund. Although this is not an exhaustive list, of Tennessee's companies that donated PPE, it does show that the Volunteer spirit is alive in our state. Through private sector partnerships, donations from businesses, and the State of Tennessee's Unified Command Group's efforts to procure PPE, over 1.4 million items were distributed to Tennessee's healthcare workers and medical personnel on the front lines of COVID-19 in all 95 of Tennessee's counties.

The Tennessee Chamber of Commerce and Industry and the Tennessee Manufacturers Association partnered together to create the TN Creators Respond<sup>49</sup> program, working with businesses to develop non-traditional supply chains in response to the pandemic. They launched the PPE Shop, which supports workforce development and training initiatives.

The healthcare industry may experience changes due to the COVID-19 pandemic. COVID-19 exposed weaknesses in the United States healthcare system<sup>50</sup>, and the healthcare industry experienced many challenges due to the pandemic such as national shortages of testing supplies and PPE and difficulty maintaining adequate staffing. McKinsey identified four changes that could disrupt the healthcare industry in the future<sup>51</sup>: modernized transaction and data infrastructure; radically more efficient medical supply chain; faster, more effective therapy development; and new, personalized, and intuitive healthcare ecosystems.

It may seem counterintuitive, but throughout the United States many hospitals furloughed or laid off employees and reduced the pay of leadership during the COVID-19 pandemic. Many hospitals make significant revenue from elective procedures like non-emergency surgeries, which were postponed until after April 30<sup>th</sup> in Tennessee.

In response to the COVID-19 pandemic, BlueCross BlueShield of Tennessee announced it was making in-network telehealth services permanent.<sup>52</sup> The change will include covering telephone and video visits with primary care providers; specialists; behavioral health

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<sup>49</sup> Tennessee Chamber of Commerce & Industry, *TN Creators Respond*, <https://www.tnchamber.org/responds>

<sup>50</sup> U.S. Department of Health and Human Services, Office of Inspector General, *Hospital Experiences Responding to the COVID-19 Pandemic*, April 2020, <https://oig.hhs.gov/oei/reports/oei-06-20-00300.pdf>

<sup>51</sup> McKinsey, *The era of exponential improvement in healthcare?*, <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/the-era-of-exponential-improvement-in-healthcare>

<sup>52</sup> BlueCross BlueShield, Press Release, May 2020, <https://bcbstnews.com/pressreleases/bluecross-making-in-network-telehealth-services-permanent/>

providers; occupational, physical and speech therapy; and ABA therapy services. Telehealth services are being offered 24 hours a day, 7 days a week—including nights, weekends and holidays. McKinsey performed a claims-based analysis that suggests telehealth could shift 20 percent of all emergency room visits to virtual urgent care offerings.<sup>53</sup>

The table below outlines healthcare occupations that have high employer demand in one or more Tennessee regions.

Table legend:

- An “X” denotes regions in which the occupation has high employer demand;
- A “\*” denotes the occupation is key to one or more of TNECD’s target industry clusters;
- A “#” denotes the occupation is a STEM occupation.

## IN-DEMAND HEALTHCARE OCCUPATIONS

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
<b>Healthcare Practitioners and Technical Occupations</b>														
29-1122	Occupational Therapists				X			X				2		
29-1123	Physical Therapists			X								1		
29-1127	Speech-Language Pathologists				X							1		
29-2010	Clinical Laboratory Technologists and Technicians									X		1		
29-2032	Diagnostic Medical Sonographers		X									1		
29-2052	Pharmacy Technicians				X	X					X	3		
29-2055	Surgical Technologists		X									1		
29-2056	Veterinary Technologists and Technicians									X		1		
29-9098	Health Information Technologists, Medical Registrars, Surgical Assistants, and Healthcare Practitioners and Technical Workers, All Other				X						X	2		
<b>Healthcare Support Occupations</b>														
31-2011	Occupational Therapy Assistants							X		X	X	3		
31-2021	Physical Therapist Assistants	X	X	X	X	X	X	X	X	X	X	10		
31-9011	Massage Therapists	X				X			X	X		4		
31-9091	Dental Assistants	X				X	X	X			X	5		
31-9092	Medical Assistants	X			X	X	X	X		X		6		
31-9094	Medical Transcriptionists								X			1		
31-9095	Pharmacy Aides									X		1		
31-9097	Phlebotomists	X	X			X		X	X	X	X	7		
31-9099	Healthcare Support Workers, All Other		X								X	2		

<sup>53</sup> McKinsey, *Telehealth: A quarter-trillion-dollar post-COVID-19 reality?*, <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality#>

## BUSINESS AND FINANCIAL OPERATIONS OCCUPATIONS

Over 166,800 Tennesseans work in the Headquarters, Finance, and Tech industry cluster. There are 10 Fortune500 companies in Tennessee: FedEx, HCA Healthcare, Dollar General, International Paper, Community Health Systems, Unum Group, AutoZone, Delek US Holdings, Eastman Chemical, and Tractor Supply.<sup>54</sup>

Tennessee's headquarters, finance, and tech industry cluster has experienced remarkable growth recently. Job growth over the last five years in this cluster is double the national average. Tennessee has experienced 32 percent job growth in the headquarters, finance, and tech industry cluster from 2014 to 2019 (national avg. is 15 percent).

Management, scientific and technical consulting services, an industry in the headquarters, finance and tech cluster, grew by 103 percent in the last five years. This industry includes companies like Parallon Business Solutions, Ernst & Young, DayNine Consulting, JumpCrew, Accenture, Primeritus Financial Services, Empyrean Benefit Solutions, and Mobile Mentor.

Another industry in headquarters, finance, and tech industry cluster that has seen incredible growth and momentum is the management of companies and enterprises, commonly also known as headquarters<sup>55</sup>. Average annual wages in this industry is \$101,972. Management of companies and enterprises commonly employ managers and supervisors, business operations specialists, customer service representatives, and accountants and auditors.

In-demand occupations for business and financial operations are found across Tennessee. Human resources specialists, training specialists, accountants, and auditors are necessary for business success. Market research analysts and marketing specialists are important to manufacturing product design and advertising. Project management specialists and business operations specialists are strongly concentrated in the headquarters, financial and tech companies, especially those specializing in consulting.

The table below outlines business and financial operations occupations that have high employer demand in one or more Tennessee regions.

### Table legend:

- An "X" denotes regions in which the occupation has high employer demand;
- A "\*" denotes the occupation is key to one or more of TNECD's target industry clusters;
- A "#" denotes the occupation is a STEM occupation.

## IN-DEMAND BUSINESS AND FINANCIAL OPERATIONS OCCUPATIONS

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
13-1020	Buyers and Purchasing Agents		X			X	X		X	X		5	*	
13-1031	Claims Adjusters, Examiners, and Investigators		X									1		

<sup>54</sup> Fortune500, 2020: <https://fortune.com/fortune500/2020/search/?hqstate=TN>

<sup>55</sup> Area Development, *Tennessee Keeps Attracting Headquarters Operations, 2019 Q3*, <https://www.areadevelopment.com/ContributedContent/Q3-2019/tennessee-keeps-attracting-headquarters-operations.shtml>

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
13-1051	Cost Estimators	X	X	X	X	X	X	X	X	X		9		
13-1071	Human Resources Specialists	X	X			X	X		X	X	X	7	*	
13-1081	Logisticians					X				X		2	*	
13-1111	Management Analysts	X	X		X		X	X	X		X	7		
13-1121	Meeting, Convention, and Event Planners	X				X			X			3	*	
13-1141	Compensation, Benefits, and Job Analysis Specialists	X	X			X				X		4	*	
13-1151	Training and Development Specialists	X	X			X						3	*	
13-1161	Market Research Analysts and Marketing Specialists	X	X		X	X					X	5	*	
13-1198	Project Management Specialists and Business Operations Specialists, All Other		X	X	X		X	X			X	6	*	
13-2011	Accountants and Auditors		X		X		X	X	X	X	X	7	*	
13-2052	Personal Financial Advisors	X	X			X			X	X	X	6		
13-2072	Loan Officers		X									1	*	
13-2082	Tax Preparers						X		X	X	X	4	*	

## TRANSPORTATION AND MATERIAL MOVING OCCUPATIONS

Tennessee is a leading state in distribution and logistics. Tennessee's geographic location is central to a large consumer base in the Southeastern United States and offers immediate access to eight interstate highways reaching 60 percent of the U.S. population within an 11-hour drive. The state has six Class I railroads, four commercial airports and more than 1,000 miles of navigable waterways. Tennessee also boasts the busiest cargo airport in the Western hemisphere—the Fedex World Hub in Memphis, which covers over 880 acres and is the largest sorting facility in the world.

These are among the characteristics of Tennessee that attract companies which rely on transportation and material moving positions. From January 2015 through July 2020, the transportation and distribution industry cluster has located \$3.4 billion in new capital investment and more than 15,200 new jobs in Tennessee. Among the companies bringing new jobs to the state are Amazon.com, Academy Sports + Outdoor, Arrive Logistics, DHL, FedEx Logistics, GAP, Lowe's, and Ryder Integrated Logistics.

Transportation and material moving occupations are and likely will continue to be in high demand across Tennessee. This occupation group is evolving quickly, and the long-term roles and skills sets are deepening. Supervisory roles are likely becoming more complex because of the fast-paced evolution of workplace dynamics for transportation and logistics workers. Supervisors of transportation and material moving workers are in-demand in several regions throughout the state. Today's logistics companies require workers with technological expertise and other advanced skill sets. Logistics operations may eventually require more workers with the ability to create or manage automated processes.

Technological advancements have had substantial and irreversible impacts on the logistics workforce. According to Matthias Heutger<sup>56</sup>, Senior VP of Global Head of Innovation & Commercial Development at DHL, "The next big challenge will be future proofing the logistics workforce through training and upskilling in increasingly technologically sophisticated operations. This will take center stage on the strategic agendas of supply chain organizations in the years to come."

Technology trends with the highest impact in the next five years, according to DHL's Logistics Trends Radar<sup>57</sup> include: big data analytics, internet of things, cloud & APIs, robotics & automation, and artificial intelligence. Trends likely to emerge between 5 and 10 years from now include: self-driving vehicles, 3D printing, unmanned aerial vehicles, blockchain, quantum computing.

The continued success of logistics companies in Tennessee will depend on adapting to new technologies to upskill the workforce, as well as increasing STEM skillsets to meet business demand of the future.

### ***Distribution & Logistics and the COVID-19 Pandemic***

The COVID-19 pandemic exposed supply chain weaknesses in the nation. Most notably, products like food and medicine, and hygiene products like toilet paper, masks, and hand sanitizer have been sought after in higher quantities by consumers. At the same time that many businesses have had supply chain disruptions, e-commerce demand has also drastically

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<sup>56</sup> Automotive World, *Artificial Intelligence, robotics, quantum computing, sustainability & global volatility*, September 2020, <https://www.automotiveworld.com/news-releases/artificial-intelligence-robotics-quantum-computing-sustainability-global-volatility-dhl-logistics-trend-radar-unveils-trends-that-will-shape-logistics-in-the-future/>

<sup>57</sup> DHL, *Logistics Trends Radar*, <https://www.dhl.com/global-en/home/insights-and-innovation/insights/logistics-trend-radar.html>

increased.

The food industry had to adapt quickly to changes in consumer behavior because people were eating out less from restaurants but shopping more at grocery stores and farmers markets, and even purchasing directly from local farms. Although the Tennessee Department of Agriculture<sup>58</sup> saw no evidence of agricultural shortages in Tennessee, they have been monitoring closely the supply chain impacts on the national level since the onset of the pandemic.

The U.S. Census Bureau began conducting a weekly Small Business Pulse Survey<sup>59</sup> at the beginning of the Pandemic. As of the collection week 9/6 to 9/12, over 36 percent of Tennessee small businesses were still having difficulties with domestic supplier delays—this was about 8 percent above the national average. Over 6 percent of Tennessee small businesses were also having difficulties locating alternative foreign suppliers. About 21 percent of Tennessee small businesses that were surveyed were also having delays in delivery and shipping to customers.

According to the University of Tennessee Global Supply Chain Institute's recent white paper titled *EPIC Global Supply Chain Risk Assessment*<sup>60</sup>, "Many companies are rethinking their supply chains as a result of this [new pressure on last-mile supply chains from e-commerce] and are storing inventory at locations closer to their customers, using contractors or crowd-sourced delivery models, or having their retail outlets pull double duty as distribution centers. These strategies can help meet demands for same-day and next-day delivery but must be balanced against higher operational and inventory holding costs."

Just-in-time manufacturing practices in local supply chains have caused some difficulties during the pandemic, and it is possible that Tennessee manufacturers could alter their supply chain management going forward, especially for more complex products that rely on a few key suppliers. Instability in lengthy global supply chains may encourage more reshoring of operations to the United States and Tennessee.

The table below outlines transportation and material moving occupations that have high employer demand in one or more Tennessee regions.

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<sup>58</sup> Tennessee Department of Agriculture, Press Release, April 2020, <https://www.tn.gov/agriculture/news/2020/4/15/agriculture-commissioner---the-food-supply-chain-remains-strong-in-tennessee.html>

<sup>59</sup> U.S. Census Bureau, *Small Business Pulse Survey: Tracking Changes During the Coronavirus Pandemic*, <https://www.census.gov/data/experimental-data-products/small-business-pulse-survey.html>

<sup>60</sup> University of Tennessee, Haslam College of Business, Global Supply Chain Institute, April 2020: <https://haslam.utk.edu/whitepapers/global-supply-chain-institute/epic-global-supply-chain-risk-assessment>

Table legend:

- An "X" denotes regions in which the occupation has high employer demand;
- A "\*" denotes the occupation is key to one or more of TNECD's target industry clusters;
- A "#" denotes the occupation is a STEM occupation.

## IN-DEMAND TRANSPORTATION AND MATERIAL MOVING OCCUPATIONS

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	X		X		X			X	X	X	6	*	
53-3031	Driver/Sales Workers		X	X	X		X	X				5	*	
53-3032	Heavy and Tractor-Trailer Truck Drivers	X	X	X	X	X	X	X	X	X	X	10	*	
53-3033	Light Truck Drivers			X			X	X	X	X	X	6	*	
53-3052	Bus Drivers, Transit and Intercity	X							X			2		
53-6031	Automotive and Watercraft Service Attendants				X			X				2		
53-7011	Conveyor Operators and Tenders			X								1	*	
53-7051	Industrial Truck and Tractor Operators	X	X	X		X	X	X	X	X	X	9	*	
53-7061	Cleaners of Vehicles and Equipment						X					1	*	
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	X			X				X	X	X	5	*	
53-7063	Machine Feeders and Offbearers									X		1	*	
53-7064	Packers and Packagers, Hand						X					1	*	
53-7081	Refuse and Recyclable Material Collectors				X							1		

## METHODOLOGY

To measure jobs with high employer demand, CERT analyzed postings, openings, and hires for an occupation relative to total number of individuals employed in the occupation. Occupations which meet at least two of these three requirements are identified to have high employer demand:

- The ratio of job postings (2019) to the number of individuals employed in an occupation is greater than or equal to the median ratio for all occupations in the region.
- The ratio of hires (2019) to the number of individuals employed in an occupation is greater than or equal to the median ratio for all occupations in the region.
- The ratio of projected annual job openings from 2016 to 2026 for the LWDAs (or 2018 to 2028 for the State) to employment for an occupation is greater than or equal to the median ratio for all occupations in the region.

To encourage job creation and skill development in high-quality jobs, occupations must meet a minimum wage threshold. All occupations identified as in-demand have a median wage which is at least 80 percent of the median wage for the region. Additionally, to prevent reporting positions with very low employment levels as in-demand, occupations must meet a minimum employment threshold of 0.04 percent of the region's total employment.

### **PARTNERSHIP:**

To write this report, the Center for Economic Research in Tennessee (CERT) partnered with the Tennessee Higher Education Commission (THEC) and the Tennessee Department of Labor & Workforce Development (TDLWD), in order to align the state agencies' evaluations of employer demand. The methodology, sources and perspective included in this report are the result of this cross-agency collaboration.

THEC and TDLWD annually release an *Academic Supply and Occupational Demand Report* in January, which will incorporate and build upon the findings of this study.

### **DATA DEFINITIONS AND SOURCES:**

Unique Job Postings: Unique job postings denotes the number of de-duplicated job advertisements listed by companies on online career sites or job boards. De-duplication is a process used to count a job posting only once even if there are listings of the same job on multiple career websites or online jobs boards.

TDLWD's Advertised Job Data can be found at [www.Jobs4TN.gov](http://www.Jobs4TN.gov) by following the path: Labor Market Information > LMI Home > Data Trends > Advertised Job Data > Jobs Data by Occupations > Job Postings by Occupations.

Projected Annual Openings: A projected annual opening is the average annual employment change over ten years from TDLWD's Long-Term Occupational Projections.

The Local Workforce Development Areas (LWDAs) use the 2016 to 2026 Projected Openings, and the Statewide uses the 2018 to 2028 Projected Openings. This is based on availability of the data, as the 2018 to 2028 data is not yet available for the LWDAs at the time of analysis for this report. The Tennessee Department of Labor & Workforce Development's Long-Term Occupational Projections can be found at [www.Jobs4TN.gov](http://www.Jobs4TN.gov)

by following the path: Labor Market Information > LMI Home > Data Trends > Employment and Wage Data > Occupation Data > Occupation Employment and Projections (Long-Term).

*Hires*: A hire is reported by the Census Bureau's Quarterly Workforce Indicators (QWI) when an individual's Social Security number appears on a company's payroll and was not there the quarter before. The QWI program produces a comprehensive tabulation of employment and wage information at the industry-level for workers covered by state unemployment insurance laws.

The hires data in this report is sourced from Economic Modeling Specialists, Intl. (EMSI). EMSI<sup>61</sup> uses the U.S. Census Bureau's QWI industry data in combination with occupation growth and occupation replacement needs from the U.S. Bureau of Labor Statistics to create a model hires figure for each occupation.

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<sup>61</sup> To learn more about EMSI's methodology for hires visit: <https://www.economicmodeling.com/2019/11/14/introducing-new-methodology-for-emsi-hires-data/>.

## **APPENDIX A: WORKFORCE PROGRAMS**

The following workforce programs are available in Tennessee to support the alignment of labor and education.

### **Achieving the Dream**

Achieving the Dream (ATD) is a national nonprofit organization with a growing network of 277 community and technical colleges committed to helping their students, particularly low-income students and students of color, achieve their goals for academic success, personal growth and economic opportunity. ATD helps colleges close equity gaps and accelerate student success through a change process to strengthen such key institutional capacities as teaching and learning, engagement and communication, leadership and vision, data and technology, and others.

Colleges work intensively in Achieving the Dream for three years, establishing ATD teams on their campuses who work closely with a leadership coach and a data coach assigned to them to help them set and achieve goals related to student success. In addition to the coaches, many of whom are retired college presidents, ATD provides a platform for scaling up evidence-based effective practices and policies, a set of peers to share knowledge, and other expert sources of innovation.

ALL 13 Tennessee Community Colleges joined Achieving the Dream between 2015 and 2019. With the addition of the Tennessee Colleges of Applied Technology in fall 2020, ALL 40 community and technical colleges in the College System and the almost 200 satellite campuses are part of the ATD Network, making Tennessee one of only a few statewide systems whose entire membership is in ATD.

### **Apprenticeship TN**

Housed in the Tennessee Department of Labor and Workforce Development, Apprenticeship TN is designed to increase the use of apprenticeship and pre-apprenticeship programs as a dependable workforce strategy for companies located in Tennessee. The program works closely with Tennessee Community and Technical Colleges and is focused on expansion and creation of traditional and non-traditional occupations, as well as increasing the diversity of the participants. As of September 2020, Tennessee boasts 5,761 current apprentices with 2,117 of them being new in 2019. There are currently 360 active apprenticeship programs, with 19 of them being newly developed in 2019.

### **Correctional Education Initiative**

Stemming from an investment from Governor Bill Lee, the Tennessee Department of Corrections has partnered with the Tennessee Board of Regents college system to create a statewide Correctional Education Initiative. This program provides post-secondary education to convicts in 9 of the 10 state prisons in Tennessee. Programs include Computer Information Technology, Building Construction Trades, Farming Operations Technology, and Welding, with the opportunity for further education upon enrollment in an institution after re-entry. Students are also able to complete relevant certifications, such as NCCER certification in Building Construction Trade or a diploma in welding. In January 2021, seven additional technical programs and five additional community college programs will be added to the Correctional Education Initiative to complete the vision of high-quality education and choice within each state prison facility.

As a secondary scope of this initiative, some schools have expanded their Correctional Officer Training Programs to allow Tennessee Department of Corrections staff to seek additional education to advance their careers.

### **Future Workforce Initiative**

A signature program of the Lee Administration, this \$4 million investment is designed to increase access to career and technical education for K-12 students, with a special emphasis on STEM training. The Future Workforce Initiative aims to put Tennessee in the top 25 states for job creation in the technology sector by 2022 through three areas of emphasis including:

- Launching new CTE programs focused in STEM fields with 100 new middle school programs and tripling the number of STEM-designated public schools by 2022.
- Growing the number of teachers qualified to teach work-based learning and advanced computer science courses through STEM teacher training and implementation of K-8 computer science standards.
- Expanding postsecondary STEM opportunities in high school through increased access to dual credit, AP courses and dual enrollment.

Twenty-two schools received the Tennessee STEM School Designation for 2020 and will receive \$10,000 grants.

### **Governor's Investment in Vocational Education**

Under Governor Lee's vision for enhancing technical skills, the Governor's Investment in Vocational Education (GIVE) initiative was created to further connect education with industry skill requirements to address workforce gaps across Tennessee.

A total investment of \$25 million was distributed among 28 grantees to facilitate the development and implementation of employer-driven career pathways connecting K12 to higher education and workforce. Distressed and at-risk communities, as defined by the Appalachian Regional Council, were given an advantage in the grant review process to ensure that these traditionally underserved communities were represented. Project implementation began in Spring 2020.

The GIVE initiative also created the GIVE Dual Enrollment Grants which provide eligible high school students up to four tuition-free dual enrollment courses at Tennessee community and technical colleges. This program encourages high school students to participate in high-needs courses, as defined by the Tennessee Student Assistance Corporation, providing the opportunity to explore in-demand training and expedite their time to degree through completion of coursework.

### **Middle College Mechatronics**

The Middle College Mechatronics (MCM) Consortium comprises 5 community colleges that offer high school students in their region the opportunity to earn the associate of applied science degree in mechatronics. With special funding provided through the state budget, the MCM Consortium colleges have served 240 students at 34 high schools in 15 public school districts. Students in the 2020 academic year cohort have earned 191 mechatronics credentials with an average 3.069 college GPA. Some of the industry certifications earned by

MCM students include Siemens I/II, FANUC, OSHA 10/30, and the Mechatronics Certificate. Students graduating from this program have zero debt and are highly sought-after candidates for high-demand, high wage career positions.

### **Seamless Alignment & Integrated Learning Support**

The Seamless Alignment and Integrated Learning Support (SAILS) program targets students that have not achieved college readiness benchmarks by introducing the college developmental curriculum into the high school senior year. Developed by K-12 teachers and higher education faculty, SAILS embeds the Tennessee Board of Regents (TBR) Learning Support competencies into the high school senior year math course, allowing students to begin their higher education career prepared for credit bearing coursework. To date, SAILS has allowed over 66,000 students to begin their postsecondary education without the need for learning support, starting students on a pathway to success. The SAILS program is now accepted at all 40 TBR institutions, several Tennessee state universities, and many other private and out-of-state institutions in Alabama, Kentucky, Virginia, West Virginia, and Kansas.

### **SkillsUSA**

SkillsUSA Tennessee Postsecondary is housed in the Tennessee Board of Regents. SkillsUSA is a partnership of students, teachers and industry working together to ensure Tennessee has a skilled workforce. SkillsUSA serves students preparing for careers in trade, technical and skilled service, including health occupations. Tennessee currently serves as a model for the country by creating and hosting Virtual Interview contests and Virtual Meet the Employer events. In Tennessee, the program is adapting to the needs of students and industry by creating virtual opportunities to network with industry partners. This allows students to showcase their skills to employers which leads to their career success.

### **Supporting Postsecondary Access in Rural Counties**

Supporting Postsecondary Access in Rural Counties (SPARC) is a targeted initiative for high school and adult learner populations with a specific focus on Career & Technical Education (CTE). This initiative addresses the associated education and workforce factors that designated them as economically distressed by engaging local constituencies and education stakeholders to bridge three identified obstacles: infrastructure need, geographic access to higher education, and unmet need for additional CTE Dual Enrollment opportunities.

Utilizing the economic indicators of the Appalachian Regional Commission (ARC), the Tennessee Higher Education Commission identified a cohort of 15 distressed counties which received individual grants of \$75,000 and 24 at-risk counties that received individual grants of \$36,000 to purchase CTE equipment and/or development of dual enrollment programs. These contracts are currently active and will close April 2021.

### **Tennessee Broadband Accessibility**

Housed in the Tennessee Department of Economic and Community Development, The Broadband Accessibility Grant Program is a critical part of Tennessee's plan to address broadband gaps. The program is designed to offset the capital expenses in the deployment of broadband in unserved areas. The goal is to facilitate broadband access to all Tennesseans while promoting practices that increase deployment and encourage adoption. Funds are targeted to areas that are unlikely to receive broadband service without grant funding. To date, the program has awarded grants to serve over 65,000 Tennesseans and was recently

recognized in research by the Pew Charitable Trusts as a best practice for states investing in broadband. The grantees for the current round of funding will be announced in March 2021.

### **Tennessee Pathways**

Tennessee Pathways is the K-12 initiative created to support regional and local led approaches to address gaps in job skills. The program is structured around high-quality college and career advisement throughout K-12, rigorous early postsecondary and work-based learning opportunities in high school, and seamless vertical alignment between secondary and postsecondary programs, as well as career opportunities as a result of effective partnerships among school districts, higher education institutions, employers, and community organizations. Students, with their certificate, degree or credential, can transition seamlessly into the workforce and contribute to the success of Tennessee's economy.

### **Tennessee Pathways Certifications**

Beginning in the spring of 2019, schools were provided the opportunity to apply for the Tennessee Pathways Certification, designed to identify strong alignment between high school programs of study, postsecondary partners, and high-quality employment opportunities. Through the certification process, schools qualify for statewide recognition and additional grants to support their programs. This recognition program ensures students, families, and the community know high-quality pathways exist for students to transition seamlessly from K-12 education into higher education and high-quality employment. In the inaugural year, 122 pathways at 74 high schools across the state earned the recognition.

### **Tennessee Promise**

Tennessee Promise provides high school students two years of tuition-free community or technical college for up to five semesters. In addition to removing the financial barrier, the program also provides students with a volunteer mentor to help guide them through the college application process. In return, the student must attend mandatory meetings, meet critical deadlines, complete eight hours of community service each semester, and maintain a 2.0 GPA throughout their tenure.

### **Tennessee Reconnect**

Tennessee Reconnect utilizes Tennessee Reconnect Communities to focus on and serve the 900,000 to 1,000,000 adults who have completed some college but have not obtained a post-secondary degree, certificate or credential. As of fall 2018, all Tennessee residents can earn a diploma or certificate at any of the 40 Tennessee Community Colleges or Colleges of Applied Technology (TCATs) completely free of tuition and fees. There are also opportunities to attend select programs at 4-year universities.

### **The Rural Initiative Funding Opportunity Announcement (RIFOA)**

Housed in the Tennessee Department of Labor and Workforce Development, this program is a \$3 million investment available to local workforce development boards to support workforce expansion efforts in the targeted counties. The state's 15 distressed counties will split \$2.1 million of the \$3 million in grant money, with the remaining \$900,000 divided among 23 counties deemed at-risk by the state.

## **UT Promise**

UT Promise is a new undergraduate scholarship program guaranteeing free tuition and mandatory fees for qualifying Tennessee residents attending UT's campuses in Knoxville, Chattanooga, Martin and Memphis. UT Promise is a student-success oriented scholarship program that requires students to complete volunteer service hours and meet with a volunteer mentor each semester to ensure a successful student experience.

Launching in fall 2020, this innovative scholarship will cover a student's last-dollar amount of tuition and mandatory fees after other financial aid is applied (such as Pell grants, HOPE Scholarship or other institutional scholarships) to students who qualify for HOPE and whose family household income is under \$50,000 a year.

## **Veterans and Military Support**

The Military Transition Team is part of the Governor's Tennessee Workforce Development System inter-agency task force. This team's mission is to improve pathway processes for veterans transitioning into civilian workforce, higher education, enrollment, or an apprenticeship program. One of the jointly developed communication and advising structures is the Servicemembers Opportunity Portal (SOP), which is a tool offering separating servicemen and women a Prior Learning Assessment (PLA) mechanism to award college credit for previous military training.

Pursuant to the 2014 Tennessee Veterans Education Transition Support (VETS) Act, the VETS Campus Designation establishes a program of recognition for higher education institutions which allocate resources for veterans' successful transition from military service to college enrollment. An institution receiving VETS Campus Certification prioritizes outreach to veterans and successfully delivers the services necessary to create a supportive environment where student veterans can prosper while pursuing their education. Currently, 9 TBR colleges have earned this distinction with a goal to become a VETS Certified 'System.'

## **Work-Based Learning**

Housed in the Tennessee Department of Education, Work-Based Learning (WBL) is a proactive approach to bridging the gap between high school and high-demand, high-skill careers in Tennessee. Students build on classroom-based instruction to develop employability skills that prepare them for success in postsecondary education and future careers. Through experiences like internships, apprenticeships, and paid work experience, juniors and seniors (16 years or older) may earn high school credit for capstone WBL experiences.

## APPENDIX B: OCCUPATIONS WITH HIGH EMPLOYER DEMAND

The table below outlines all occupations which have high employer demand in one or more of Tennessee's regions.

In the table, an "X" denotes high demand for an occupation in each region of Tennessee. The total number of regions is denoted with a number 1 through 10 in the column named "Number of Regions". A "\*" denotes if the occupation is key to one or more of TNECD's industry clusters. A "#" denotes if the occupation is a STEM occupation.

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
<b>Management Occupations</b>														
11-1021	General and Operations Managers										X	1	*	
11-2021	Marketing Managers		X									1	*	
11-2022	Sales Managers		X	X		X	X	X	X	X		7	*	
11-3031	Financial Managers		X									1	*	
11-3061	Purchasing Managers					X			X	X		3	*	
11-3071	Transportation, Storage, and Distribution Managers			X			X			X	X	4	*	
11-3121	Human Resources Managers				X			X		X		3	*	
11-3131	Training and Development Managers					X						1	*	
11-9021	Construction Managers	X		X			X	X	X	X		6		
11-9033	Education Administrators, Postsecondary					X	X			X		3		
11-9041	Architectural and Engineering Managers						X					1	*	#
11-9051	Food Service Managers	X	X	X	X	X	X	X	X	X	X	10		
11-9081	Lodging Managers	X								X		2		
11-9111	Medical and Health Services Managers	X	X	X			X					4	*	
11-9141	Property, Real Estate, and Community Association Managers	X	X		X	X		X	X	X	X	8		
11-9151	Social and Community Service Managers			X						X		2		
<b>Business and Financial Operations Occupations</b>														
13-1020	Buyers and Purchasing Agents		X			X	X		X	X		5	*	
13-1031	Claims Adjusters, Examiners, and Investigators		X									1		
13-1051	Cost Estimators	X	X	X	X	X	X	X	X	X		9		
13-1071	Human Resources Specialists	X	X			X	X		X	X	X	7	*	
13-1081	Logisticians					X				X		2	*	
13-1111	Management Analysts	X	X		X		X	X	X		X	7	*	
13-1121	Meeting, Convention, and Event Planners	X				X			X			3		
13-1141	Compensation, Benefits, and Job Analysis Specialists	X	X			X				X		4	*	
13-1151	Training and Development Specialists	X	X			X						3	*	
13-1161	Market Research Analysts and Marketing Specialists	X	X		X	X					X	5	*	
13-1198	Project Management Specialists and Business Operations Specialists, All Other		X	X	X		X	X			X	6	*	
13-2011	Accountants and Auditors		X		X		X	X	X	X	X	7	*	
13-2052	Personal Financial Advisors	X	X			X			X	X	X	6		
13-2072	Loan Officers		X									1	*	
13-2082	Tax Preparers						X		X	X	X	4	*	
<b>Computer and Mathematical Occupations</b>														
15-1212	Information Security Analysts									X		1	*	#

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
15-1232	Computer User Support Specialists		X	X	X			X			X	5	*	#
15-1244	Network and Computer Systems Administrators							X				1	*	#
15-1251	Computer Programmers		X						X	X		3	*	#
15-1256	Software Developers and Software Quality Assurance Analysts and Testers	X	X		X	X		X		X	X	7	*	#
15-1257	Web Developers and Digital Interface Designers		X							X		2	*	#
15-1299	Computer Occupations, All Other				X							1	*	#
15-2031	Operations Research Analysts	X				X						2	*	#
<b>Architecture and Engineering Occupations</b>														
17-2051	Civil Engineers					X			X	X	X	4	*	#
17-2071	Electrical Engineers			X				X				2	*	#
17-2141	Mechanical Engineers			X			X					2	*	#
17-2199	Engineers, All Other			X							X	2	*	#
17-3023	Electrical and Electronic Engineering Technologists and Technicians				X		X					2	*	#
17-3026	Industrial Engineering Technologists and Technicians		X	X						X		3	*	#
17-3027	Mechanical Engineering Technologists and Technicians						X					1	*	#
17-3098	Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	X	X		X					X	X	5	*	#
<b>Life, Physical, and Social Science Occupations</b>														
19-1042	Medical Scientists, Except Epidemiologists	X										1	*	#
19-3031	Clinical, Counseling, and School Psychologists	X										1		
19-4021	Biological Technicians	X										1	*	#
19-4031	Chemical Technicians								X			1	*	#
<b>Community and Social Service Occupations</b>														
21-1012	Educational, Guidance, and Career Counselors and Advisors	X	X							X		3		
21-1013	Marriage and Family Therapists								X			1		
21-1018	Substance Abuse, Behavioral Disorder, and Mental Health Counselors	X	X			X	X	X	X	X	X	8		
21-1022	Healthcare Social Workers			X			X					2		
21-1023	Mental Health and Substance Abuse Social Workers	X			X						X	3		
21-1093	Social and Human Service Assistants	X	X		X	X		X	X	X	X	8		
21-1099	Community and Social Service Specialists, All Other							X	X			2		
23-2011	Paralegals and Legal Assistants						X				X	2	*	
<b>Education Instruction and Library Occupations</b>														
25-1011	Business Teachers, Postsecondary									X		1		
25-2011	Preschool Teachers, Except Special Education		X						X		X	3		
25-3021	Self-Enrichment Teachers	X	X			X		X	X		X	6		
25-3097	Tutors and Teachers and Instructors, All Other	X	X			X	X	X	X	X		7		
<b>Arts, Design, Entertainment, Sports, and Media Occupations</b>														
27-1024	Graphic Designers	X		X		X			X			4	*	
27-1026	Merchandise Displayers and Window Trimmers						X			X		2	*	
27-2012	Producers and Directors	X				X			X			3		
27-2022	Coaches and Scouts	X				X	X			X	X	5		
27-3031	Public Relations Specialists	X	X			X			X			4	*	

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
27-3043	Writers and Authors									X		1		
27-4011	Audio and Video Technicians	X				X						2		
<b>Healthcare Practitioners and Technical Occupations</b>														
29-1122	Occupational Therapists				X			X				2		
29-1123	Physical Therapists			X								1		
29-1127	Speech-Language Pathologists				X							1		
29-2010	Clinical Laboratory Technologists and Technicians									X		1		
29-2032	Diagnostic Medical Sonographers		X									1		
29-2052	Pharmacy Technicians				X	X					X	3		
29-2055	Surgical Technologists		X									1		
29-2056	Veterinary Technologists and Technicians									X		1		
29-9098	Health Information Technologists, Medical Registrars, Surgical Assistants, and Healthcare Practitioners and Technical Workers, All Other				X						X	2		
<b>Healthcare Support Occupations</b>														
31-2011	Occupational Therapy Assistants							X		X	X	3		
31-2021	Physical Therapist Assistants	X	X	X	X	X	X	X	X	X	X	10		
31-9011	Massage Therapists	X				X			X	X		4		
31-9091	Dental Assistants	X				X	X	X			X	5		
31-9092	Medical Assistants	X			X	X	X	X		X		6		
31-9094	Medical Transcriptionists								X			1		
31-9095	Pharmacy Aides									X		1		
31-9097	Phlebotomists	X	X			X		X	X	X	X	7		
31-9099	Healthcare Support Workers, All Other		X								X	2		
<b>Protective Service Occupations</b>														
33-9032	Security Guards							X		X	X	3	*	
33-9091	Crossing Guards and Flaggers	X	X									2		
33-9098	School Bus Monitors and Protective Service Workers, All Other	X				X						2		
<b>Food Preparation and Serving Related Occupations</b>														
35-1011	Chefs and Head Cooks	X	X			X			X			4		
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	X	X		X	X	X		X	X		7		
<b>Building and Grounds Cleaning and Maintenance Occupations</b>														
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	X	X		X	X			X		X	6		
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	X	X		X	X			X		X	6		
37-2021	Pest Control Workers	X		X	X	X		X	X		X	7		
37-3011	Landscaping and Groundskeeping Workers			X	X		X				X	4		
37-3013	Tree Trimmers and Pruners	X										1		
37-3019	Grounds Maintenance Workers, All Other								X			1		
<b>Personal Care and Service Occupations</b>														
39-1098	First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services			X				X	X			3		
39-5012	Hairdressers, Hairstylists, and Cosmetologists								X			1		

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
39-6012	Concierges								X			1		
39-9031	Exercise Trainers and Group Fitness Instructors	X				X	X					3		
39-9032	Recreation Workers							X				1		
<b>Sales and Related Occupations</b>														
41-1011	First-Line Supervisors of Retail Sales Workers	X	X	X	X	X		X	X	X	X	9		
41-1012	First-Line Supervisors of Non-Retail Sales Workers				X		X				X	3	*	
41-2021	Counter and Rental Clerks							X				1		
41-2022	Parts Salespersons	X			X		X	X		X	X	6	*	
41-3011	Advertising Sales Agents	X	X	X		X			X			5		
41-3021	Insurance Sales Agents	X	X			X		X	X		X	6		
41-3031	Securities, Commodities, and Financial Services Sales Agents									X		1		
41-3041	Travel Agents					X						1		
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	X	X		X	X		X	X	X	X	8	*	
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products			X	X		X					3	*	#
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products			X	X		X		X		X	5	*	
41-9022	Real Estate Sales Agents	X	X			X			X	X		5		
<b>Office and Administrative Support Occupations</b>														
43-3011	Bill and Account Collectors	X	X	X		X			X	X		6	*	
43-3021	Billing and Posting Clerks		X					X			X	3	*	
43-3031	Bookkeeping, Accounting, and Auditing Clerks	X		X	X	X			X	X	X	7	*	
43-3051	Payroll and Timekeeping Clerks	X	X	X	X	X	X	X	X			8		
43-3061	Procurement Clerks		X									1		
43-4011	Brokerage Clerks	X				X						2		
43-4051	Customer Service Representatives	X	X	X	X	X	X	X	X	X	X	10	*	
43-4071	File Clerks	X	X			X						3		
43-4111	Interviewers, Except Eligibility and Loan	X			X	X	X	X	X	X		7		
43-4131	Loan Interviewers and Clerks		X		X							2		
43-4151	Order Clerks						X					1	*	
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	X	X		X		X		X	X	X	7		
43-4171	Receptionists and Information Clerks								X			1	*	
43-4181	Reservation and Transportation Ticket Agents and Travel Clerks					X						1		
43-5011	Cargo and Freight Agents	X								X		2	*	
43-5021	Couriers and Messengers	X							X			2	*	
43-5031	Public Safety Telecommunicators		X									1		
43-5032	Dispatchers, Except Police, Fire, and Ambulance		X		X	X						3	*	
43-5061	Production, Planning, and Expediting Clerks	X	X				X	X				4	*	
43-5071	Shipping, Receiving, and Inventory Clerks				X	X						2	*	
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	X	X			X			X			4	*	
43-6011	Executive Secretaries and Executive Administrative Assistants	X	X	X	X	X	X	X	X	X	X	10	*	

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
43-6013	Medical Secretaries and Administrative Assistants				X		X					2		
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	X	X	X	X	X	X	X	X	X	X	10	*	
43-9021	Data Entry Keyers	X			X	X	X	X	X	X	X	8	*	
43-9041	Insurance Claims and Policy Processing Clerks							X				1		
43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	X				X						2		
43-9061	Office Clerks, General	X		X			X			X		4	*	
43-9199	Office and Administrative Support Workers, All Other	X	X								X	3		
<b>Farming, Fishing, and Forestry Occupations</b>														
45-2091	Agricultural Equipment Operators				X							1		
<b>Construction and Extraction Occupations</b>														
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	X		X				X	X		X	5		
47-2021	Brickmasons and Blockmasons	X				X				X		3		
47-2031	Carpenters	X	X	X	X				X	X	X	7		
47-2051	Cement Masons and Concrete Finishers				X				X			2		
47-2061	Construction Laborers	X	X	X	X	X	X	X	X		X	9		
47-2071	Paving, Surfacing, and Tamping Equipment Operators	X	X							X	X	4		
47-2073	Operating Engineers and Other Construction Equipment Operators	X			X			X	X	X		5		
47-2081	Drywall and Ceiling Tile Installers					X						1		
47-2111	Electricians	X	X	X		X	X	X	X		X	8	*	
47-2141	Painters, Construction and Maintenance	X	X		X	X	X	X	X	X	X	9		
47-2151	Pipelayers				X	X				X		3		
47-2152	Plumbers, Pipefitters, and Steamfitters	X	X	X	X	X		X	X	X	X	9	*	
47-2181	Roofers	X							X	X	X	4		
47-2211	Sheet Metal Workers	X		X		X		X			X	5	*	
47-2221	Structural Iron and Steel Workers									X		1		
47-3013	Helpers--Electricians	X	X			X			X	X	X	6		
47-4011	Construction and Building Inspectors	X	X									2		
47-4051	Highway Maintenance Workers										X	1		
47-4090	Miscellaneous Construction and Related Workers	X				X		X	X	X		5		
47-5022	Excavating and Loading Machine and Dragline Operators, Surface Mining			X				X	X			3		
<b>Installation, Maintenance, and Repair Occupations</b>														
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers			X		X			X			3	*	
49-2011	Computer, Automated Teller, and Office Machine Repairers					X					X	2	*	
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers						X				X	2	*	
49-2098	Security and Fire Alarm Systems Installers	X				X						2		
49-3011	Aircraft Mechanics and Service Technicians	X				X			X			3	*	
49-3021	Automotive Body and Related Repairers		X			X					X	3		
49-3023	Automotive Service Technicians and Mechanics				X					X		2	*	
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists		X	X	X	X	X	X	X	X	X	9	*	

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	X	X	X		X		X		X	X	7	*	
49-3093	Tire Repairers and Changers								X			1		
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	X	X	X	X	X	X	X	X	X	X	10	*	
49-9041	Industrial Machinery Mechanics			X								1	*	
49-9043	Maintenance Workers, Machinery	X		X		X			X		X	5	*	
49-9044	Millwrights								X			1	*	
49-9051	Electrical Power-Line Installers and Repairers						X		X		X	3		
49-9062	Medical Equipment Repairers	X										1	*	
49-9071	Maintenance and Repair Workers, General		X			X		X		X		4	*	
49-9098	Helpers--Installation, Maintenance, and Repair Workers	X	X	X	X				X	X	X	7		
49-9099	Installation, Maintenance, and Repair Workers, All Other	X		X					X			3		
<b>Production Occupations</b>														
51-1011	First-Line Supervisors of Production and Operating Workers				X							1	*	
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	X					X		X			3	*	
51-2041	Structural Metal Fabricators and Fitters								X			1	*	
51-2090	Miscellaneous Assemblers and Fabricators		X		X	X	X	X	X	X	X	8	*	
51-3021	Butchers and Meat Cutters	X			X	X					X	4	*	
51-3092	Food Batchmakers	X								X		2	*	
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic										X	1	*	
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic				X							1	*	
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic										X	1	*	
51-4041	Machinists						X	X		X	X	4	*	
51-4071	Foundry Mold and Coremakers									X		1		
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic									X		1	*	
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic							X				1	*	
51-4121	Welders, Cutters, Solderers, and Brazers	X			X	X	X	X	X		X	7	*	
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders						X		X	X		3	*	
51-4199	Metal Workers and Plastic Workers, All Other			X								1	*	
51-5112	Printing Press Operators						X				X	2		
51-7011	Cabinetmakers and Bench Carpenters								X			1		
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood				X			X				2		
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	X										1		
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	X							X	X		3	*	
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders				X				X			2	*	
51-9041	Extruding, Forming, Pressing, and Compacting Machine								X			1	*	

OES 2019 SOC Code	Occupation Title	Tennessee	Greater Memphis	Northwest	Southwest	Northern Middle	Southern Middle	Upper Cumberland	East	Southeast	Northeast	Number of Regions	Key to Industry Clusters	STEM
	Setters, Operators, and Tenders													
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	X	X				X		X		X	5	*	
51-9111	Packaging and Filling Machine Operators and Tenders	X	X			X	X	X				5	*	
51-9124	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders				X			X				2	*	
51-9161	Computer Numerically Controlled Tool Operators			X					X			2	*	
51-9196	Paper Goods Machine Setters, Operators, and Tenders						X					1		
51-9198	Helpers--Production Workers	X		X		X	X		X	X	X	7	*	
<b>Transportation and Material Moving Occupations</b>														
53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	X		X		X			X	X	X	6	*	
53-3031	Driver/Sales Workers		X	X	X		X	X				5	*	
53-3032	Heavy and Tractor-Trailer Truck Drivers	X	X	X	X	X	X	X	X	X	X	10	*	
53-3033	Light Truck Drivers			X			X	X	X	X	X	6	*	
53-3052	Bus Drivers, Transit and Intercity	X							X			2		
53-6031	Automotive and Watercraft Service Attendants				X			X				2		
53-7011	Conveyor Operators and Tenders			X								1	*	
53-7051	Industrial Truck and Tractor Operators	X	X	X		X	X	X	X	X	X	9	*	
53-7061	Cleaners of Vehicles and Equipment						X					1	*	
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	X			X				X	X	X	5	*	
53-7063	Machine Feeders and Offbearers									X		1	*	
53-7064	Packers and Packagers, Hand						X					1	*	
53-7081	Refuse and Recyclable Material Collectors				X							1		

## APPENDIX C: IN-DEMAND OCCUPATIONS KEY TO TNECD TARGET INDUSTRY CLUSTERS

The table below outlines in-demand occupations which are important to one or more of TNECD's strategic industry clusters.

A "\*" denotes if the occupation is key to one or more of TNECD's industry clusters. The total number of TNECD industry clusters an occupation is key to is denoted with a number 1 through 9 in the column named "Number of Clusters". A "#" denotes if the occupation is a STEM occupation.

OES 2019 SOC Code	Occupation Title	Food & Agriculture	Healthcare & Life Sciences	Rubber, Ceramics, & Glass	Automotive	Electrical Equipment & Appliances	Headquarters, Finance, & Tech	Distribution & Logistics	Aerospace & Defense	Chemicals	Number of Clusters	STEM
<b>Management Occupations</b>												
11-1021	General and Operations Managers	*	*	*	*	*	*	*	*	*	9	
11-2021	Marketing Managers		*			*	*				3	
11-2022	Sales Managers	*	*	*	*	*	*	*		*	8	
11-3031	Financial Managers	*	*	*	*	*	*	*	*	*	9	
11-3061	Purchasing Managers		*		*	*	*		*		5	
11-3071	Transportation, Storage, and Distribution Managers	*					*	*		*	4	
11-3121	Human Resources Managers		*		*		*				3	
11-3131	Training and Development Managers						*				1	
11-9041	Architectural and Engineering Managers		*	*	*	*	*		*	*	7	#
11-9111	Medical and Health Services Managers		*								1	
<b>Business and Financial Operations Occupations</b>												
13-1020	Buyers and Purchasing Agents	*	*	*	*	*	*	*	*	*	9	
13-1071	Human Resources Specialists	*	*	*	*	*	*	*	*	*	9	
13-1081	Logisticians	*	*		*		*	*	*	*	7	
13-1111	Management Analysts		*				*	*			3	
13-1141	Compensation, Benefits, and Job Analysis Specialists						*				1	
13-1151	Training and Development Specialists		*		*		*				3	
13-1161	Market Research Analysts and Marketing Specialists	*	*			*	*	*		*	6	
13-1198	Project Management Specialists and Business Operations Specialists, All Other		*		*	*	*		*	*	6	
13-2011	Accountants and Auditors	*	*	*	*	*	*	*	*	*	9	
13-2072	Loan Officers						*				1	
13-2082	Tax Preparers						*				1	
<b>Computer and Mathematical Occupations</b>												
15-1212	Information Security Analysts		*				*				2	#
15-1232	Computer User Support Specialists		*	*	*		*	*	*		6	#
15-1244	Network and Computer Systems Administrators		*	*	*		*	*	*	*	7	#
15-1251	Computer Programmers		*				*		*		3	#
15-1256	Software Developers and Software Quality Assurance Analysts and Testers		*		*		*	*	*		5	#

OES 2019 SOC Code	Occupation Title	Food & Agriculture	Healthcare & Life Sciences	Rubber, Ceramics, & Glass	Automotive	Electrical Equipment & Appliances	Headquarters, Finance, & Tech	Distribution & Logistics	Aerospace & Defense	Chemicals	Number of Clusters	STEM
15-1257	Web Developers and Digital Interface Designers						*				1	#
15-1299	Computer Occupations, All Other		*				*		*		3	#
15-2031	Operations Research Analysts		*		*		*		*		4	#
<b>Architecture and Engineering Occupations</b>												
17-2051	Civil Engineers						*				1	#
17-2071	Electrical Engineers		*		*	*	*		*		5	#
17-2141	Mechanical Engineers		*	*	*	*	*		*	*	7	#
17-2199	Engineers, All Other			*	*	*	*		*		5	#
17-3023	Electrical and Electronic Engineering Technologists and Technicians		*	*	*	*	*		*		6	#
17-3026	Industrial Engineering Technologists and Technicians	*	*	*	*	*	*		*	*	8	#
17-3027	Mechanical Engineering Technologists and Technicians		*	*	*	*	*		*		6	#
17-3098	Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other		*	*	*				*		4	#
<b>Life, Physical, and Social Science Occupations</b>												
19-1042	Medical Scientists, Except Epidemiologists		*				*				2	#
19-4021	Biological Technicians		*				*				2	#
19-4031	Chemical Technicians		*	*			*			*	4	#
<b>Legal Occupations</b>												
23-2011	Paralegals and Legal Assistants		*								1	
<b>Arts, Design, Entertainment, Sports, and Media Occupations</b>												
27-1024	Graphic Designers		*				*				2	
27-1026	Merchandise Displayers and Window Trimmers	*									1	
27-3031	Public Relations Specialists						*				1	
<b>Protective Service Occupations</b>												
33-9032	Security Guards								*		1	
<b>Sales and Related Occupations</b>												
41-1012	First-Line Supervisors of Non-Retail Sales Workers		*				*	*			3	
41-2022	Parts Salespersons							*			1	
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel						*	*			2	
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products		*			*	*	*		*	5	#
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	*	*	*	*	*	*	*	*	*	9	
<b>Office and Administrative Support Occupations</b>												
43-3011	Bill and Account Collectors		*				*	*			3	

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43-3021	Billing and Posting Clerks		*				*	*			3	
43-3031	Bookkeeping, Accounting, and Auditing Clerks	*	*	*	*	*	*	*	*	*	9	
43-4051	Customer Service Representatives	*	*	*	*	*	*	*	*	*	9	
43-4151	Order Clerks	*	*	*		*		*			5	
43-4171	Receptionists and Information Clerks		*					*			2	
43-5011	Cargo and Freight Agents							*			1	
43-5021	Couriers and Messengers							*			1	
43-5032	Dispatchers, Except Police, Fire, and Ambulance							*			1	
43-5061	Production, Planning, and Expediting Clerks	*	*	*	*	*	*	*	*	*	9	
43-5071	Shipping, Receiving, and Inventory Clerks	*	*	*	*	*		*	*	*	8	
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	*		*				*			3	
43-6011	Executive Secretaries and Executive Administrative Assistants		*		*		*	*	*		5	
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	*	*	*	*	*	*	*	*	*	9	
43-9021	Data Entry Keyers						*	*			2	
43-9061	Office Clerks, General	*	*	*	*	*	*	*	*	*	9	
<b>Construction and Extraction Occupations</b>												
47-2111	Electricians	*		*	*	*			*	*	6	
47-2152	Plumbers, Pipefitters, and Steamfitters				*						1	
47-2211	Sheet Metal Workers								*		1	
<b>Installation, Maintenance, and Repair Occupations</b>												
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	*	*	*	*	*	*	*		*	8	
49-2011	Computer, Automated Teller, and Office Machine Repairers		*								1	
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers						*				1	
49-3011	Aircraft Mechanics and Service Technicians								*		1	
49-3023	Automotive Service Technicians and Mechanics							*			1	
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	*						*			2	
49-3042	Mobile Heavy Equipment Mechanics, Except Engines							*			1	
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers					*					1	
49-9041	Industrial Machinery Mechanics	*	*	*	*	*		*	*	*	8	
49-9043	Maintenance Workers, Machinery	*	*	*	*	*			*	*	7	
49-9044	Millwrights				*						1	
49-9062	Medical Equipment Repairers		*								1	
49-9071	Maintenance and Repair Workers, General	*	*	*	*	*	*	*	*	*	9	

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<b>Production Occupations</b>												
51-1011	First-Line Supervisors of Production and Operating Workers	*	*	*	*	*		*	*	*	8	
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers		*		*	*			*		4	
51-2041	Structural Metal Fabricators and Fitters				*	*			*		3	
51-2090	Miscellaneous Assemblers and Fabricators	*	*	*	*	*		*	*	*	8	
51-3021	Butchers and Meat Cutters	*									1	
51-3092	Food Batchmakers	*									1	
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic			*	*	*				*	4	
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic			*	*	*			*		4	
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic		*	*	*	*			*		5	
51-4041	Machinists		*	*	*	*			*	*	6	
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic		*	*	*	*					4	
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic		*	*	*	*			*		5	
51-4121	Welders, Cutters, Solderers, and Brazers		*	*	*	*			*		5	
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders		*	*	*	*			*		5	
51-4199	Metal Workers and Plastic Workers, All Other					*					1	
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	*	*	*						*	4	
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	*		*							2	
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	*	*	*	*					*	5	
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	*	*	*	*	*	*	*	*	*	9	
51-9111	Packaging and Filling Machine Operators and Tenders	*	*	*	*	*		*		*	7	
51-9124	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders			*	*	*			*	*	5	
51-9161	Computer Numerically Controlled Tool Operators		*	*	*	*			*		5	
51-9198	Helpers--Production Workers	*	*	*	*	*			*	*	7	
<b>Transportation and Material Moving Occupations</b>												

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53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	*	*	*	*	*		*	*	*	8	
53-3031	Driver/Sales Workers	*						*			2	
53-3032	Heavy and Tractor-Trailer Truck Drivers	*		*	*			*		*	5	
53-3033	Light Truck Drivers	*	*	*	*			*			5	
53-7011	Conveyor Operators and Tenders	*						*			2	
53-7051	Industrial Truck and Tractor Operators	*		*	*	*		*	*	*	7	
53-7061	Cleaners of Vehicles and Equipment	*						*			2	
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	*	*	*	*	*	*	*	*	*	9	
53-7063	Machine Feeders and Offbearers	*		*		*		*		*	5	
53-7064	Packers and Packagers, Hand	*	*	*	*	*		*	*	*	8	