



VIRGINIA INITIATIVE FOR
**GROWTH &
OPPORTUNITY**
IN EACH REGION

GO Virginia Region 2

Growth and Diversification Plan

Revised July 2019



Prepared by the Virginia Tech Office of
Economic Development

ACKNOWLEDGEMENTS

This document is submitted to the state GO Virginia Board by the Region 2 Council. Prepared in accordance with state Growth and Diversification plan amendment guidelines, this plan updates the original August 2017 Regional Economic Growth and Diversification Plan. This 2019 update relies on the foundations of the prior plan, which was developed through substantive research and thoughtful deliberation on economic conditions and opportunities in the region.

The Region 2 Council and support organization staff have provided updated data on the economy and labor markets throughout this document. There is a discussion of progress on the strategies in each of the relevant sections. The amended plan also incorporates feedback from a regional survey distributed in June of 2019 and regional input sessions in June and July 2019. Staff also conducted several individual conversations with selected individuals, whose perspective might be of interest. For instance, we contacted several directors of county school system career and technical education programs.

The additional outreach informed a more rigorous understanding of how the original plan's strategic approaches were still important and in what ways the strategies might need to be adjusted. Those changes are reflected in this document.

This plan once again represents an extensive body of work completed over a short span of time, although this retains most of the foundations and content from the original 2017 plan. Again, this would not be possible without the committed service of leaders from business, education, government and non-profits who have participated in the council and supported the work here in this region. Further thanks go to the leaders of our nine regional economic development, planning, and workforce organizations. Their previous research provided a strong starting point for this plan and fresh insights during the fact-finding process. Lastly, we wish to thank Council members and staff for the energy and insights they brought to the process.

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TABLE OF CONTENTS

Acknowledgements	i
Table of Contents	ii
List of Figures and Tables	iv
Executive Summary	v
Section 1: Regional Demographics and Growth Data	1
Demographics	1
Economic Growth	3
Firm Growth, Employment and Primary Industries	5
Section 2: Regional Economic Drivers and Clusters	11
Manufacturing Cluster	15
Life Sciences and Health Care Cluster	17
Food and Beverage Processing Cluster	19
Emerging Technology and IT Cluster	21
Section 3: Regional Priorities	24
2019 Outreach for Plan Revision	26
Talent Development, Attraction, and Retention	29
Key Points: Talent Development and Retention	
2019 UPDATE per TALENT DEVELOPMENT and RETENTION	33
Sites and Buildings	36
Information	37
Collaboration	38
Strategies and Criteria	39
2019 UPDATE per Sites and Buildings	41
Key Points: Sites and Buildings	
Entrepreneurship and Business Development	42
Key Points: Entrepreneurship and Business Development	
2019 Update per Entrepreneurship and Business Development	46
Technology Development	49
Key Points: Technology Development	
2019 Update for Technology Development Strategy	53
Section 4: Application Process and Assessment Criteria	56
Section 5: Implementation and Sustainability	60
Implementing the Plan and Advancing GO Virginia Goals	60
Proposed GO Virginia Region 2 Peer Regions	64

Closing	66
Appendix A: Industry Cluster Definitions	67
Appendix B: Additional Workforce Demand Data	72
Manufacturing Cluster	74
Health Care and Life Sciences Cluster	76
Food and Beverage Processing Cluster	78
Emerging Technology and IT Cluster	80
Appendix C: Region 2 Membership	82
Council Members (as of August 2, 2019)	82
Working Group Members from Original Plan Process in 2017	82
Collaborative Sites and Buildings	82
Entrepreneurship and Business Development	83
Talent and Workforce Development	83
Technology Development	84
Appendix D: Region 2 Sites List	84

LIST OF FIGURES AND TABLES

Figure 1: Region 2 1996, 2006, and 2015 Annual Graduates by Degree and Percent Change in Graduates	2
Figure 2: Employee Commuting Patterns	3
Table 1: Population and Population Growth	4
Table 2: Real GRP and Percent Change, from 2001 - 2007, 2008 - 2015, and 2001 -2015	4
Figure 3: Annual Change in Average Personal Income	5
Figure 4: Total Annual Jobs Created, and Percent from Old and Young Firms	6
Figure 5: Unemployment Rate	6
Figure 6: Total Employment and Share by Industries in Region 2	7
Table 3: Employment by Industry, and 2001, 2016 Average Hourly Wage	8
Table 4: Total Jobs Supported by Exports in Region 2	10
Figure 7: Top Contributors to Gross Regional Product (GRP)	11
Figure 8. Region 2 Target Industry Clusters--GRP, LQ and Shift-Share	12
Table 5. Region 2 Industry Cluster Performance Trends	13
Table 6. Comparative Industry Cluster Trends	14
Table 7. Industry Cluster Sales and Demand, Region 2	14
Table 8: Key Manufacturing Cluster Occupations	16
Table 9: Key Life Science and Health Care Cluster Occupations	18
Table 10: Key Food and Beverage Processing Cluster Occupations	20
Table 11: Key Emerging Technology and IT Cluster Occupations	23
Table 12. Region 2 Strengths, Opportunities, Challenges	24
Figure 9: GO Virginia Region 2 Institutes of Higher Learning, Universities, Colleges, Community Colleges, and Training Centers	29
Table 13: Region 2 Assets, Strengths, and Challenges	31
Table 14: Region 2 Strategies, Potential Activities, and Example Metrics	32
Figure 10: Select examples of sites and special assets	39
Table 15. Sites and Buildings Development Strategies	40
Figure 11: Region 2 Startup Presence and Employment	43
Figure 12: Sampling of Accessible Capital for Region 2 Companies	44
Table 16: Mentorship and Training Assets in Region 2	45
Table 17: Entrepreneurship and Business Development Strategies	45
Table 18. Target Cluster Assets	50
Table 19. Technology Development Strategies	52
Table 20. Possible GOVA Region 2 Peer Regions	65

EXECUTIVE SUMMARY

GO Virginia’s objectives, as set by the state, are simple and provide a clear path for action. The program seeks to grow jobs that pay higher than the regional median wage, primarily through investment that is new to Virginia. This requires a focus on industries with high growth potential, featuring in-demand occupations with higher wages.

This Growth and Diversification plan, originally written for GO Virginia Region 2 in August of 2017, provides a roadmap for utilizing GO Virginia funding for projects across this region, which includes the Lynchburg, New River Valley, and Roanoke-Alleghany sub-regions. Each of these areas has a strong history of local cooperation, and some experience with interregional collaboration, primarily between the New River and Roanoke Valleys. Together, they all share many economic similarities: traditional industry strengths in manufacturing, transportation, and agriculture; emerging technology sectors; mixed urban and rural characteristics; and higher education and health care as economic and employment drivers.

This document substantively retains the strong foundations and content of the original plan, while incorporating more recent data, updated stakeholder input, reports on progress since the initial plan, and revised strategies where needed. The plan documents the concentration of different industries across this footprint, their job growth rates compared to the nation, their contributions to gross regional product, the number of higher than median wage jobs available in these industries, and assets unique to the region that drive opportunity.

Changes have occurred since 2017. The median wage for a worker in Region 2 has risen and is now \$19.63 per hour, or \$41k annually, assuming full-time employment.

The 2017 plan identified four priority “clusters”—or geographic concentrations of businesses with common markets, suppliers, technologies, and workforce needs. These four interrelated industries were selected as those that offer the greatest potential for sustainable, scalable, future growth in the region:

- ▶ Manufacturing (basic and advanced)
- ▶ Life sciences and health care
- ▶ Food and beverage processing
- ▶ Emerging technology and IT

Data indicates that the same four clusters retain their significance and should continue to be the industry sector priorities. Together these clusters provide more than 125,000 jobs, over one-third the total in the region. In the next five years that number is expected to grow at a rate higher than the rest of the economy. The median hourly wage across the four clusters is \$21, also exceeding the rest of the economy. These clusters also generate more than \$11.3 billion in economic activity, or 36.8% of gross regional product.

However, within these four priority sectors there have been some changes. Manufacturing has an even greater concentration of employment, but growth is projected to slow. Food and beverage manufacturing are also more greatly concentrated in the region now and growth projections are even greater moving forward. Emerging Technology and IT sector employment remains relatively unchanged compared to the 2017 plan. Analysis of job postings data for top technology occupations suggests that regional firms may be struggling even more to find talent to fill open positions. Life Sciences and Health

sector employment is now expected to grow even faster in the coming years. Four of the fifteen top occupations in that sector have grown significantly more than predicted in the original 2017 plan.

To continue to grow economic opportunity in these clusters, this amendment re-emphasizes the original core strategies in four focus areas.

1. Talent or workforce development, attraction, and retention, which includes strengthening the pipeline from all levels of education to careers in the region, increasing the completion of relevant degrees, increasing the knowledge and access to complementary workforce and training services, and increasing employer engagement across the system.
2. Collaborative development of sites and buildings, which includes improving information about our supply of real estate and market demand, incentivizing collaboration among localities at all stages of development, and building partnerships to leverage the development potential of special assets like research facilities.
3. Entrepreneurship and business development, which includes growing the presence of and access to capital investors, expanding and better coordinating programs for mentorship and business training, and improving awareness of existing capital, mentorship & training resources.
4. Technology development, which includes increasing investments for innovative technologies, expanding rates of research commercialized in the private sector, supporting talent attraction efforts focused on individuals with technological skills, and growing the number of individuals entering training and education programs that develop technological skills.

For each strategic area, this document includes an update section highlighting recent developments and Council-funded activities. In addition, the implementation section of this document includes a discussion of gaps and opportunities across strategies moving forward, as well as a discussion of project pipeline development activities.

The plan includes specific success metrics for projects in each of these focus areas and suggests some early returns on progress to date since the advent of GO Virginia in 2017. GO Virginia eligible projects must connect to these strategies, promote higher paying jobs in the priority clusters, and include substantive matching funds. The Region 2 Council encourages projects that demonstrate an innovative and forward-looking approach that doesn't simply represent business as usual.

SECTION 1: REGIONAL DEMOGRAPHICS AND GROWTH DATA

Region 2 of GO Virginia is in western Virginia and spans across three metropolitan statistical areas (MSAs) and regional commissions: the Lynchburg, New River Valley, and Roanoke-Alleghany regions. In total, Region 2 is comprised of 18 jurisdictions including thirteen counties and five independent cities.¹ The region's population of 781,929 is about 9% of Virginia's 2018 total population.² This population estimate represents about 4,000 more people than the initial G&D plan's estimate.

The region's industries provided approximately 6.4%³ of the state's gross domestic product (GDP) in 2017.⁴ Historically, manufacturing, trade, transportation, and utilities industries have played a significant role in the region's economic activity, but recently the region has experienced growth in the health and education sectors. Along with this shift in economic activity, the region has experienced a 185% growth (1998 – 2017) in annual postsecondary graduates, growth driven by the region's higher education institutions. The region's growth in higher education and diversification in economic activities suggests the region is primed to take advantage of increases in investment outlined in GO Virginia.

Demographics

From 1999-2018, the region's population grew by 16.9% (Table 1), a slower rate of growth than the state (23.9%) and nation (20%); however, regional population growth has increased by two percentage points in the last two years, while the growth rates for the state and nation have remained relatively stagnant.⁵ Similar to national trends, Region 2 has a growing senior population with aging baby boomers. A distinct characteristic in this region, however, is the large college-age population that is 20-24 years old (8.9% of all age cohorts in 2018).⁶ While the population of college-age or early career residents (20 to 34 year olds) in the region increased by 10.1% since the beginning of the Great Recession in 2008 to 2018, the population of mid- to late-career individuals (35 to 54 year olds) decreased by 11.8%.⁷ These statistics represent little change from the initial plan. This demographic trend reflects the region's postsecondary education institutions attracting a younger population, although the region may be failing to retain these individuals or to attract mid-career workers and families.

The increase in the supply of postsecondary graduates is driven by the growth of the two public universities (Virginia Tech and Radford University); several private institutions (including Liberty University, Jefferson College of Health Sciences, Hollins University, Lynchburg University, Randolph College, Roanoke College, Ferrum College, and Sweet Briar College); and four community colleges (New

¹ Counties include Alleghany, Amherst, Appomattox, Bedford, Botetourt, Campbell, Craig, Floyd, Franklin, Giles, Montgomery, Pulaski, and Roanoke. Independent cities include Covington, Lynchburg, Radford, Roanoke, and Salem

² U.S. Census Bureau (2018). Retrieved from <https://www.census.gov/programs-surveys/popest.html>

³ GRP data is available for three Metropolitan Statistical Areas only. We've included the Blacksburg – Christiansburg – Radford, Lynchburg, and Roanoke MSAs found in the region. Alleghany County and the City of Covington are not part of the Roanoke MSA, so we have underestimated total contribution to state GDP.

⁴ U.S. Bureau of Economic Analysis (BEA; 2017). GRP by State and by Metropolitan Area. Retrieved from <https://www.bea.gov/regional/index.htm>

⁵ U.S. Census Bureau (2018). Retrieved from <https://www.census.gov/programs-surveys/popest.html>

⁶ U.S. Census Bureau (2018). Retrieved from <https://www.census.gov/programs-surveys/popest.html>

⁷ EMSI 2019.3; QCEW Employees

River Community College, Virginia Western Community College, Dabney S. Lancaster Community College, and Central Virginia Community College). From 1998-2017, the region has supplied more than 400,000 graduates with at least an associate's degree or a certificate (Figure 1). There has been an 82% increase in the annual number of graduates receiving a degree since 2008. All degrees have increased over this time (including associates, certificates, bachelors, and professional and graduate degrees). The annual number of graduates receiving a graduate and professional degree has increased from 2,570 to 11,612 (352%). This increase is due in part to a surge in graduates during and after the recession, when individuals delayed entering the labor market, as well as intentional growth practiced by some of the region's largest higher education institutions. In the last two years, the number of annual bachelor degrees and above has increased slightly by 4% while associate degree completions declined by 6%. According to the State Council for Higher Education in Virginia (SCHEV), these numbers are inclusive of online degree earners. The increase in Region 2 degree bachelor's degree earners over the past several years, for instance, may partly reflect growth of online degree options.

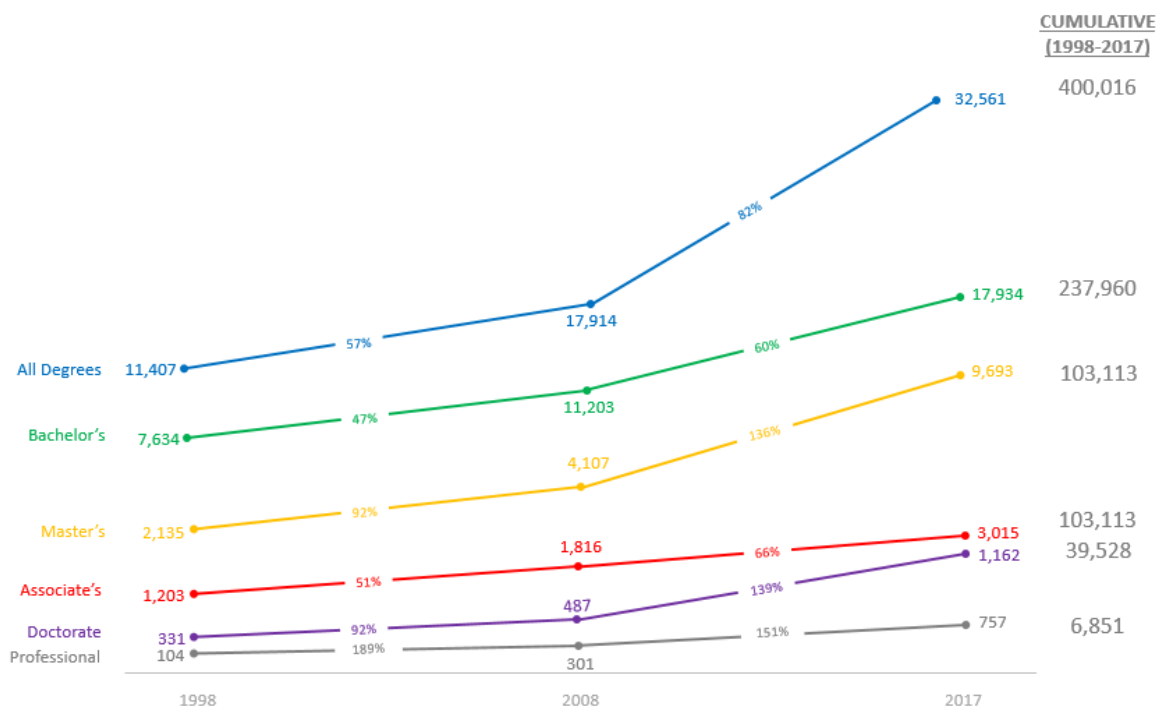


Figure 1: Region 2 1996, 2006, and 2015 Annual Graduates by Degree and Percent Change in Graduates⁸

Despite the decline in the number of Region 2 workers in the 35 to 54-year-old demographic, a labor-shed analysis reveals the region's workers include a growing number of commuters from just outside the region. The number of total commuters has increased for the past 15 years; however, net commuter inflow has fallen in recent years. In 2015, for instance, 63,512 Region 2 workers lived outside of the region while 50,830 workers lived in Region 2 but were employed outside the region. The majority of region 2 employees (248,702) both lived and worked in the region. Moreover, the region's three metropolitan statistical areas are connected through intra-regional commuting, as illustrated in Figure 2.

⁸ State Council of Higher Education for Virginia (2018). Retrieved from <http://research.schev.edu/Completions/>

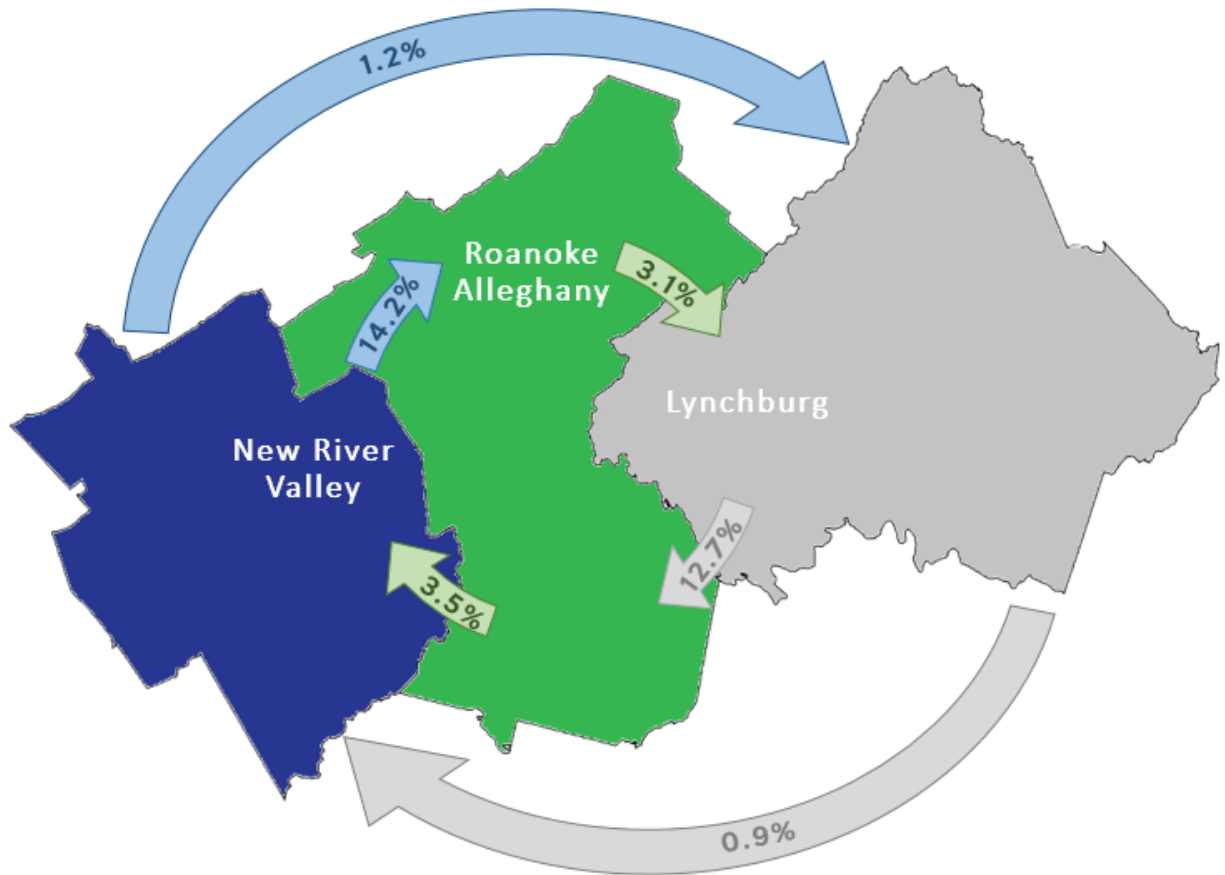


Figure 2: Employee Commuting Patterns⁹

Economic Growth

Like population growth, the region's total economic output has increased at a slower rate compared to the state and nation. The region displayed 12.3% growth in real gross regional product (GRP) from 2001 – 2017, compared to 27.8% growth in Virginia and 33.8% in the US (Table 2). Within the region, there have been differences in economic performance, with the Blacksburg-Christiansburg-Radford MSA being the smallest MSA in terms of real GRP but having the fastest growth rates in the region (Table 2).

⁹ Source: US Census Bureau, Longitudinal Employer-Household Dynamics OnTheMap, 2018. Retrieved from <https://onthemap.ces.census.gov/>. Note: Overlay arrows do not indicate directionality of worker flow between home and employment locations.

Table 1: Population and Population Growth¹⁰

	POPULATION (1999)	POPULATION (2018)	CUMULATIVE CHANGE	AVG. ANNUAL GROWTH RATE
Region 2	669,054	781,924	16.9%	0.8%
Virginia	6,872,912	8,517,685	23.9%	1.1%
United States	272,690,813	327,167,434	20.0%	1.0%

Table 2: Real GRP and Percent Change, from 2001 - 2007, 2008 - 2015, and 2001 - 2015¹¹

	REAL GRP (MILLIONS OF 2009 CHAINED DOLLARS)		GROWTH IN REAL GRP		
	2001	2017	2001 - 2008	2009 - 2017	2001 - 2017
Region 2 Total	25,172	27,944	10.9%	2.4%	12.3%
Blacksburg-Christiansburg- Radford MSA¹²	5,057	6,134	11.6%	13.1%	21.3%
Lynchburg MSA¹³	7,525	8,547	11.1%	2.3%	13.6%
Roanoke MSA¹⁴	12,312	13,236	10.6%	-1.8%	7.7%
Virginia	346,918	443,255	17.4%	8.9%	27.8%
United States	12,735,110	16,949,421	15.1%	18.7%	33.1%

Some GRP growth may be due to increases in state expenditures. For instance, cumulative expenditure growth has increased by 9% since 2006, from approximately \$2.1 billion to \$2.2 billion (accounting for inflation). Spending is not evenly distributed, however. Eleven localities had positive changes in state expenditures from 2006-2018 (Alleghany, Botetourt, Covington, Floyd, Franklin, Giles, Montgomery, Pulaski, Radford City, and Roanoke County), while per capita state expenditures declined in six jurisdictions (Appomattox, Campbell, Craig, Lynchburg City, Roanoke City and Salem City).¹⁵

¹⁰ U.S. Census Bureau (2018). Retrieved from

¹¹ BEA (2017). GDP by State and by Metropolitan Area. Retrieved from <https://www.bea.gov/regional/index.htm>

¹² Includes Radford City, Montgomery, Pulaski, Giles, and Floyd Counties

¹³ Includes Lynchburg City, Amherst, Appomattox, Campbell, and Bedford Counties

¹⁴ Includes Roanoke City, Salem City, and Craig, Franklin, Botetourt, and Roanoke Counties

¹⁵ Virginia Auditor of Public Accounts. Retrieved from

http://www.apa.virginia.gov/APA_Reports/LG_ComparativeReports.aspx Note: This excludes Bedford.

Slow change in personal wealth is another reflection of slower economic growth. The region's population experienced relatively slow year-to-year growth of personal income since 1996 (Figure 3), an even slower rate of growth in the last two years since the previous G&D plan. Average personal income, however, increased by 11% from \$35,514 to \$39,577 (1999-2017).¹⁶ Wealth varies within Region 2. In 2017, five localities had above the regional average personal income per capita (Roanoke City, Salem City, Bedford, Botetourt and Roanoke Counties). Additionally, five localities (Craig, Montgomery, Amherst, Campbell, and the city of Lynchburg) saw average personal income at approximately 10% less than the regional average.

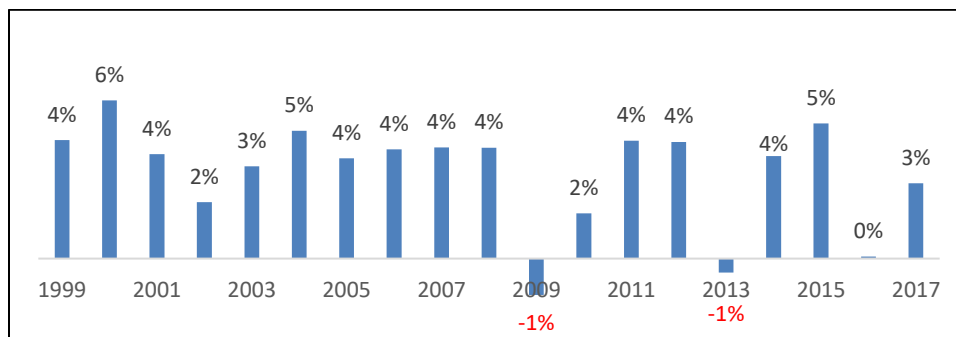


Figure 3: Annual Change in Average Personal Income¹⁷

Firm Growth, Employment and Primary Industries

Another economic indicator is the health of regional firms, measured as firm destruction and creation, and the age of firms. Overall, firm creation has declined by 24% since 1999, with a particularly significant decline during the recession.¹⁸ Meanwhile, the number of firms closing has remained relatively constant.¹⁹ Figure 4 shows the total jobs created annually (primary vertical axis) and the percent of jobs created (secondary vertical axis) from old and young firms. Young firms are five years old or less, while old firms are over ten years old. Region 2's employment growth is due largely to the expansion of old firms. From 1999-2017 young firms provided on average, just 25% of annual job creation. Region 2 is underperforming when compared to state and national levels, which show young firms on average accounting for 27% and 29% of total new jobs, respectively. The last few years of young firm job creation in the region have exhibited a growth trend, however, which may continue provided adequate support.

¹⁶ BEA (2019). Retrieved from <http://cra.gmu.edu/go-virginia>

¹⁷ U.S. Census Bureau (2019). Longitudinal Business Database (LBD). Retrieved from <https://www.census.gov>

¹⁸ U.S. Census Bureau (2019). Longitudinal Business Database (LBD). Retrieved from <https://www.census.gov>

¹⁹ U.S. Census Bureau (2019). LBD. Retrieved from <https://www.census.gov/ces/dataproducts/datasets/lbd.html>

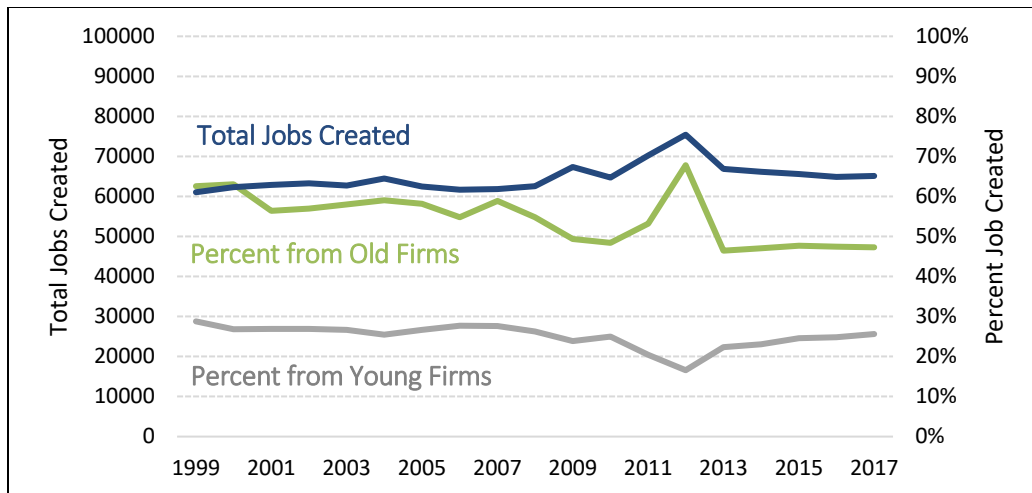


Figure 4: Total Annual Jobs Created, and Percent from Old and Young Firms²⁰

Region 2's unemployment rate has bounced back since the recession, and is lower than the national unemployment rate (Figure 5). Since the recession, the unemployment rate has fallen 5.5% from peak unemployment of 8.8% in 2010. Since the last G&D plan, unemployment has fallen from 4.6% in 2012 to 3.3% in 2018. Though the region has maintained a lower unemployment rate relative to the nation, unemployment has remained higher compared to the state. The total amount of jobs has increased by 9% since 2001 (Figure 6). These low unemployment and job growth numbers suggest the region's ability to adapt from an economic downturn compared to the nation, however the numbers may also include individuals who are underemployed. Underemployed workers include those individuals who are highly skilled but working in low paying jobs, low skill jobs, or as part-time workers who would prefer to be full time.

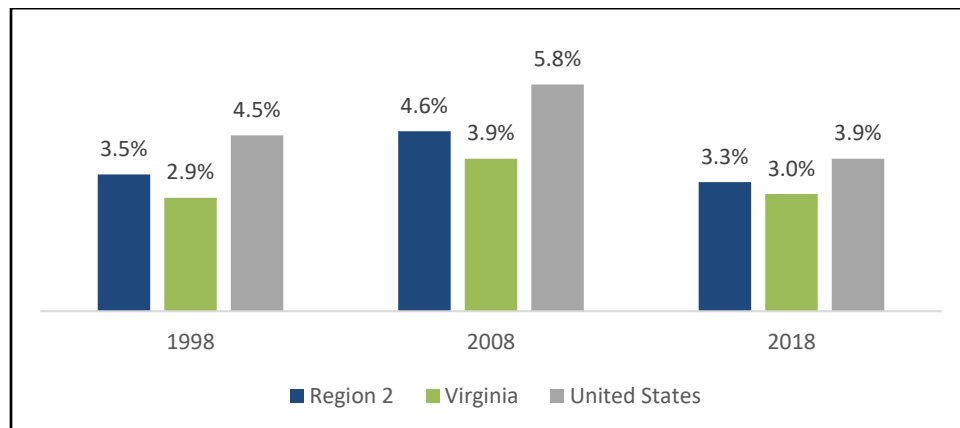


Figure 5: Unemployment Rate²¹

²⁰ U.S. Census Bureau (2019). Longitudinal Employer-Household Dynamics LEHD, QCEW. Retrieved from <http://cra.gmu.edu/go-virginia>

²¹ U.S. Bureau of Labor Statistics (2019). Retrieved from <https://www.bls.gov/lau/>

Labor force participation fell by 2.6 percentage points from 2000 to 2017, this compares to a 0.7 and 0.5 percentage point reduction for Virginia and the United States during the same period.

	LABOR FORCE PARTICIPATION		
	2000	2009	2017
Region 2	62.2%	61.8%	59.6%
Virginia	66.8%	67.4%	66.1%
United States	63.9%	65%	63.4%

Figure 5a: Labor Force Participation in Region 2

Lower labor force participation today is a trend nationally, but it seems to be particularly salient in more rural regions of the United States. This is an example of how more rural economies have not recovered as quickly from the Great Recession. Lower to mid-income workers may have been laid off during the recession, were perhaps older, and ceased to look for employment. As unemployment declines and the region approaches “full employment”, a lower participation rate represents opportunities to bring more people back into the labor force.

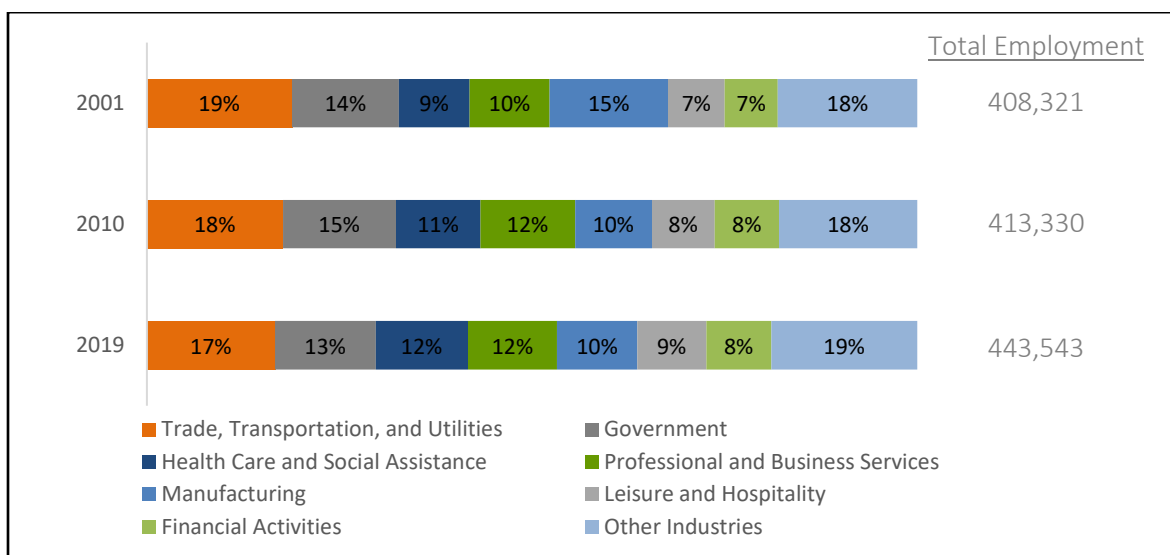


Figure 6: Total Employment and Share by Industries in Region 2²²

Figure 6 outlines the total employment and the employment share of the region’s largest industries. Shares of employment from the government sector; the trade, transportation, and utilities sector; the professional and business services sector; and the leisure and hospitality sector have remained relatively constant throughout the last two decades. However, the historically important manufacturing sector has

²² U.S. Bureau of Labor Statistics (2017). Retrieved from <http://cra.gmu.edu/go-virginia>; EMSI 2019.3 Class of Worker dataset, Retrieved from <http://www.economicmodeling.com>. Note: Other Industries includes construction, other services, educational services, information, and natural resources and mining,

declined since 2001. Over the same time, the region saw increased employment shares from the education sector, and the health care and social services sector.

This economic diversification is at least partly a result of the recession. Industries hit hardest by the recession included the construction, information, and manufacturing sectors, in which jobs decreased 21%, 29%, and 5% respectively from 2008-2019. Note that Manufacturing has seen an eight percent increase in jobs since 2011. Since these jobs are susceptible to economic booms and busts, shifting away from these jobs represents more financial security for the region's workforce; however, these industries also generally pay higher wages (Table 3), with median hourly earnings above the regional median (\$19.63). Meanwhile, the quickly growing education sector tends to pay less than \$19.63 an hour on average, or \$41K annually. Crop and animal production (i.e. natural resources), education, health care and social assistance, leisure and hospitality, and other services have gained workers (Table 3). Despite a 5% decline since its 2007 employment peak (77,768), the trade, transportation, and utilities sector are still the largest employing sector in Region 2, largely due to retail trade. However, the industry as a whole pays substantially less than median wage.²³

Note that median hourly wages by industry have changed since the original G&D plan. Region median hourly wage has increased by more than one dollar, \$18.66 to \$19.86. However, much of that increase has been driven by increased government wages. While certain industries have seen some increases in their median wages (e.g. trade & transportation, finance, professional and business services, education, healthcare), others have actually experienced a decline in their estimated median hourly wage (e.g. construction, manufacturing, information, and other services).

Table 3: Employment by Industry, and 2001, 2016 Median Hourly Wage²⁴

INDUSTRY	EMPLOYMENT (2011)	EMPLOYMENT (2019)	% CHANGE IN JOBS (2011-2019)	MEDIAN HOURLY WAGE (2016)	MEDIAN HOURLY WAGE (2019)
NATURAL RESOURCES AND MINING	9,228	9,798	6%	\$16.19	\$21.66
CONSTRUCTION	23,175	23,443	1%	\$19.31	\$18.88
MANUFACTURING	42,554	46,085	8%	\$20.17	\$18.18
TRADE, TRANSPORTATION, AND UTILITIES	74,336	73,705	-1%	\$15.14	\$16.23
INFORMATION	4,333	3,730	-14%	\$21.75	\$19.65
FINANCIAL ACTIVITIES	36,422	37,292	2%	\$21.34	\$22.26
PROFESSIONAL AND BUSINESS SERVICES	49,544	51,284	4%	\$21.38	\$21.80
EDUCATIONAL SERVICES	13,799	20,535	49%	\$16.21	\$16.95

²³ EMSI 2019.3 Class of Worker dataset. Retrieved from: <http://www.economicmodeling.com>

²⁴ EMSI 2017.3 Class of Worker dataset. Retrieved from: <http://www.economicmodeling.com>. Industry median wage was constructed by taking the weighted average of median wages for all occupations making up 0.1% or greater of the industry sector.

HEALTH CARE AND SOCIAL ASSISTANCE	45,679	52,940	16%	\$22.14	\$22.54
LEISURE AND HOSPITALITY	34,435	39,644	15%	\$10.44	\$11.69
OTHER SERVICES	22,449	26,459	18%	\$15.67	\$13.65
FEDERAL GOVERNMENT	7,596	7,472	-2%	\$24.95	\$31.65
STATE GOVERNMENT	19,632	17,077	-13%	\$22.47	\$23.40
LOCAL GOVERNMENT	32,892	33,239	1%	\$18.52	\$19.45
TOTAL	355,339	383,542	7%	\$18.66	\$19.86

In addition to having one of the highest hourly wages (on average), the manufacturing sector provides the largest amount of jobs supported by exports. Traded industries, such as manufacturing, sell many of their products out of region and produce more regional economic impact from outside revenues than do non-traded industries. Non-traded, or local, industries include health care, food services, residential construction, and personal services. Non-traded industries are interrelated, may share workers, and are important for the well-being of local populations; nevertheless, they do not inject new money into the local economy to the same extent as traded industries. Table 4 highlights the total jobs supported by exports for the region by traded industry, and it shows a 9% growth in the total amount of jobs supported by exports from 2006-2017. Manufacturing provided over two-thirds of the jobs from exports between 2006 and 2017. Moreover, manufacturing jobs supported by exports grew by 18% from 2006 to 2011. More recently, however, export-supported manufacturing jobs have fallen by 10.1% from 2011 to 2017.²⁵ The next three largest industries with jobs supported by exports (education, medicine, and tourism; information and technology; and engineering and heavy industries), provided just 31.2% or 8,928 of export-supported jobs in 2017.

²⁵ Brookings Institute (2018). Export Monitor 2017 data. Retrieved from <https://www.brookings.edu/research/export-monitor-2018/>

Table 4: Total Jobs Supported by Exports in Region 2²⁶

INDUSTRY	NUMBER OF JOBS			CUMULATIVE GROWTH
	2006	2011	2017	
MANUFACTURING	18,683	22,022	17,050	-9%
EDS, MEDS, AND TOURISM	1,969	2,473	4,260	116%
ENG. & HEAVY MACHINERY	1,714	2,000	1,886	10%
INFORMATION	1,945	3,028	2,782	43%
FINANCE	555	603	582	5%
BUSINESS	520	616	834	60%
AGRICULTURE	839	961	1,094	30%
MINING, OIL, AND GAS EXT.	70	116	131	87%
TOTAL	26,295	31,819	28,619	9%

²⁶ Brookings Institute (2018). Export Monitor 2017 data. Retrieved from <https://www.brookings.edu/research/export-monitor-2018/>. For more information on the methodology, please visit, <https://www.brookings.edu/wp-content/uploads/2015/05/Brookings-Export-Series-Methodology-NM-5715.pdf>.

SECTION 2: REGIONAL ECONOMIC DRIVERS AND CLUSTERS

As described in the previous section, manufacturing remains a leading contributor to Region 2's economy, accounting for over \$6.3 billion of the region's \$31 billion in total gross regional product (GRP). Government services are next in line, making up \$4.1 billion of GRP. Health care, retail trade, wholesale trade and financial services all take up significant portions of total GRP as well. The median wage for a worker in Region 2 is \$19.63 per hour, or \$41k annually, assuming full-time employment (2087 hours annually). For the more rural counties of Region 2, the median wage is closer to \$18.50 per hour. Of the top contributing industries, only two (on average) pay less than the median wage: retail trade and real estate and rental and leasing. These revised hourly wages are \$0.97 and \$1.50 higher than the last estimates from 2017.

As with many regional economies, manufacturing is one of the main driving forces behind the economic engine. In Region 2, other important sectors include finance and insurance; professional, scientific, and technical services; real estate and rental and leasing; government; and construction. The other driver industries—those that have higher than average employment concentration (location quotient), job growth, and contribution to gross regional product (GRP)—include health care and social assistance as well as retail trade. As part of the government sector, education contributes approximately \$2 billion to GRP, about half of which is from higher education institutions in the region.

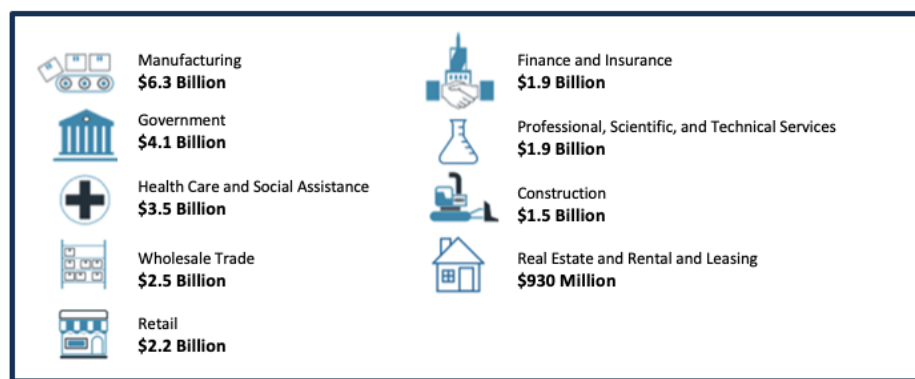


Figure 7: Top Contributors to Gross Regional Product (GRP)

The term “industry clusters” refers to a geographic concentration of businesses that share common markets, suppliers, technologies, and workforce needs. Businesses within a cluster benefit from their proximity to shared resources including a skilled workforce, specialized suppliers, infrastructure, and a localized base of sophisticated knowledge about their industry. Each cluster has a high level of economic integration and interdependency. Beginning with Harvard industry cluster definitions, Region 2 identified and tailored four existing and emerging industry clusters to the unique assets of the region using the following criteria:

- ▶ *Location Quotient (LQ)*: demonstrates the overall concentration of employment within a particular cluster, which serves as an indication of regional competitiveness. Those with proportionally higher employment concentrations in the region compared to the nation will have LQs higher than 1.0. Clusters showing particular regional competitiveness will have LQs higher than 2.0.

- ▶ *Competitive Effect (Shift-Share)*: identifies clusters that have or will have job growth faster than the national average. Numbers higher than zero indicate that the cluster is not just following national trends, but has growth driven by regional assets as well. Higher than average job growth illustrates regional strength within the particular cluster and helps to identify possible emerging industries.
- ▶ *Gross Regional Product (GRP)*: illustrates a cluster's contribution to overall regional wealth. GRP can be an indication that the cluster is a regional economic driver.
- ▶ *Higher than Median Wage*: focusing on clusters that already have average median wages higher than the regional average (\$41K) will ensure that GO Virginia funding is promoting the growth of higher than median wage jobs.

Using these criteria as well as input from regional stakeholders, Region 2 identified four clusters: manufacturing (particularly advanced manufacturing), life sciences and health care, food and beverage processing, and emerging technology and IT clusters. Each cluster represents opportunities for growth and diversification for the region's economy as well as opportunities for regional businesses to diversify their market base. Each make significant contributions to GRP, as demonstrated by the bubble size in Figure 7 and the GRP column in Table 5. Manufacturing and food and beverage processing clusters each have higher employment concentrations than the national average. Manufacturing, life sciences and health care, and food and beverage processing clusters are also expected to grow faster than the national average in the next five years, as seen in the vertical axis measurement for competitive effect (see definition above).

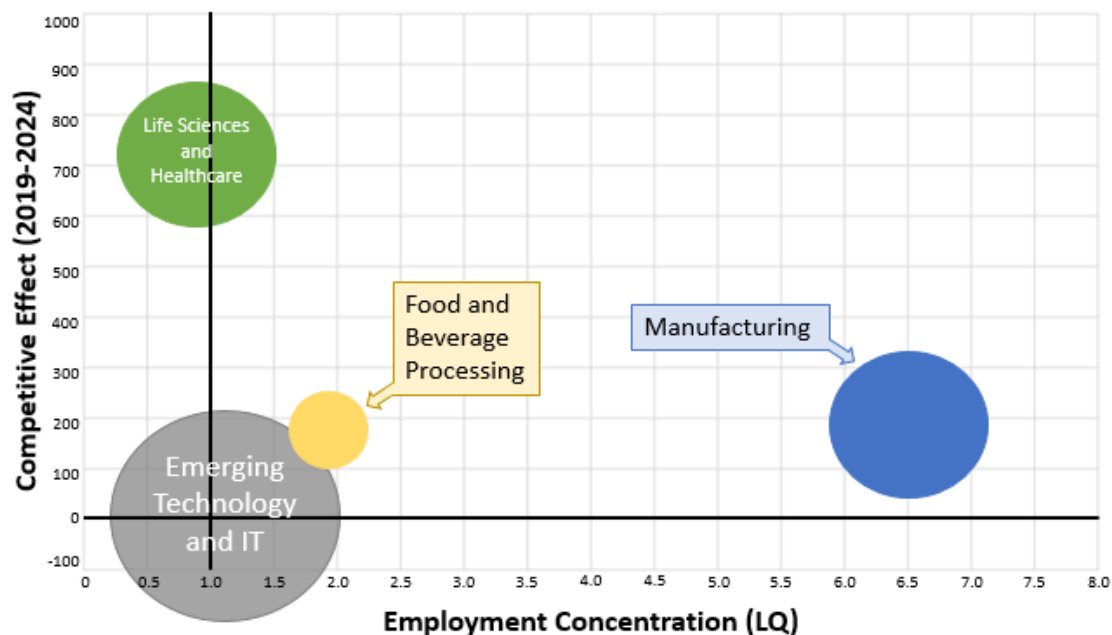


Figure 8. Region 2 Target Industry Clusters--GRP, LQ and Shift-Share²⁷

These statistics have shifted since the original plan was created. Manufacturing has an even greater employment concentration than before, but is not expected to grow as fast. Originally, food and beverage

²⁷ EMSI 2017.3; QCEW

manufacturing did not have a higher employment concentration than the nation. Today, it not only demonstrates a significant regional strength in terms of LQ, but it is also expected to grow more than before. Life sciences and healthcare is also expected to grow more than originally projected; however, its amount of employment today is not as competitive (i.e. not as concentrated) as the national average. Emerging Technology and IT remains relatively unchanged compared to the last G&D plan.

Table 5 on the next page summarizes projected employment growth for each cluster and its corresponding location quotient. The clusters selected are growing faster than the regional economy as a whole, with projected job growth rates averaging 5.2% from 2019 to 2024 (versus overall regional job growth of 4%). The jobs in these clusters pay, on average, nearly 50% more than other jobs in the region. While these clusters have only about 11% of all establishments in the region, they provide almost 33% of all jobs and account for 37% of the gross regional product (GRP).

Table 5. Region 2 Industry Cluster Performance Trends²⁸

	2019 JOBS	PROJECTED JOB GROWTH (2019-2024)	2019 LQ	2019 GRP (MILLIONS)	2018 PAYROLLED BUSINESS LOCATIONS	2019 MEDIAN HOURLY WAGE
MANUFACTURING	17,220	2%	6.48	\$3,189	123	\$20.79
LIFE SCIENCES	37,175	9%	0.96	\$3,099	1,158	\$26.75
FOOD & BEVERAGE PROCESSING	5,615	6%	2.12	\$828	217	\$15.67
EMERGING TECH & IT	65,199	5%	0.91	\$4,229	1023	\$20.63
TOTAL 4 CLUSTERS	125,209	5%	2.62	\$11,345	2,521	\$20.96
ALL INDUSTRIES	375,175	4%	0.92	\$30,823	22,289	\$19.64
4 CLUSTERS AS % OF TOTAL ECONOMY	33.4%	--	--	36.8%	11.3%	--

Except for the manufacturing cluster, all identified clusters are projected to grow at the same rate or faster in Region 2 than in Virginia (Table 6). Compared to the U.S., all clusters are expected to grow faster in Region 2. As seen in Table 6, median wages are lower in Region 2 when compared to Virginia and the U.S. They are notably lower in the emerging technology and IT cluster because the region's education institutions dominate this cluster. The U.S. and Virginia clusters have higher concentrations of private IT-related firms that pay higher wages. As such, developing an emerging technology and IT cluster may pose difficulties unless the region uses other factors (not wage) to attract and retain workers.

²⁸ EMSI 2017.3; QCEW

Table 6. Comparative Industry Cluster Trends²⁹

	PROJECTED JOB GROWTH (2019-2024)			2019 MEDIAN WAGES		
	REGION 2	VIRGINIA	U.S.	REGION 2	VIRGINIA	U.S.
MANUFACTURING	1.4%	2.7%	-0.8%	\$43,243	\$48,716	\$45,841
LIFE SCIENCES	8.8%	8.8%	7.2%	\$55,642	\$59,133	\$58,672
FOOD AND BEVERAGE PROCESSING	5.8%	4.8%	2.4%	\$32,600	\$34,284	\$32,525
EMERGING TECH AND IT	5.2%	4.8%	5.3%	\$42,921	\$66,761	\$56,669
TOTAL ALL 4 CLUSTERS	5.3%	5.3%	3.5%	\$43,601	\$52,223	\$48,427
ALL INDUSTRIES	3.6%	4.9%	4.8%	\$36,962	\$40,727	\$42,650

Table 7 illustrates that each cluster exports 45% or more of its products outside the region, indicating the potential for them to become significant traded industries. Furthermore, the table shows how much local demand is met by companies within the region and how much is met by imports. This comparison helps determine opportunities to expand local businesses' shares of local demand. For example, only 27% of industry inputs are bought regionally (regional demand) in manufacturing, which pose opportunities for regional companies to develop products to meet the current demand met by imports.

Table 7. Industry Cluster Sales and Demand, Region 2³⁰

	TOTAL SALES (MILLIONS)	% IN-REGION SALES	% EXPORTED SALES	TOTAL DEMAND (MILLIONS)	% DEMAND MET IN-REGION	% DEMAND MET BY IMPORTS
MANUFACTURING	\$10,696	5%	95%	\$1,885	27%	73%
LIFE SCIENCES	\$5,317	55%	45%	\$3,983	74%	26%
FOOD & BEVERAGE PROCESSING	\$2,867	17%	83%	\$1,618	31%	69%
EMERGING TECH & IT	\$5,682	51%	49%	\$6,204	49%	51%

Based on jobs postings, annual openings and regional completions data as well as input from stakeholders, Region 2 conducted a workforce gap analysis. Workforce demands exist across different occupation types within these four clusters, depending on the level of education and skill sets. In general, demand for occupations includes:

- **Entry-level Occupations:** Certain entry-level occupations have increased demand for two major reasons. First, many of these occupations do not have high enough wages to secure and retain qualified talent. Second, companies express a lack of basic mathematical skill sets among high school graduates and a dearth of soft skills such as problem solving, initiative, dependability,

²⁹ EMSI 2017.3 Class of Worker dataset, Retrieved from <http://www.economicmodeling.com>. Industry median wage was constructed by taking the weighted average of median wages for all occupations making up 0.1% or greater of the industry sector and then multiplying by 2087 work hours in the year. This calculation assumes full-time employment.

³⁰ EMSI 2017.3; QCEW

and timeliness. Many applicants or beginning workers do not demonstrate the aptitude to learn quickly on the job.

- ▶ **Middle-Skill Occupations:** These jobs often require a unique skill set acquired through 1-2 year certification or associate degree programs, whether they are academic or workforce-based. Many of the occupations also involve professional accreditations, licensing and/or apprenticeship-style training. Technicians, machinists, Licensed Practical Nurses, computer support specialists, carpenters, HVAC workers, etc. are all considered “middle-skill” jobs. As many of the workers employed in these kinds of occupations are aging out of the workforce (i.e. baby boomers), demand for new workers grows. Meeting this demand is particularly challenging due to lack of interest among younger generations. First, they may not know about the opportunities available to them, such as the higher than median income wages for many of these jobs. Second, our society has developed a stigma regarding these types of occupations; people may view the jobs as manual labor or “grunt work”. In addition, school counselors, peers, and families may reinforce the perception that students need to go to a four-year college to be successful, whereas many of these jobs do not require a four-year degree. Finally, many of these jobs require similar skill sets to those described in the entry-level occupation's description, and potential workers may find it challenging to acquire these skills.
- ▶ **Mid-Level Managerial Positions and Higher:** This region provides several jobs for recent bachelor or advanced degree graduates. The area also has higher than average numbers of graduates receiving bachelor, master, and doctorate degrees. Retaining these graduates is a challenge, however. First, four-year higher education institutions and companies in the region do not adequately collaborate to build a pipeline of graduates into regional employment opportunities. Second, as graduates gain experience and search for promotion opportunities, they do not find as many of the mid-level jobs or salaries they desire. As a result, they may move elsewhere. Counter-intuitively, some companies in the region have also partly attributed departures or closings to difficulty finding qualified applicants for middle-management positions.³¹

The following is a description of the four priority industry clusters. We provide contextual data on the industry, occupation and skill needs in these clusters based on secondary data and stakeholder input.

Manufacturing Cluster

Historically and today, manufacturing has been one of the top industry drivers in Region 2. With a significantly higher employment concentration (LQ) and contribution to GRP, cluster strengths include:

- ▶ **Automotive (including Truck) Manufacturing:** Region 2 excels at developing automotive parts and specializing in heavy-duty truck production. Volvo Trucks USA produces all Volvo trucks sold in North America and is the largest automotive manufacturer in the region.
- ▶ **Downstream Chemical Products:** Region 2 has strengths in manufacturing personal care and cleaning products, pigments and coating, and explosives. Some of these products may support the automotive and mining industries. The expertise in this cluster can also contribute to biopharma and plastics industries,³² which are two traded industry clusters in this region.

³¹ We use information from EMSI (2017.3), Bureau of Labor Statistics, the most recent workforce strategic plans, and local stakeholder interviews. More data on demand can be found in Appendix B.

³² Harvard Business School (2014) U.S. Cluster Mapping. Retrieved from: <http://www.clustermapping.us>

- ▶ **Metalworking Technology:** Plate work manufacturing—which can support automotive, construction, energy and other downstream industries—and the development of machine tools for manufacturers are two regional strengths, as indicated by the high location quotients and projected job growth exceeding the national average. Many of these manufacturers are small, with less than 50 employees.
- ▶ **Paper and Packaging:** Paper and packaging supports the transportation and distribution sector and has potential to support the food and beverage processing cluster.
- ▶ **Lighting and Electrical Equipment:** Region 2 has a strength in lighting and electrical equipment, with a 7.35 LQ and a \$391 million contribution to GRP. Companies contribute to automotive and energy through motor and generator manufacturing, construction through niche lighting fixtures, and even the technology sector through fiber optics.

These manufacturing industries are expected to grow 1.4% in the coming five years, compared to national growth of 0.2%. As technologies develop, many of these industries will also need to adopt automation and advanced technologies to compete. For instance, the development of autonomous vehicle technologies and advanced CNC machining will challenge many companies to adapt both their production methods and products.

Table 8 provides a list of 15 prominent occupations in the manufacturing cluster. Little has changed since the original G&D plan. Occupations that provide higher than median wages for the region are in green. Occupational demand is contingent on potential interest to work in the cluster, on worker retirements, and on training and experience. Those occupations paying lower than median wage generally require a high school education level and some on-the-job training. While they are and will be in high demand, as illustrated by the large number of annual openings, the key challenge for employment here is increasing interest among potential workers and ensuring they have the soft skills (e.g. timeliness, dependability, and problem-solving skills) to retain those jobs. Those occupations paying higher than median wage generally require some post-secondary education—ranging from professional certifications through bachelor degrees—and/or extensive on-the-job training. They are mostly middle-skill jobs and managerial positions. Companies in the region have indicated that filling both position types is challenging due to an insufficient career pipeline. Although community college and midlevel management training programs exist in the region, they are often not operating at full capacity or cannot meet all regional demand. In addition, many in Region 2 are not aware of these programs or the potential benefits they provide.

Table 8: Key Manufacturing Cluster Occupations³³

SOC	Description	Manufacturing Cluster				All Industry	
		Employment (2019)	% Change (2014-2019)	Employment (2024)	% Change (2019-2024)	Median Hourly Earnings	Avg. Annual Openings (2019-2024)
11-1021	General and Operations Managers	220	3%	231	5%	\$40.51	334
17-2112	Industrial Engineers	269	17%	291	8%	\$36.20	65

³³ EMSI 2017.3; QCEW Employees

41-4012	Sales Representatives, Wholesale and Manufacturing	250	16%	264	6%	\$26.31	333
49-9041	Industrial Machinery Mechanics	409	12%	430	5%	\$21.10	126
49-9071	Maintenance and Repair Workers, General	271	-3%	274	1%	\$17.29	430
51-1011	First-Line Supervisors of Production and Operating Workers	686	24%	720	5%	\$27.06	209
51-2028	Electrical, Electronic, and Electromechanical Assemblers	821	21%	742	-10%	\$16.16	144
51-2098	Assemblers and Fabricators, including Team Assemblers	3,106	15%	3,144	1%	\$14.45	749
51-4041	Machinists	492	3%	511	4%	\$21.46	152
51-4121	Welders, Cutters, Solderers, and Brazers	556	25%	612	10%	\$19.14	189
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	454	4%	427	-6%	\$17.32	192
51-9196	Paper Goods Machine Setters, Operators, and Tenders	797	25%	780	-2%	\$18.69	105
51-9198	Helpers—Production Workers	218	-16%	232	6%	\$13.00	126
51-9199	Production Workers, All Other	244	-24%	249	2%	\$11.96	139
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	400	31%	419	5%	\$12.45	843
	Total	9,177	13%	9,306	3%	\$22.53	4,065

* Occupations that provide higher than median wages for the region are in green. Paper Goods Machine Setters are also in green due to its higher than median wage for more rural areas of GOVA Region 2.

Life Sciences and Health Care Cluster

Following national trends, Region 2's health care sector has grown significantly in the past decade and will grow approximately 8.8% by 2024. While the cluster's employment concentration has actually become less than the national average, it is expected to grow faster in the coming years. Four of the fifteen careers listed in Table 9 below have grown significantly more than predicted in the original G&D plan (greater than 10%): Medical & health service managers, physicians & surgeons, psychiatric technicians, and person care aides. Carilion Clinic, Centra Health, Lewis-Gale and other health care entities and

providers continue to experience growth in facilities, services, and employees. While health care is not a traded (or exports-producing) sector, it is an engine for higher wage job growth, talent attraction and retention, and supports other traded sectors, such as life sciences.

Life sciences (defined as research, manufacturing, and distribution related to medical instruments, supplies, and pharmaceuticals) still constitutes an emerging cluster in this region. In recent years, the region has begun to develop the infrastructure to support this growing cluster. For instance, a partnership between Virginia Tech and Carilion Clinic has supported the creation of the Virginia Tech Carilion Research Institute and the Virginia Tech School of Medicine in Roanoke, VA. From this successful partnership, other initiatives have emerged such as a Health-IT Innovation Corridor and the business accelerator RAMP, which partially focuses on the fostering of life science startups. To support this effort and bolster the health care career pipeline, several higher education institutions have increased their support of life sciences and health care programming. Virginia Western Community College, for example, has constructed a wet lab to train lab technicians and others in the field.

A robust life sciences industry cluster can promote the growth of higher wage positions and become a strong economic driver through its exports. Because the life science cluster is still relatively nascent, the occupations listed in Table 9 (below) are mostly relevant to the health care industry. About half of the current employees in this group make higher than median wage. Other than the Licensed Nurses (LPNs/LVNs), these jobs require an associate’s degree or above. Demand for Registered Nurses is particularly high. Regional hospitals and health care employers are currently collaborating with nonprofits and other training entities to create an adequate pipeline to fill this gap. Hindering this effort is the lack of basic STEM-skills, particularly mathematics, among potential workers (e.g. high school graduates) in the region. This skill gap will also hamper the growth of a life science cluster. For every PhD researcher, the industry will need multiple technicians and support staff capable of basic mathematics and lab testing.

For occupations requiring a bachelor’s degree or higher, the challenge may be attracting or keeping employees in the region. Median salaries for these occupation types are 8.9% lower than the national median (\$60,418 versus \$68,058). While regional salaries may be lower, the worker’s actual purchasing power may more than make up for this difference. According to BEA data on price parities for metropolitan areas, Region 2 price levels are approximately 10% lower than the nation.

Table 9: Key Life Science and Health Care Cluster Occupations

SOC	DESCRIPTION	LIFE SCIENCE AND HEALTH CARE CLUSTER				ALL INDUSTRY	
		Employment (2019)	% Change (2014-2019)	Employment (2024)	% Change (2019-2024)	Median Hourly Earnings	Avg. Annual Openings (2019-2024)
11-9111	Medical and Health Services Managers	637	23%	712	12%	\$45.97	85
29-1062	Family and General Practitioners	396	-2%	424	7%	\$93.67	18
29-1069	Physicians and Surgeons	917	26%	979	7%	\$100.35	46
29-1141	Registered Nurses	6,252	15%	6,892	10%	\$28.85	569

29-2034	Radiologic Technologists	552	10%	595	8%	\$24.44	41
29-2053	Psychiatric Technicians	260	13%	254	-2%	\$9.26	33
29-2061	Licensed Practical and Licensed Vocational Nurses	1,879	7%	1,972	5%	\$19.78	219
31-1014	Nursing Assistants	4,311	5%	4,587	6%	\$11.65	680
31-9091	Dental Assistants	603	7%	650	8%	\$19.28	96
31-9092	Medical Assistants	1,056	14%	1,216	15%	\$14.45	177
37-2012	Housekeeping Cleaners	732	4%	792	8%	\$9.49	564
39-9021	Personal Care Aides	496	65%	604	22%	\$9.11	774
43-4171	Receptionists and Information Clerks	1,350	12%	1,458	8%	\$11.61	439
43-6013	Medical Secretaries	678	9%	782	15%	\$15.99	119
43-9061	Office Clerks, General	1,811	2%	1,815	0%	\$13.76	1,237
	Total	21,930	14%	23,731	9%	\$28.51	5,096

* Occupations that provide higher than median wages for the region are in green.

Food and Beverage Processing Cluster

Another industry cluster in Region 2 is food and beverage processing. Already, the region has a relatively strong food and beverage manufacturing industry group, with industries such as processed dairy products, snack foods, soft drinks and others having location quotients higher than 2.0. Commercial and retail food manufacturing is projected to grow even more in the coming five years. In addition, winery and brewery employment may grow as much as 20%, two percentage points higher than the previous G&D plan. Many fermented beverage firms exist already in the region, and this sub cluster is growing with the support of educational programming like Virginia Tech's Enology and Fermentation Sciences Department. With national concerns over food security, healthy eating, and local sustainability, this urban-rural mixed region is well positioned to align its agricultural supply chain, skilled workforce, manufacturing, and wholesale assets.

A December 2016 article in Forbes pointed to the extent of global and national industry growth, while highlighting that Silicon Valley invested over \$1 billion in food startups and projects in 2016 alone.³⁴ According to McKinsey & Company, from 2004-2013, global investments in the food-and-agribusiness sector increased threefold, to more than \$100 billion in 2013. In Region 2, Frito Lay, Abbott Nutrition, Mennel Milling, Tetra U.S., Blue Ridge Beverage Company, Pepsi Bottling Group, and Red Sun Farms are just a few examples of businesses contributing to this cluster. The Roanoke MSA has successfully competed to be an east coast hub for several larger scale breweries including Ballast Point and Deschutes. Municipalities and regional economic development groups frequently cite the region's water

³⁴ Lampert, P. (Dec 2016). Ten Food Trends That Will Shape 2017. Forbes. Retrieved from: <https://www.forbes.com/sites/phillempert/2016/12/14/the-supermarketgurus-2017-food-trend-forecast/#22f9bf1854b8>

and sewer infrastructure as a key asset. Water (quality, access, and cost) is among the leading site selection considerations for food and beverage processing.

Similar to the manufacturing cluster, the food and beverage processing cluster—both its agriculture and manufacturing components—may benefit from changing technology as well as consumer spending trends. Mechatronics, autonomous systems, and other technology continue to develop and have a growing presence among these industries. While most of the occupations listed in Table 10 do not officially require much higher than a high school education and some on-the-job training, many increasingly rely on an array of mechanical, computer, scientific, and business skill sets. Moreover, future job growth in this sector would likely include higher-wage occupations. Companies in this cluster represent small firms and start-ups as well as mid-size and larger-scale operations all of which must stay up to date on consumer spending, food trends, FDA and EPA regulations, and more. Those working in agriculture, for instance, often learn appropriate agricultural practices and integrate them more and more with technology used to monitor and produce agricultural goods. Small farmers may benefit from “buy local” movements, but they must also take advantage of changing practices to sustain their businesses. Value-added agriculture and the transition to larger commercial agribusiness may be one opportunity for Region 2 to capitalize and align these assets. Thus, although there may always be a need for entry-level manufacturers and commercial drivers, the cluster will increasingly need talent skilled in the food sciences, mechatronics, and other technical skills, as well as those conscious of industry and regulatory trends. Consequently, overall median wage may increase.

Table 10: Key Food and Beverage Processing Cluster Occupations³⁵

SOC	DESCRIPTION	FOOD AND BEVERAGE PROCESSING CLUSTER				ALL INDUSTRY	
		Employment (2019)	% Change (2014-2019)	Employment (2024)	% Change (2019-2024)	Median Hourly Earnings	Avg. Annual Openings (2019-2024)
11-9013	Farmers & Ranchers	5,495	-10%	5,371	-2%	\$9.50	418
41-4012	Sales Rep, Wholesale and Manufacturing	166	4%	177	7%	\$25.59	368
43-5081	Stock Clerks and Order Fillers	5,179	6%	1,166	7%	\$10.87	46
43-9061	Office Clerks, General	79	23%	81	3%	\$13.93	1,273
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	557	7%	705	12%	\$10.42	42
45-2093	Farmworkers, Farm, Ranch, and Aquaculture Animals	271	28%	8,540	10%	\$9.98	569

³⁵ EMSI 2019.3; QCEW, Non-QCEW Employees, and Sole Proprietors. We include non-QCEW and Self-Proprietors because many farmers are included in self-proprietors.

51-1011	First-Line Supervisors of Production and Operating Workers	1,969	7%	820	7%	\$27.06	59
51-3092	Food Batchmakers	705	56%	5,659	7%	\$14.16	680
51-9111	Packaging and Filling Machine Operators and Tenders	931	-2%	792	9%	\$13.70	96
53-3031	Driver/Sales Workers	94	-9%	104	11%	\$10.91	95
53-3032	Heavy and Tractor-Trailer Truck Drivers	5,507	7%	1,423	15%	\$18.45	177
53-3033	Light Truck or Delivery Services Drivers	2,406	6%	3,957	11%	\$11.74	564
53-7051	Industrial Truck and Tractor Operators	1,427	-5%	3,233	5%	\$14.84	439
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	5,841	7%	926	18%	\$12.45	119
53-7064	Packers and Packagers, Hand	1,584	-7%	10,072	3%	\$17.87	1,237
	Total	26,549	10%	37,479	9%	\$14.34	5,396

* Occupations that provide higher than median wages for the region are in green.

Compared to the original G&D plan, certain occupation data has changed. Office clerks and food batchmakers are growing faster than predicted (greater than 10%). Farmers and Ranchers are still declining; however, average annual job openings have increased significantly due to retirements (418 annual openings compared to 69 in the 2017 G&D plan). Unlike the previous G&D plan, certain occupations are experienced job declines: driver/sales workers, industrial truck & tractor operators, and packers & packagers. These declines may be less about demand and more about the limited supply of workers suitable for these jobs. Employers may have adapted to this limited supply.

Emerging Technology and IT Cluster

This cluster includes existing and emerging industries that ultimately support the other prominent driver industries and clusters in the region through technology development. Sub-clusters include:

- **Autonomous Systems:** The autonomous systems market has been dominated by the Department of Defense (DoD), which budgeted \$4.457 billion for autonomous systems development and research in 2017³⁶ alone. DoD spending is expected to increase in future years; however, the U.S. agricultural industry could be responsible for two-thirds of all private sector market purchases³⁷ within the next ten years. This would eventually lead to agricultural industries being the largest purchasers of autonomous systems devices. Farmers use autonomous systems to successfully

³⁶ http://dronecenter.bard.edu/files/2016/02/DroneSpendingFy17_CSD_1-1.pdf

³⁷ <http://www.westernfarmpress.com/miscellaneous/agriculture-farm-two-thirds-uav-drone-market>

identify crop diseases, monitor water usage, gauge weather patterns, and ultimately increase crop yields. Region 2 already has research, education, and manufacturing strengths in air, land, and sea. These assets include but are not limited to Virginia Tech's Transportation Institute research, Liberty University's Aviation and Unmanned Aerial Systems curriculum, community college drone curriculum, the Mid-Atlantic Aviation Partnership (an FAA-designated test site), the Association for Unmanned Vehicle Systems International (AUVSI) Valleys and Ridges chapter, and numerous researchers and companies pursuing the development and manufacturing of unmanned systems technology.

- ▶ **Cyber security and Information Technology (IT):** Cyber security and IT industries support practically all industries in the region from government and health care to manufacturing and financial industries. Many of the most recent, successful startups in Region 2 were innovative in their use and development of information technology. Meanwhile, the cyber security market has seen increasing demand that has progressed steadily along with technology. There is an ever-increasing global demand for IT skills such as coding, systems administration, malware prevention, network engineering, security analysis, and more. By 2020, the demand for cyber security will eclipse \$120 billion.
- ▶ **Knowledge Creation and R&D:** The knowledge creation and R&D sub cluster includes higher education institutions and research firms. Research and knowledge-production is vital to the development and evolution of other industries. In Region 2, most R&D activity is within higher education institutions, which represents a challenge, as much of the research has not translated to regional activities by private firms. Like most of Virginia, Region 2 has a high concentration of higher education institutions, although the scale, number, and variety of entities is perhaps unique. For example, Region 2 includes both the state's largest private university (Liberty University in Lynchburg) and the state's largest research university (Virginia Tech in Blacksburg). In Lynchburg alone, there are four colleges and universities. The highest number of jobs are teaching-related. The largest non-teaching occupations are technicians and engineers.

Technology and IT industries typically offer competitive wages, contributing handsomely to a region's GRP; however, this cluster typically requires a high level of skill, usually in a specific skill set, creating supply gaps in the workforce. Although graduates from the region's many higher education institutions can be a potential source of workforce supply, most with these skill sets leave the region after graduation. According to jobs postings data, in the average month over the last 12 months, the region filled 594 positions listed in Table 11 out of 1,407 unique job postings. This means there was approximately one hire for every two active job postings. This difference is an indication of unmet demand and greater competition among employers for talent. It is also a considerably higher ratio than that cited in the original G&D plan: 670 hires to 969 postings.

Table 11: Key Emerging Technology and IT Cluster Occupations³⁸

SOC	DESCRIPTION	EMERGING TECHNOLOGY AND IT CLUSTER				ALL INDUSTRY	
		Employment (2019)	% Change (2014-2019)	Employment (2024)	% Change (2019-2024)	Median Hourly Earnings	Avg. Annual Openings (2019-2024)
15-1121	Computer Systems Analysts	329	6%	355	8%	\$34.90	54
15-1132	Software Developers, Applications	557	23%	652	17%	\$44.27	91
15-1133	Software Developers, Systems Software	258	-2%	278	8%	\$48.94	42
15-1151	Computer User Support Specialists	1,505	10%	1,662	10%	\$21.25	145
17-2051	Civil Engineers	381	28%	404	6%	\$36.76	65
17-2071	Electrical Engineers	276	-5%	293	6%	\$45.07	59
19-1021	Biochemists and Biophysicists	24	-37%	23	-4%	\$21.61	7
19-1042	Medical Scientists, Except Epidemiologists	69	-12%	71	3%	\$57.80	15
19-2031	Chemists	27	-25%	28	4%	\$50.48	13
19-4021	Biological Technicians	69	-9%	71	3%	\$14.44	17
25-1099	Postsecondary Teachers	2,848	-3%	3,061	7%	\$27.41	268
25-2021	Elementary School Teachers, Except Special Education	3,066	3%	3,098	1%	\$23.08	230
25-2022	Middle School Teachers, Except Special and Career/Technical Education	2,585	-3%	2,612	1%	\$23.26	195
25-2031	Secondary School Teachers, Except Special and Career/Technical Education	1,529	5%	1,543	1%	\$22.90	111
41-3099	Sales Representatives, Services, All Other	418	10%	455	9%	\$25.42	228
	Total	13,941	-1%	14,607	5%	\$33.17	1,541

* Occupations that provide higher than median wages for the region are in green.

³⁸ EMSI 2017.3; QCEW Employees

SECTION 3: REGIONAL PRIORITIES

Region 2's three sub-regions have similar assets and concerns, as demonstrated by a review of existing strategic plans for each of the three areas as well as discussions with area representatives. The existing strategic plans reviewed for this document include Comprehensive Economic Development Strategies, Workforce Development Strategic Plans, and strategic plans of each of the three Economic Development Marketing Organization. During the original planning process, the GOVA Region 2 Council also met with representatives from each of the three area organizations to discuss key assets, activities and challenges. These organizations included:

- ▶ **New River Valley:** the [New River Valley Regional Commission](#), the [New River Mount Rogers Workforce Development Board](#), and the [New River Valley Economic Development Alliance](#)
- ▶ **Roanoke-Alleghany:** the [Roanoke Valley-Alleghany Regional Commission](#), the [Virginia's Blue Ridge Works! Workforce Development Board](#), and the [Roanoke Regional Partnership](#)
- ▶ **Lynchburg MSA:** [Virginia's Lynchburg Region Local Government Council](#), the [Lynchburg Region Workforce Development Board](#), and [Lynchburg Regional Business Alliance](#)

Through their strategic planning and daily activities, each of these organizations employ in-depth community engagement processes, which allows for a comprehensive perspective of each area's economy. Below is a list of key characteristics similar across Region 2 based on the 2017 analysis of these strategic plans.

Table 12. Region 2 Strengths, Opportunities, Challenges

Areas of Interest		Common Characteristics
Talent	Demographics	<ul style="list-style-type: none"> CHALLENGES: Region 2 has an aging population with increasing loss of younger residents due to brain drain. Like many regions in the US, Region 2 also faces drug abuse challenges among citizens within its population.
	Education	<ul style="list-style-type: none"> STRENGTHS: The community college system; many 4-year higher education institutions; strong K-12 system among many counties in the region OPPORTUNITIES: Create stronger partnerships between businesses and schools; leverage the integrated community college system more CHALLENGES: Lack of experiential learning opportunities; stigma against middle-skill (non-bachelor degree) jobs; workforce lacks soft skills
	Workforce	<ul style="list-style-type: none"> STRENGTHS: Strong education system (K-postsecondary) OPPORTUNITIES: Retain students and young professional by raising awareness of regional employment opportunities; grow public awareness of skilled trade occupations CHALLENGES: Many low-wage jobs; brain drain; pipeline challenges; cost/time to upskill someone; limited retention of college graduates; lack of soft skills
Infrastructure	Infrastructure	<ul style="list-style-type: none"> STRENGTHS: Water and sewer OPPORTUNITIES: Redevelop and repurpose underutilized property; create more basic infrastructure including communications in rural parts of the region; expanding recreational, cultural and quality of life assets

Areas of Interest		Common Characteristics
		<ul style="list-style-type: none"> • CHALLENGES: Aging infrastructure and building stock; broadband access, rural-urban divide
	Transportation	<ul style="list-style-type: none"> • STRENGTHS: I-81 interstate system; regional airports; Amtrak; major railroads • OPPORTUNITIES: Improve regional air service; facilitate access to interstate system for attracting and growing businesses • CHALLENGES: Lack of public transportation especially in rural areas; regional airport challenges; congestion on I-81; no international terminal
Entrepreneurship	Business Environment	<ul style="list-style-type: none"> • STRENGTHS: Low cost of doing business; collaborative business community; good resources for businesses. • OPPORTUNITIES: Promote entrepreneurial growth and venture capital funding; improve business engagement with resource entities, ensure greater broadband connectivity; create financial incentives for hiring dislocated workers. • CHALLENGES: Weak entrepreneurial leadership; competition with online retailers; corporate restructuring resulting in regional downsizing or restructuring; lack of regional brand/image/identity
	Quality of Life and Culture	<ul style="list-style-type: none"> • STRENGTHS: Natural amenities and outdoor recreation; low cost of living; ability to retain family-oriented professionals; diversity in arts and culture; vibrant downtowns; low crime-rates • OPPORTUNITIES: Build public engagement; market to millennials; regionalize youth development programs; develop regional brand • CHALLENGES: Unaffordable and/or deteriorating housing; low citizen engagement; affordable housing; regional identity/brand; preservation of historic buildings and neighborhoods
	Institutional Collaboration	<ul style="list-style-type: none"> • STRENGTHS: Realignment of the workforce system • OPPORTUNITIES: Leverage research (including medical); develop shared legislative platform; more coordination and service delivery related to workforce; promote experiential learning; share data and market opportunities; build community leadership capacity • CHALLENGES: Lack of common vision among partners; lack of regional collaboration; no system of shared outcomes/metrics/collective impact

Moreover, these three sub-regions within Region 2 have several well-aligned target industry goals. The Region 2 Council considered these target industries in developing its four priority clusters. In the future, many of these industries will rely on their ability to grow and adapt to the changing economy with the help of new technologies. These industry similarities include:

- ▶ Manufacturing (both basic and advanced)
- ▶ Life sciences, biomedical, and health care
- ▶ Food and beverage processing
- ▶ Information technology (especially cybersecurity)
- ▶ Business and financial services

Other industries that at least two regions mentioned in their plans or during the Growth and Diversification planning process were transportation manufacturing and warehousing, autonomous systems (including aerial and terrain), and energy. While there are many industries that support the region's strong cultural environment and overall quality of life, the driver industries listed above provide a critical employment base.

While these three sub-regions exhibit numerous similarities, differences do arise particularly with respect to the more urban and rural parts of Region 2. For example, access to broadband and transportation infrastructure are much larger concerns for those in outlying rural counties. As small businesses in these counties consider growing their market base and exporting outside the region, they are hindered by this lack of IT and transportation access. Most rural counties in Region 2 are also more economically reliant on the manufacturing sector, as well as on the food and beverage processing cluster that includes agricultural production. Region 2's urban hubs, however, focus more on developing the life sciences, health care, and IT industries. This difference in industry reliance also contributes to diverse workforce needs from middle skilled jobs requiring industry certifications and associate degrees to jobs requiring higher level, research and development-oriented degrees. While the median hourly wage for all of Region 2 is \$19.62 per hour, the region's more rural counties have median hourly wages closer to \$18.50 per hour.

2019 Outreach for Plan Revision

In the summer of 2019, Region 2 Support Organization staff, under the direction and engagement of Region 2 Council, conducted additional outreach in Region 2 to elicit feedback on strengths, opportunities and challenges, with particular focus on gaps and project needs per GO Virginia strategic areas. Council and support organization staff conducted a gap analysis in mid-2018 to identify strategic areas that were not yet being addressed by funded projects. Technology development and K-12 strategies in talent development were two areas which had received less focus on projects to that time. Since then, Council and staff have worked to grow the project pipeline in these areas and the outreach process in 2019 included a particular focus on technology and K-12 issues and opportunities.

The process included input sessions in each sub-region (Greater Lynchburg; Roanoke-Alleghany; and New River Valley) with over 60 total participants.

The Lynchburg session was held on June 7, 2019 and included members of the GO Virginia Region 2 council, as well as attendees from BB&T, the Lynchburg Regional Business Alliance, and the Region 2 Local Government Council. The meeting was led by Megan Lucas, CEO of the Lynchburg Regional Business Alliance. The purpose of this meeting was to update leadership on the strategic initiatives that were being executed on behalf of the region by the Lynchburg Regional Business Alliance, Central Virginia Planning Council, and the Central Virginia Workforce Board. Updates were shared. There was brief discussion regarding the recent productive interaction between the Valleys Innovation Council and the Alliance regarding entrepreneur development strategies. A local government council briefing was conducted to discuss structure, organizational strategies, and regional initiatives related to the Comprehensive Economic Development Strategy and the Regional Connectivity Plan. On the Regional Workforce briefing, current GO Virginia projects were highlighted and discussed. Attendees remarked on the success of the Worlds of Opportunities Career Expo (funded by Region 2 Council as part of the Talent

Collaborative project) and were interested in engaging student's parents more. Several participants noted the overall lack of funding for broadband.

The Roanoke session was held on June 18, 2019 and included a diverse range of attendees from K-12 and Career and Technical Education, entrepreneur resource organizations, regional commission leaders, economic development officials, Goodwill Industries, and various regional local government stakeholders.

Attendees were separated into three groups according to interest: technology/entrepreneurship, education, and "other". Those in the technology/entrepreneurship group expressed interest in blockchain, increasing the capacity for angel networks, and creating an inter-regional program accelerator. Education responses focused on funding for a registered apprenticeship through GOVA funding, increased business interaction, and increased high-wage job training services. Finally, those in the "other" category expressed interest in regional food system planning and creating a community development financial institution to partner with GOVA to offset higher costs of riskier investments.

Attendees were given worksheets to write out existing assets or activities that GOVA can build upon, opportunities/projects for GOVA to fund, and obstacles that exist in the region. Needs and opportunities included enhanced support for unmanned technology sector companies, aftercare for early-stage high growth entrepreneurs coming out of regional incubator and accelerator programs such as RAMP, and increasing minority owned business support through funding, mentorship programs, and other resources. Opportunities for funding listed an incubator and accelerator space for entrepreneurs, blockchain, and an angel fund. Finally, the limited amount of regional funding available as match from individual local governments was listed as an obstacle.

The New River Valley session was conducted on June 19, 2019. Participants in the New River Valley input session included stakeholders from K-12/CTE, local governments, and *regional* business development centers and organizations including the NRV Small Business Development Center. Similar to the Roanoke meeting, attendees were separated into the same three groups. Those in technology/entrepreneurship expressed interest in continuing access to capital, supporting an opportunity zone funds, angel investing, and a co-working/small scale production space for post-accelerator program businesses. Those in the education group were interested in connecting CTE curriculum to higher paying jobs, creating entrepreneurship tracks/increasing entrepreneurship training in K-12/vocational schools, and leveraging the ACE program. Finally, those in "other" listed infrastructure funding support, investor education, and solving funding gap issues related to improvement sites.

NRV input session attendees were also given the same feedback worksheet. For existing assets, stakeholders listed ACE, TAMP, work-based learning, the entrepreneurial ecosystem, and increasing collaboration between employers and K-12. Opportunities for funding included an entrepreneurial hub, a makerspace, incentivizing IT companies to provide internships, and central Virginia training center redevelopment. Obstacles listed included site improvement costs and a lack of K-12 representation on the GOVA Region 2 board.

Across all input sessions, the assets of region mentioned most included: Education, talent, entrepreneur resources (ecosystem), and collaboration. The challenges mentioned most: included access to capital, more incubator/accelerator programs and cohorts, landing spaces for entrepreneurs; more sites; and funding gaps for site improvement.

In addition to the input session opportunities, Region 2 distributed a survey instrument in June of 2019 to over 300 regional stakeholders (elected and appointed officials, economic development contacts, etc.). There were 52 responses, including 16 from the Lynchburg sub-region, 18 from the Roanoke-Alleghany sub-region, and 11 from the New River Valley. Respondents were well distributed across various sectors including industry (12), education (10), government (9), and economic development (13).

Respondents rated these economic factors as strongest in the region: quality of life; business climate; post-secondary training; and the health care industry.

In terms of weaknesses, over 50% of respondents said that these were weak or very weak: access to capital, availability of workforce, and available sites for industry. Ten other factors were listed as “weak or very weak” by over 25% of respondents and included: amenities to attract and retain young professionals and families, presence of IT companies and support for IT sector, and overall strength of the entrepreneur ecosystem.

Respondents rated these three factors as most important for the region to focus on to strengthen economy: retain talent, increase access to capital, and increase number of individuals completing training for in-demand occupations. The survey results also included a number of “initiatives we should support” and those included talent development (Brain Drain); Virginia Tech Carilion Research Institute growth and expansion; advanced manufacturing sector, and accelerators and high-growth entrepreneur assistance.

All in all, the feedback reinforced the importance of the original four strategic focus areas for Region 2 GO Virginia project funding:

- ▶ **Talent (Workforce) Development, Attraction, and Retention:** One significant focus area for Region 2’s GO Virginia funds addresses the need for talent attraction, retention, and development within the priority industry clusters, particularly as it pertains to higher than median-wage jobs. (Note: This plan uses the term “talent” in reference to workforce, partly since workforce is often associated with training programs and worker services whereas talent refers to a broader spectrum of approaches concerning attraction and retention of highly skilled [talented] people.)
- ▶ **Sites and Buildings:** Region 2’s Council recognizes that one focus area in this region should include the development or re-development of real estate, particularly existing underutilized sites and buildings, appropriate for the needs of growing priority industry clusters.
- ▶ **Entrepreneurship and Business Development:** To address the need for entrepreneurial activity and business growth in the region, Region 2 identified a focus on promoting access to capital, mentorship, and training programs.
- ▶ **Technology Development:** To grow Region 2’s priority industry clusters, the Council created a focus area specifically addressing the promotion and development of technology-based enterprises that drive overall industry growth.

The sections that follow provide an in-depth overview of each focus area, along with a discussion of regional assets, potential strategies, and possible criteria for projects related to this area. The sections are identical to those in the regional plan, except that data is updated where noted and there is a concluding section for each strategy outlining progress updates. Section Five of this document includes a discussion of strategy gaps or needed refinements.

Talent Development, Attraction, and Retention

The first part of this section is largely identical to the 2017 plan. The last part of this section includes an update on progress and related activities in Region 2.

Talent production and the attraction and retention of highly skilled workers is a critical challenge for all regions in Virginia. Members of Region 2's three sub-regions all share a desire with connecting skilled workers to high-paying jobs for the purpose of growing and retaining skilled talent. One major strength of Region 2 is that it is home to 21 institutions of higher learning, including colleges, universities, community colleges, and technical training centers (Figure 1). In fall 2018 alone, there were 105,570 individuals enrolled in undergraduate programs in Region 2, which is roughly 16% of the population.³⁹ By comparison, 63,750 individuals were enrolled in *both* undergraduate and graduate programs at postsecondary institutions in the Richmond MSA or only 5% of the MSA's population.⁴⁰ Moreover, the Roanoke Regional Partnership estimates that the region has a higher concentration of undergraduates per capita than the Boston-Cambridge, San Francisco-Oakland, Raleigh-Durham-Chapel Hill, or Austin areas⁴¹.

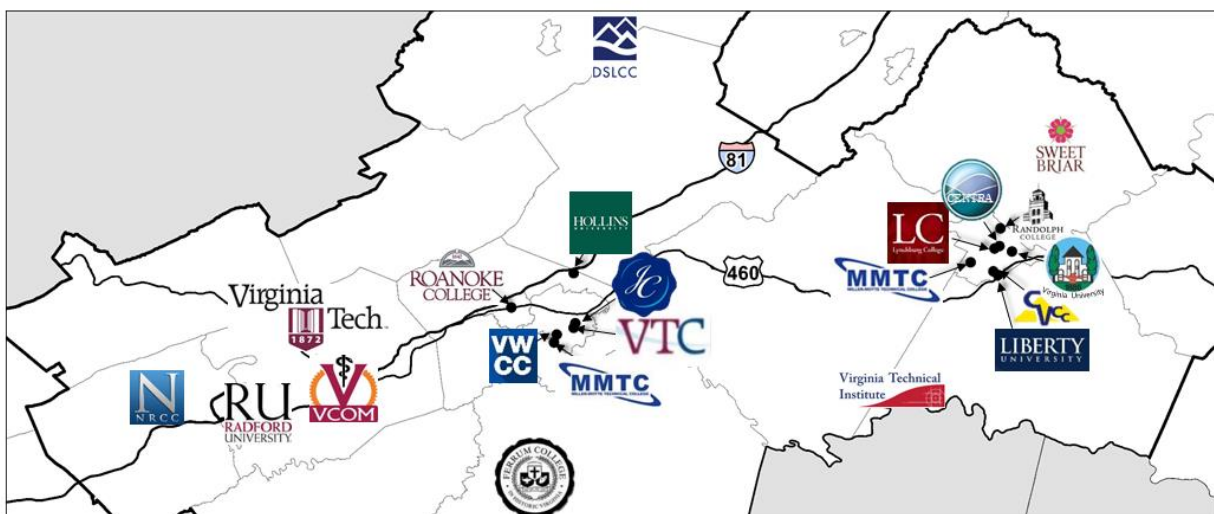


Figure 9: GO Virginia Region 2 Institutes of Higher Learning, Universities, Colleges, Community Colleges, and Training Centers

³⁹ State Council for Higher Education for Virginia (2018) Fall Headcount Enrollment (1992 thru Current Year).

⁴⁰ State Council for Higher Education For Virginia (2018) Fall Headcount Enrollment; U.S. Census Bureau (2018) Population Estimates

⁴¹ Roanoke Regional Partnership. Retrieved from <http://roanoke.org/advantages/higher-education/> Note: This estimate may be slightly different for the GO Virginia region as a whole.

Indeed, the number of regional degree completions has increased steadily over the past 10 years, and the number of professional and graduate degree completions has increased by 118% (see Figure 1 on page 2). Total regional completions in 2017 topped 33,000.⁴²

As measured by program completions, the region has increased its production of skilled workers; however, the overall number of jobs that require a certificate, two-year or four-year degree have not increased to the same extent. This suggests that graduates are leaving the region to pursue employment or are underemployed. Underemployed workers include those individuals who are highly skilled but working in low paying jobs, low skill jobs, or as part-time workers who would prefer to be full time. Data collected from regional employers and contained within regional workforce development plans suggests that companies are having difficulty filling positions with workers possessing the necessary and preferred skills. This misalignment between employers and employees is a major barrier for growing skilled talent in the region, and it can be described in terms of four major gaps:

- ▶ *Talent (skills) gap*: employers struggle to attract talent with the appropriate skills to succeed.
- ▶ *Interest gap*: there is a lack of interest in obtaining certifications and degrees required for in-demand technical occupations. Alternatively, those with the appropriate skills may not be interested in staying or coming to Region 2.
- ▶ *Affordability gap*: degree and certification programs are costly both in terms of tuition, and opportunity cost (lost wages in pursuit of a degree)
- ▶ *Coordination gap*: companies, education institutions, and workforce training entities do not necessary collaborate enough to seamlessly align career pipelines with regional job availability.

A review of nine economic development, planning and workforce plans for the three sub-regions in Region 2 describes several common goals to help address these gaps. Supporting and developing the continued growth of a qualified workforce through collaboration and partnership development is a common thread among the three regional planning commission's Comprehensive Economic Development Strategy (CEDS) plans. The New River Valley CEDS plan contains strategies for leveraging community colleges, one-stop centers, and experiential learning opportunities. The plan also calls for a better alignment of workforce needs and skills gaps with training opportunities. Roanoke Valley-Alleghany similarly focuses on promoting cooperation between higher education institutions and businesses and highlights the need for stronger links between K-12 and higher education in the region. The Lynchburg region's plan also highlights partnerships between training institutions and regional employers.

Similarly, three regional workforce development boards (WDB) share common goals, including business engagement and sector partnerships, marketing and technology to improve awareness of both available jobs and available talent, and skill development for job seekers for in-demand occupations. The three regional economic development organizations (EDO) focus on attracting not just companies and jobs to the region, but highly skilled talent that would then assist with the marketing of the region as a premier destination to do business. Like the regional commissions and workforce boards, these regional EDOs also cite collaboration and marketing as potential means for bridging the gaps that exist between employers and job seekers.

⁴² Dept of Education, NCES IPEDS, adjusted for non-resident programs

During the planning process, Region 2 Council members and working group participants noted the presence of higher education in the region as an asset, particularly Virginia Tech, a major research university. Many people also cited the growth of other colleges and universities. While this represents a large potential talent pool, several individuals voiced concerns that the region is not doing enough to retain these graduates. Some stakeholders expressed concern that these institutions (and Virginia Tech in particular), are not doing enough to connect students and graduates to area businesses.

Based on these plans and discussions with key informants, important regional assets related to the attraction and retention of skilled talent to grow higher wage jobs include:

Table 13: Region 2 Assets, Strengths, and Challenges

Asset Type	Example Strengths	Challenges
Educational assets	K-12, community colleges, proprietary schools' medical schools, universities, 4-year colleges, adult education (ACE program and similar)	Limited linkages between education institutions, limited awareness of offerings between sub-regions
Similar occupations across industry clusters	IT occupations, middle-skill occupations across GOVA target industry clusters. Programming for those cross-industry occupations.	Filling those programs with interested students, for example technician related programs
Workforce system	Three workforce development boards, robust community college system with access programs like ACCE at New River, CCAP at VA Western	Connectivity between the systems, employer/business awareness
National and international employers	Lab Corp, Carilion, BWX Technologies, Volvo, West Rock, Celanese, Rackspace, GE	Lack of awareness of employer needs and of workforce resources
Willingness to collaborate	Mentioned in each regional plan and highlighted during discussions with stakeholders during the Region 2 Planning period.	Limited means and methods of collaboration

In order to grow, attract, and retain top talent in Region 2, the region should develop strategies that address the four major gap areas: talent, interest, affordability, and coordination. These gaps can be addressed both individually and holistically. Using an iterative process, approximately 20 representatives from workforce, economic development, and regional planning groups helped identify the following potential strategies during the original plan development process in 2017:

Table 14: Talent Strategies, Opportunities, and Metrics

Strategies	Opportunities	Metrics
Strengthen the pipeline from K-12 to higher education to career for each priority sector	Define clear career pathways for each of the four priority industry sectors and support programs that address critical pathway training opportunities (e.g. apprenticeships, STEM-focused CTE, or etc.)	<ul style="list-style-type: none"> • Number of career pathways (tailored to region) developed • Number of career counselors using career pathways to advise students • Percent of target population potentially reached in the GO Virginia region • Number of high school graduates pursuing occupations or higher education that may lead to occupations in target industries
	Begin job training at K-12 level and enhance K-12 career exploration activities	
	Bridge the interest gap through the creation of targeted awareness and recruitment campaigns in each priority industry sector	
Increase completions of degrees applicable to target industry sectors	Cross-market and cross-promote technical programs and certifications	<ul style="list-style-type: none"> • Increase in awareness of programs and resources by target populations in the GO Virginia region • Number enrolled in targeted program(s) • Number of inquiries from potential students in target footprint
	Provide financial assistance or incentives for students to enroll in certificate or degree programs that lead to careers in high-demand occupations	
Improve knowledge and promotion of complementary workforce and training services	Development and implementation of a collaborative region-wide impact-focused program model	<ul style="list-style-type: none"> • Number of workforce service participants in program • Number of new partnerships created • Number and diversity of participants in the workforce system
	Development and implementation of a virtual “one-stop shop” resource for employers, workers, students and their parents	
Enhance employer engagement activities that will encourage more aligned skill development, create opportunities for regional employment post-graduation, and promote the hiring of in-demand occupations	Develop and promote experiential learning opportunities	<ul style="list-style-type: none"> • Number of employers engaged • Number of student participants • Number of universities engaged • Number of new internships, apprenticeships, or experiential learning opportunities established
	Increase and promote internship opportunities	
	Identify innovative employer engagement activities that promote the presence of in-demand job openings	

Key Points: Talent Development and Retention

Why is this important?

- 21 institutions of higher learning, including colleges, universities, community colleges, and technical training centers
- Regional degree completions in 2017 almost topped 33,000

Problem:

- The overall number of jobs that require a certification, community college, or four-year degree have not increased to the same extent as completions
- Graduates are leaving the region to pursue employment, or are underemployed
- Four major gaps:
 - *Talent gap*: employers struggle to attract skilled talent
 - *Interest gap*: there is a lack of interest in obtaining certifications and degrees required for in-demand technical occupations
 - *Skills gap*: job applicants lack the required skills to succeed in available jobs
 - *Affordability gap*: degree and certification programs are costly both in terms of tuition, and opportunity cost (lost wages in pursuit of a degree)

Strategies

- Strengthen the pipeline from K-12 to higher education to career for each priority sector
- Increase completions of degrees applicable to priority industry sectors
- Improve knowledge and promotion of complementary workforce and training services
- Enhance employer engagement activities that will encourage more aligned skill development, create opportunities for regional employment post-graduation, and promote the hiring of in-demand occupations

2019 UPDATE per TALENT DEVELOPMENT and RETENTION

Since 2017, the Region 2 has funded six projects supporting talent development and retention strategies. Those projects include:

The Region 2 Talent Collaborative, a partnership between the region's three workforce development board regions. GO Virginia Region 2 Talent Collaborative serves the entire GO Virginia Region 2 service region and works to stimulate the region's economic growth by closing the skill and interest gap in middle-to-high skilled occupations in Manufacturing, Healthcare, and Information Technology. The Talent Collaborative works to create an existing worker-training program that helps priority industries further develop their talent to remain competitive. Furthermore, the Talent Collaborative will create a Region 2 High Demand Career Pathway Educational Campaign to address the interest gap in hard-to-fill, technical occupation across the priority industry clusters, identified in the Growth and Diversification Plan, to develop a sustainable career pathway system for regional jobs. This includes K-12 outreach and partnership career events in each region to introduce K-12 students to employers and higher wage career opportunities.

Stopping the Brain Drain Strategy Development (Enhanced Capacity Building) works through the Roanoke Regional Partnership (RRP) to develop a complete talent attraction and retention program for the GO Virginia Region 2 service area. The project will examine the challenges in attracting talent from the 25 colleges and universities in the region, retaining young professionals, challenges faced by regional employers in recruiting talent, and other concerns in developing talent-focused programs of work. The Region 2 service area has a wealth of available talent for a variety of different fields but fails to keep many in the region post-graduation. There is, however, little data or information on why this challenge exists. Stopping the Brain Drain seeks to overcome the gap and create a Talent Action Coalition that will serve as an action platform in the implementation of retaining talent in the region.

Enhancing the Region through New Technology for Unmanned Systems is led by Dabney S. Lancaster Community College (DSLCC). The project seeks to build a unique and innovative partnership in the DSLCC Service Region and supports a new drone technology program to meet the needs of the Alleghany Highlands Drone Zone. The project will create 18 high-wage jobs and attract three to five new businesses to the area. The project focuses on exhibiting pathways to middle and high school students in the region, so students become aware there are a growing number of interesting, challenging, and rewarding jobs available and what the foundational knowledge and skill sets needed to perform these jobs are in the region. Funds are used to purchase and roll out drone technology training courses to develop the Alleghany Highlands Drone Zone program to train students for potential employers.

The Regional Career and Technical Education Study is led by the Western Virginia Workforce Development Board. The study seeks to increase the availability and alignment of CTE programs in the Roanoke-Alleghany region. The study will evaluate previously completed studies of CTE programs, evaluate existing conditions for CTE centers and programs, and recommend next steps to improve and grow CTE programs in the region.

Ignite is led by the United Way of Southwest Virginia (UWSWVA). The project will expand their existing efforts in GO Virginia Region 1 to some GO Virginia Region 2 localities in the New River Valley, with a goal to facilitate regional collaboration between schools and employers to equip and retain the next generation of the local workforce. Through a collaborative effort between K-12 and industry, the program will focus on creating industry experience opportunities and enhanced occupational awareness through employer engagement, problem-based learning, and related activities.

The Council also supported two projects led by Liberty University. **The Center for Energy Research and Education (CERE) Industry Labs** works with Liberty University and Framatome (AREVA Inc.) to create four industry labs including: Chemical/Material Lab, EMC Lab, Calibration Lab, and a Non-Destructive Testing Lab through site preparedness on a 28-acre lot in Bedford, VA. Through developing the land and establishing the labs, the region will be able to attract and build industry support for leading innovations and attract high-growth energy companies to the region. The CERE project includes career awareness and training components for K-12, higher education, and existing workers.

The second Liberty University-led project is the **Additive Manufacturing Partnership Labs (AMPL)**, a collaborative effort between Liberty University (LU), The Center for Advanced Engineering and Research (CAER), Central Virginia Community College (CVCC), the XLR8 STEM Academy, local partners BWX Technologies, FarField NDT, and Bedford County to support the collective goal of building the Additive Manufacturing (AM) base and educating the AM workforce. GO Virginia funding will help purchase the AM equipment needed to establish the lab. LU will outfit the AM laboratory with: two Markforged Metal

X 3D Printers, one Markforged X7 3D Printer, one Geomagic Capture Scanner, and smaller 3D printers in support of the STEM Academy. The 2,400 square-foot facility will include several AM systems capable of full consolidation of nylon, carbon fiber, polymeric, metallic, and ceramic material systems, as well as a prototyping laboratory which includes a host of characterization techniques. Again, the lab and facilities will include significant student outreach and workforce training components.

Collectively, these projects represent a significant investment by the Region 2 Council in Talent Development and Retention. Moreover, the studies funded with capacity building funds (Brain Drain and CTE study) should help identify future opportunities for project needs and funding as well.

There are a substantial number of existing projects and initiatives in Region 2 related to talent and workforce including ongoing activities of our three workforce development boards, four community colleges, and numerous colleges and school systems. Some larger initiatives of note include the Virginia SkillsBelt project, an initiative led by Appalachian Power and Boyette Consulting in partnership with the Virginia Tech Office of Economic Development. The project is funded by the Tobacco commission and includes extensive surveying and focus groups of regional workers, jobseekers, employers, and students to identify and address skills gaps.

In addition, the New River Mt. Rogers Workforce Development Board continues to lead a four-year \$6,000,000 America's Promise Job Driven grant by the U.S. Department of Labor to enhance workforce development capacity through an education and training system that adapts quickly to the changing needs of businesses. The project, Pathways to the American Dream, included 35 jurisdictions spanning four Workforce Development Areas, which developed a partnership collaborative that is building a pipeline of 1,100 skilled workers to help businesses in the Healthcare, Advanced Manufacturing, and IT industries fill existing job openings and meet talent needs for expansion. As demonstrated through quantifiable data, federal monitoring, and an evaluation being conducted jointly by Outcomes Consulting Incorporated and Virginia Tech's Office of Economic Development, Pathways to the American Dream is, to date: (1) exceeding performance outcomes of participant training, credentialing, and employment in middle-skilled jobs with a median wage of \$22.42; (2) strengthening partnerships through expanded participants in Business Solution Teams and Integrated Resource Teams; and (3) providing research and best practices for Virginia policy-makers on how sector strategy initiatives create innovative programming thus furthering the Workforce Innovation and Opportunity Act (WIOA).

In terms of future gaps and needs, there continue to be a recognition that this strategic area is critical for the region: how do we retain and/or attract talent, including the high concentration of college-age youth in the area. Existing and prospective employers in priority sectors frequently cite talent and workforce as one of their primary concerns. In addition, the Council has heard from area stakeholders that more needs to be done at the K-12 level to better prepare students for higher wage jobs in technology, manufacturing and related areas here in the region. Two recently funded projects (Ignite and the CTE study) reflect this area of interest.

In addition, some of the public comments suggest that K-12 representation would be valuable on the Council itself. Region 2 support organization staff reached out to a number of county CTE directors this summer to get more perspective on needs and opportunities. The size, scale, and needs of career and technical education vary widely from locality to locality across the region. There were some common concerns among the CTE representatives contacted:

- All are interested in expanding the involvement of employers and companies, through partnerships, internships, externships, job shadowing, apprenticeships, career events, and other activities. The barriers to greater employer engagement are often time related. School systems sometimes lack staff and resources to coordinate and facilitate employer engagement. Projects that lend support to this function or include employer engagement on behalf of K-12 would be welcomed. Small to mid-size employers also lack time and resources and incentives for employers to partner with K-12 students and take on interns, job shadowing, site visits, would be very useful.
- Some school systems have more students interested in CTE than they can fit due to teacher, staff, or space limitations. Schedules are also a limitation. Students often cannot commit the large daily time block needed for CTE enrollment. Some school systems have creatively offered shorter blocks to help make programs more available.
- Agriculture programs continue to be of great interest in many of the Region 2 counties. This creates a possible opportunity for unique food science, food technology or entrepreneur focused opportunities that showcase higher wage opportunities in that sector.
- Likewise, mechatronics and other advanced manufacturing programs are of great interest and many schools partner with community colleges in these and other programs. Often there are a relatively small number of students able to take advantage of these spaces due to time, travel, or other constraints. There may be a need to consider how to make the community college-partnered offerings more widely accessible for interested students.
- While many trade occupations are not explicitly cited as priority sectors in the Region 2 plan, they do represent higher wage job opportunities in the region.
- Company internship and apprenticeship opportunities are sometimes very limited for those under age 18 due to company rules. This may be a company-to-company challenge and individualized outreach per policies and conditions could help make more companies open to accepting younger students.

Sites and Buildings

The first part of this section is largely identical to the 2017 plan. The last part of this section includes an update on progress and related activities in Region 2.

The task of developing appropriate real estate products, the places and spaces where different industries can thrive in a changing economy, has never been more complex and demanding. As currently understood, GO Virginia funds are not appropriate for direct site acquisition, but may be used for site preparation and development and to better position and animate sites and built assets to spur economic growth. In designing Go Virginia the state board has recognized there are opportunities to facilitate specific approaches to collaborative, regionally significant development through GO Virginia funds. Those opportunities may be shaped by the needs of priority industry clusters or groups of related firms identified through the Growth and Diversification planning process.

Region 2's three sub-regions all share a common issue with the availability of what economic developers describe as "product," market-ready sites and buildings. The limited number of large sites, graded pads, and "shovel-ready" development sites are a common concern. Increased attention is also being given to existing special assets like research or educational facilities, airports, or corporate anchors. All parts of the region are talking about ways to leverage them. Business accelerators or specialized entrepreneurship

centers, research parks or innovation districts, or other targeted development plans are being discussed for their stimulative effect on products coming to market and ultimately business location and expansion.⁴³

Information

Readying a site or a building for market involves a host of considerations. Questions about physical features like lot size and topography, grading and readiness to build, as well as the quality of existing structures or the availability of shell buildings are common. Access to networked assets like power and communications infrastructure, transportation, and labor is important. Further, the proximity of institutions like educational and medical facilities, airports, or large corporate anchors is a concern. Sites of interest will look very different for different industries.

The state provides a very basic database of available properties called Virginia SCAN.⁴⁴ This provides limited physical information, most importantly size and acreage as well as proximity to highways. Within Region 2, most sites and buildings listed in the database are small. For example, 90% of sites are less than 22 acres, and 90% of buildings are less than 160,000 square feet. There are available sites and buildings in the Roanoke and Lynchburg regions that are less than 12 miles from an airport, while all the locations in the New River Valley are less than 35 miles from a major highway.

To create a richer picture, some areas have undertaken extensive efforts to assess and characterize sites and buildings. For example, the Roanoke Regional Partnership (RRP), on behalf of the Western Virginia Regional Industrial Facilities Authority (RIFA), completed an extensive study of 165,000 parcels, examining physical characteristics and proximity to utilities and infrastructure. Ten high priority sites emerged from that process and RIFA selected one location for development.⁴⁵

Site evaluation criteria utilized by the RRP included:

- ▶ 100 acre minimum
- ▶ Limited number of landowners
- ▶ Avoiding floodplain locations
- ▶ Average slope <5% for a minimum 80 acre pad
- ▶ Maximizing buffer from residential areas
- ▶ Regular configuration (i.e. square or rectangular shape)
- ▶ High-visibility sites with highway access
- ▶ Utilities (e.g. power, water, sewer, fiber, natural gas) within 2 miles

Other economic development organizations in Region 2 are preparing to launch similar site assessment initiatives, both to better position individual sites and to explore the feasibility of joint acquisition and

⁴³ Regional CEDS reports accessed August 9, 2017. <http://nrvc.org/wp-content/uploads/2017/07/CEDS2017Report.pdf>

<http://rvarc.org/wp-content/uploads/2017/07/2017-RVAR-CEDS-Annual-Report.pdf>

http://www.localgovernmentcouncil.org/images/PDFs/16_11_DOC_ceds-and-implementation-plan_v.final.pdf

⁴⁴ Virginia SCAN database accessed August 9, 2017. <http://virginiascan.yesvirginia.org/propertySearch/>

⁴⁵ Announcement of Western Virginia RIFA, accessed August 9, 2017.

http://www.roanoke.com/business/news/roanoke-valley-governments-to-buy-acres-near-i-81/article_6efcc9cb-ae72-5008-a692-131c0cd2bb04.html

development. The Commonwealth of Virginia has also launched a competitive site characterization and development grant program specifically supporting efforts to bring sites of 100 acres or greater on the market and introducing a tiered system of judging site readiness.

There has been a clear focus on bringing more information to bear on the site development process, especially identifying a supply of large industrial sites, characterizing their physical features, and their access to networked infrastructure or special assets. This speaks to the supply of sites or “products”, although there is less information on the demand side. Economic development organizations can pursue multiple market opportunities based on site characteristics, but they face an information gap. “We don’t know what we don’t know,” stated one participant in the working group developing this section of the plan. Most economic development organizations track some information about company prospects; however, consultants managing initial inquiries often provide limited information about their clients. Further, as many leads are generated centrally from the state, which does not collect and characterize such inquiries, there is no context in which to assess the leads that reach the regions.

This focus on sites also means in some instances that we may not know enough about existing office markets. This type of knowledge may be important in highly urbanized areas, or in targeting sectors where smaller high-growth firms may need a different footprint as they scale-up their activities. The focus on public acquisition and development also leaves open the possibility that actors in the private market may be overlooked, which is a subject of interest to some economic development organizations.

Collaboration

Collaboration among localities is clearly a key to large sites, given limited land availability in many jurisdictions, and the costs for acquisition and development. The state provides a legal framework for joint site development and revenue sharing through the Regional Industrial Facilities Act (RIFA).⁴⁶ Partners are asked to share costs up front with the promise of shared tax revenues at the end of the day. This model allows a relatively land-poor jurisdiction like Salem to share in the benefits of a large site in Roanoke County developed by the new Western Virginia Regional Industrial Facilities Authority.

It is important however to think about the long path of development and the many investments that partner jurisdictions may make along the way, such as utilities, site grading, shell buildings, and ultimately incentive packages. For example, years passed between the creation of Virginia’s First Regional Industrial facility and securing its first tenant at the 1,000-acre New River Valley Commerce Park. In such a timeline markets can shift, leadership can change in partner governments, and the vision for a joint site must adjust. The RIFA may not provide enough incentive to partners to avoid a “free-rider” phenomenon over the life of such a project. Performance agreements for economic development projects exist to govern shared investments, but targeted funding available on the condition of joint investments by localities, might provide an incentive to make meaningful commitments.

Another form of collaboration takes place around special assets. Much attention is paid in economic development to anchor institutions; for instance, higher education institutions’ ability to spin innovative

⁴⁶ Regional Industrial Facilities Act, accessed August 9, 2017. <http://law.lis.virginia.gov/authorities/virginia-regional-industrial-facilities-act/>

new companies from research or teaching facilities. Similarly, certain functions of large corporations, federal facilities, or even airports, are often considered generative assets to leverage for development.

Ideas about what works to build on such assets focuses in many cases on how to facilitate and capture value from the unique points of connection and collision they represent. Bringing different economic actors together, almost always crossing jurisdictional or even state or national boundaries, can generate new ideas and opportunities. These ideas need the right kind of spaces like accelerators and incubators, research parks, or specialized development districts or corridors in the open market. They may require partnerships between localities and universities, or other “anchor” entities, to assist with development or facilitation.

The Virginia Tech Corporate Research Center, created in 1988, currently houses 185 technology companies with 3,000 employees on 230 acres adjacent to the Virginia Tech campus. Similar opportunities may exist for Liberty University, which just purchased the Center for Advanced Engineering and Research in Bedford’s New London Park as a home to a new engineering campus. The City of Roanoke and partners from several anchor institutions are exploring an innovation corridor that, in part, would leverage innovations from the Virginia Tech Carilion School of Medicine and Research Institute. The uniqueness of each opportunity can make it hard to describe definitively the right kind of space. This creates an information challenge potentially more complex than that required to target industrial sites.

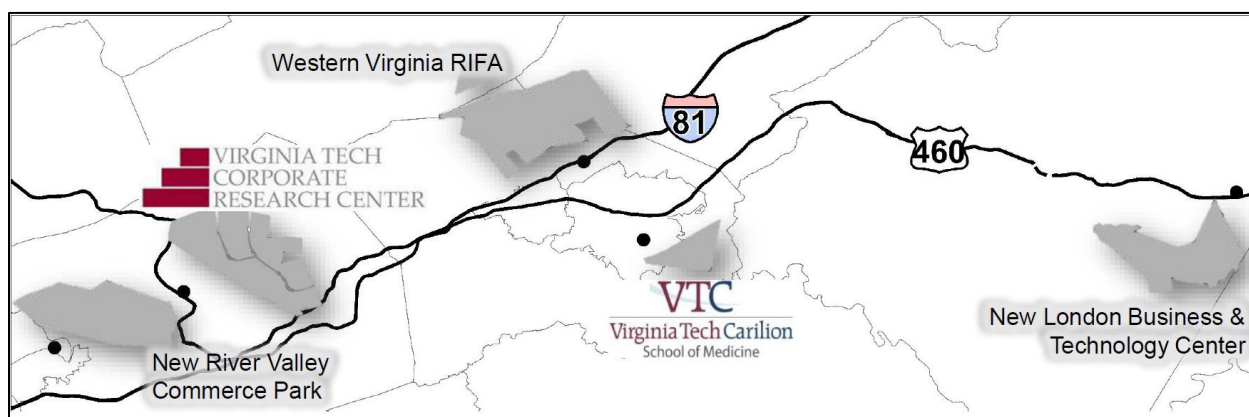


Figure 10: Select examples of sites and special assets

Strategies and Criteria

The goals of the GO Virginia program include growing higher than region median wage jobs, primarily from new investment, and facilitating collaboration across jurisdictions. Accordingly, one priority of Region 2, described in Table 14 below, is to support strategies that increase the number of collaboratively developed sites and buildings on the market, improving their market positioning, and meaningfully engaging sites and buildings leveraging special assets.

The reality of limited funding available through the GO Virginia program should encourage applicants to carefully consider other available sources they can utilize with respect to the topics discussed in this section. There is limited state support for information strategies, and many have worked largely through their own resources. There are substantial state and federal dollars available for infrastructure investments and site development. These do not require, but would reward, collaborative strategies. They are however highly competitive, require substantial planning, and play out over extended timelines.

Strategies for leveraging special assets may tap resources like those listed above; but generally, they begin with commitments at the local or regional level or in partnership with the anchors. Success metrics for projects could include bringing more information about both supply and demand to this market, delivering more data about site characteristics and industry needs to improve the success of development projects. Other measurements may include the number of sites appropriate for target clusters identified in this plan, market ready sites judged through the state assessment system, and dollars invested in collaborative projects. An appendix on Region 2 site lists can be found on page 93.

Table 15. Sites and Buildings Development Strategies, Opportunities, and Metrics

Strategies	Opportunities	Metrics
Improve information about site and buildings characteristics and market demand for sites and buildings	Local government or regional economic development agency funding	<ul style="list-style-type: none"> • More information available on site and building characteristics available to the market • More information available to economic developers on industry demand from priority industry clusters defined by this plan • More sites and buildings on the market appropriate for priority industry clusters defined by this plan • More ready-to-market sites as defined by the state tiered readiness grades • More joint local investments or anchor institution investments in site/buildings development or re-development measured by dollars committed to projects
	VEDP sites characterization and development grants	
Incentivize collaboration at all stages of joint site/building development or re-development	Virginia Resources Authority funding	
	Virginia DHCD (e.g. Building Collaborative Communities, CDBG) grants	
	USDA Rural Development	
	US EDA Public works grants	
Develop and implement real estate strategies to leverage special assets	Local government or regional economic development agencies funding	
	Anchor institutions support	

Key Points: Sites and Buildings

Why is this important?

- Developing appropriate real estate products has become more complex and demanding

Problem

- Region 2 has a limited number of large sites, graded pads, and “shovel-ready” development sites
- Virginia SCAN system provides limited information on available sites
- Focus on public acquisition and development means actors in the private market may be overlooked

Strategies

- Improve information about site and buildings characteristics and market demand for sites and buildings
- Incentivize collaboration at all stages of joint site/building development
- Develop and implement real estate strategies to leverage special assets

2019 UPDATE per Sites and Buildings

Since 2017, the Region 2 Council has supported several projects related to the strategic focus on sites and buildings. (Some projects are mentioned in more than one strategic focus area because they include multiple components). These include:

- **Wood Haven Road Water and Sewer Infrastructure Enhancement** led by the Western Virginia Regional Industrial Facility Authority (WVRIFA). The project seeks to improve site readiness and marketability by making the water and sewer utility connections to the site ready for use. Prior to receiving funds, the site, jointly owned by the County of Roanoke and the Cities of Roanoke and Salem through the WVRIFA, was unable to be developed and did not attract businesses to the area. Through the project, the site will be propelled to a Tier 4 readiness standard through the Virginia Businesses Ready Sites Program. The project seeks to attract new businesses to the region through site preparedness.
- **Lynchburg Site Readiness** is led by the Lynchburg Regional Business Alliance. The project will advance a portfolio of six existing commercial/industrial sites along the site readiness scale and clarify next steps for moving all sites to at least Tier III on the Virginia Business Site Readiness Scale (VBRSP). This project will complete the site improvement phase that is the due diligence process in the development phase in the Region 2 Growth & Diversification Plan.
- **Center for Energy Research and Education (CERE) Industry Labs** is led by Liberty University. The project works with industry partners such as Framatome (AREVA Inc.) to create four industry labs including: Chemical/Material Lab, EMC Lab, Calibration Lab, and a Non-Destructive Testing Lab through site preparedness on a 28-acre lot in Bedford, VA. Through developing the land and establishing the labs, the region will be able to attract and build industry support for leading innovations and attract high-growth energy companies to the region.
- Liberty University also leads the **Additive Manufacturing Partnership Labs (AMPL)**. The project is a collaborative effort between Liberty University (LU), The Center for Advanced Engineering and

Research (CAER), Central Virginia Community College (CVCC), the XLR8 STEM Academy, local partners BWX Technologies, FarField NDT, and Bedford County to support the collective goal of building the Additive Manufacturing (AM) base and educating the AM workforce. GO Virginia funding will purchase the AM equipment needed to establish the lab. LU will outfit the AM laboratory with: two Markforged Metal X 3D Printers, one Markforged X7 3D Printer, one Geomagic Capture Scanner, and smaller 3D printers in support of the STEM Academy. The 2,400 square-foot facility will include several AM systems capable of full consolidation of nylon, carbon fiber, polymeric, metallic, and ceramic material systems, as well as a prototyping laboratory which includes a host of characterization techniques.

Collectively, the projects represent a significant investment in advancing high-potential, high-need sites and special research assets that can support existing industry to grow or can help attract new companies to the region. The Region 2 Council continues to follow state of Virginia guidance in this area which prioritizes VEDP and other existing state funding sources for industrial site development with GO Virginia funds as an alternative or secondary resource for project-specific opportunities as opposed to a primary vehicle for industrial site development.

Progress on industrial site development in the region is steady and each regional economic development organization is helping lead or encourage site characterization or improvement projects in their region, in addition to locally advanced efforts. Moreover, many of the region's unique research assets continue to grow. The Fralin Biomedical Institute in Roanoke is in the closing stages of a \$90 million expansion. Other higher education entities across the region continue to add new facilities and associated staff and programs including Liberty University, Radford University, Virginia Western Community College, and others. The Virginia Tech Corporate Research Center is continuing a major expansion as well.

The regional council will support regional approaches to addressing the region's site readiness needs by advancing sites through the Virginia Business Ready Sites Program (VBRSP). Currently VEDP is leading a state-wide review of this program and state-wide site needs. The Council will work with the state GO Virginia Board, VEDP, and others to identify most appropriate uses of GO Virginia funding for site readiness.

Entrepreneurship and Business Development

The first part of this section is largely identical to the 2017 plan. The last part of this section includes an update on progress and related activities in Region 2.

Another common goal across Region 2's three sub-regions is the desire to support the development of young and growing firms. All three Comprehensive Economic Development Strategy (CEDS) plans that make up the region describe small and entrepreneurial business promotion as strategies. Several Economic Development Organizations (EDOs), Workforce Development Boards (WDBs), and other prominent organizations in the region also identify the acceleration of young and growing firms as an

opportunity for regional growth. Indeed, the most recent federal data on regional startups shows that job creation by startups in the region is still lower than the state and nation. This region relies more on firms that are 11 years old and older for job creation compared to the state and nation. The overall density of startups (i.e. four startups for every 1,000 people) is also lower than the state and nation, indicating greater opportunity for startup growth and development.⁴⁷

If STEM employment is any indication, the number of high growth startups may also be lower than average. Successful high growth startups tend to employ higher percentages of STEM-related workers and provide significantly higher than median wage jobs. Currently, the proportion of STEM-related workers in Region 2 is 26% below the national average.⁴⁸ It was 20% below the national average in 2017. The definition used for STEM-related workers included 92 occupations including: computer occupations, mathematical science occupations, engineers, engineering and mapping technicians, life scientists, physical scientists, social scientists and related workers, science technicians. If the definition were broadened to include STEM-H, this would include 144 occupations. That total of STEM-H workers in Region 2 in 2017 would remain 15% below the national average.

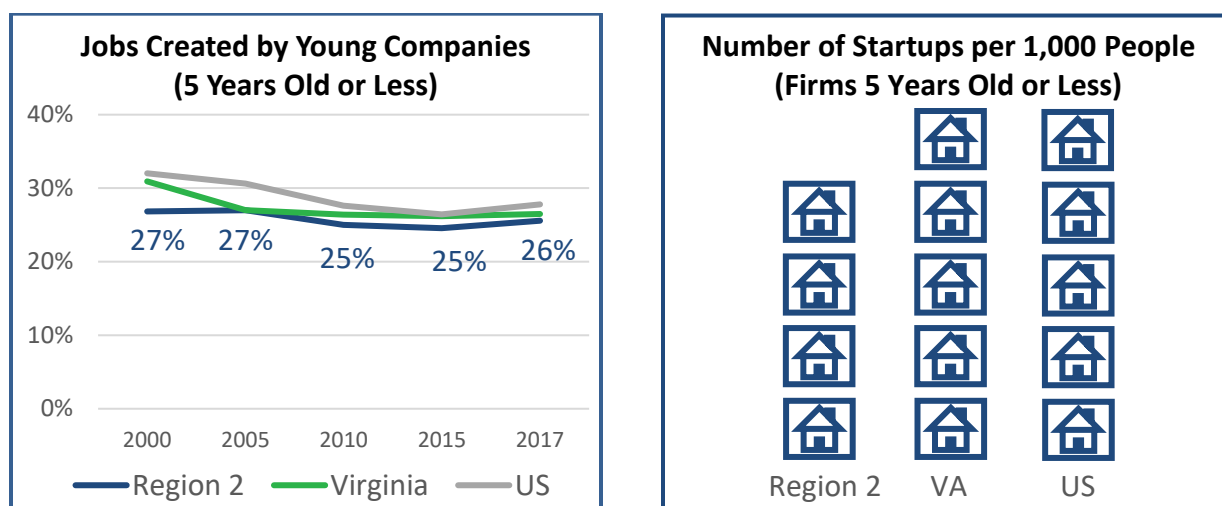


Figure 11: Region 2 Startup Presence and Employment⁴⁹

Discussions among regional commissions, EDOs, WDBs, Chambers of Commerce and other business development interest groups highlight the need for greater access to capital. Compared to other regions, the amount of accessible capital is scarce in Region 2. This includes angel, venture capital, seed and pre-seed funding. Many entrepreneurs perceive investors as too risk averse. Meanwhile, potential investors question the quality and quantity of the region's investable opportunities. Although capital investors are present in the region, many look elsewhere because regional small businesses and entrepreneurs have not sufficiently built their management team, developed their products, and tested their business models. While increased capital would be an asset, the primary challenge may be deal-flow and an undersupply of vetted, high-growth potential ventures. Hence, an important component of connecting

⁴⁷ George Mason University (2017). GO Virginia Regional Data. <http://cra.gmu.edu/go-virginia/>

⁴⁸ EMSI (2019.3) Class of Worker dataset.

⁴⁹ U.S.Census Bureau, Center for Economic Studies, LEHD; George Mason University (2017). GO Virginia Regional Data. <http://cra.gmu.edu/go-virginia/>; U.S. Census (2014).

business with capital is developing and promoting training and mentorship programs. An increasingly common approach to effective capital deployment is high quality mentorship accompanied by education. Such initiatives tend to target firms with high growth potential across challenging stages of their life cycle.

Region 2 companies already have access to several angel and venture capital groups that make investments throughout Virginia. These funds do not require businesses to relocate to the home city of the fund. Below are lists and general locations of the more active capital investment and loan groups.

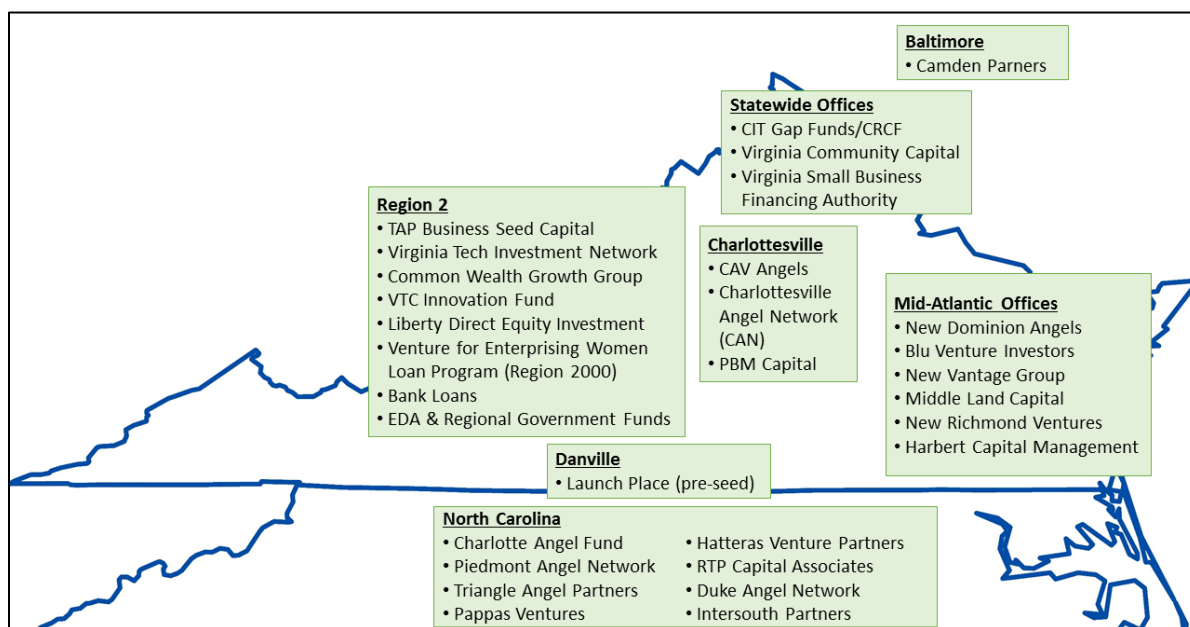


Figure 12: Sampling of Accessible Capital for Region 2 Companies

Several of these financiers may not offer pre-seed for research and development, presenting a resource gap in the region. Although Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants through the federal government are one source of pre-seed funding, they are untapped by many in Region 2. For instance, Region 2 had over 360 SBIR/STTR grant awards between 2012 and 2016. Since larger entities can receive multiple awards, as few as 37 firms were actual grantees. The underlying challenge for many businesses in Region 2 is lack of awareness and understanding of how to access capital resources.

Region 2 is also home to many organizations that offer informal and formal mentorship programs. Formal programs are those that establish more structured mentor-mentee assignments over a designated time. GOVA has invested in several of these programs, resulting in their growth over time. Informal programs are those that set up an environment or event(s) where the mentor-mentee relationship may develop over time. They can be working spaces, meetups, one-off consulting opportunities, educational programming, or competitions where entrepreneurs and small business owners meet successful business owners and serial entrepreneurs. Training and mentorship assets include but are not limited to:

Table 16: Mentorship and Training Assets in Region 2

	Mentorship Assets
Formal Mentorship Programs	RAMP, Roanoke SCORE, Advancement Foundation (Roanoke)
	Co. Starters, Greater Lynchburg SCORE, Innovate Lynchburg (Lynchburg)
	Roanoke-Blacksburg Tech Council (Region)
Informal Mentorship Opportunities	Local and Regional Chambers of Commerce (Region)
	Colab, Roanoke Public Library Consultations, Small Business Development Center, Star Tank, HIVE, Roanoke Regional Partnership (Roanoke)
	Small Business Development Center of CVCC, Leadership Lynchburg, PopupAltavista, Opportunity Lynchburg, Lynchburg Business Development Center (Lynchburg)
	Studio 2.0, TechPad, Hacksburg, Beans & Rice, Onward NRV, American Business Women's Association (New River Valley)

Many of these programs started in the last decade as the region's entrepreneurial network has developed. However, stakeholders mention that while there are numerous 'spaces of collision' for entrepreneurs, translating these interactions into coordinated resources for emerging businesses remains a challenge. They noticed that several existing programs do not facilitate a pipeline toward significant capital investment. Moreover, resource providers may not coordinate their efforts or be aware of other resources, leaving entrepreneurs and business owners alone to navigate the system.

To achieve the goal of growing more startup and existing firms that create and sustain higher wage jobs, one priority of Region 2 is to support GOVA initiatives that increase the number of startups and small businesses accessing capital investments. Below are three strategies for increasing access to capital.

Table 17: Entrepreneurship and Business Development Strategies, Opportunities, and Metrics

Strategies	Opportunities	Metrics
Increase presence of and access to capital investors	Activities to encourage development of pre-seed and early-stage seed funding	<ul style="list-style-type: none"> • Number of active capital funds in region over time • Number & dollar amount of deals and grants in region over time • Number of firms (in priority industry clusters) receiving funding over time • Number of program participants over time • Number of program participants creating and sustaining startups, actively engaging with mentor, pursuing and/or receiving funding
	Activities that connect regional companies to investors outside the region.	
	Activities that help formalize and professionally sustain regional network(s)	
	Activities that train entrepreneurs in acquiring government and private funding	
Expand and coordinate mentorship and training resources to increase the supply and flow of investible ventures	Activities to start/expand mentorship programs.	
	Activities to expand incubator/accelerator activities that make businesses capital ready.	
	Activities that would encourage resource collaboration among capital, mentoring and other business resource providers	

Strategies	Opportunities	Metrics
Improve awareness of existing capital, mentorship & training resources.	Activities to help measure, market, and illustrate the region's entrepreneurial resources and successes.	<ul style="list-style-type: none"> • Survival rates of served companies • Revenue and jobs of served companies • Survey/Interview data illustrating increased collaboration among regional groups
	Activities that raise awareness and connect entrepreneurs and businesses to training, mentorship and funding resources.	

Key Points: Entrepreneurship and Business Development

Why is this important?

- Common goal across Region 2's three metropolitan areas: The desire to support the development of young and growing firms in the region

Problem

- Job creation by startups in the region is still lower than the state and nation despite growth since 2000
- The overall density of startups (i.e. four startups for every 1,000 people) is also lower than the state and nation, indicating greater opportunity for startup growth and development
- The region faces a capital supply and demand challenge in which capital and a pipeline of vetted, high-growth potential businesses are limited compared to other regions

Strategies

- Increase presence of and access to capital investors
- Expand and coordinate mentorship and training resources to increase the supply and flow of investible ventures
- Improve awareness of existing capital, mentorship & training resources

2019 Update per Entrepreneurship and Business Development

The Region 2 Council has been very active in supporting this strategic area of focus. The Council has supported a number of projects in this arena:

- **Capital Ecosystem Development** (Enhanced Capacity Building) is led by the Valleys Innovation Council. The project examines the Region 2 capital ecosystem to understand the current landscape and find ways to strengthen formal pathways to capital for businesses and entrepreneurs. The project will create a Capital Landscape Study to understand and describe the various sources of capital in the region through surveys and interviews with entrepreneurs and investors in the region. Through this study, analysis will determine a capital access plan that

would be most effective for Region 2 to connect businesses and entrepreneurs with investors throughout the region.

- **The Regional Acceleration and Mentorship Program (RAMP) Expansion** is led by the Roanoke-Blacksburg Technology Council, in partnership with the City of Roanoke and Virginia Western Community College. The project assists technology-based startups with access to classroom education, mentoring, and assistance in identifying capital. RAMP has previously supported one cohort through the program and current funds will help build a diverse mentor network, provide mentors and entrepreneurs with education and tools to help grow and develop, and build a pipeline of companies who wish to apply to RAMP, the region's only accelerator program. Through Pitch-and-Polish clinics, pairing mentors and startups, and beginning a second RAMP cohort, RAMP will strengthen the job and resource network in Region 2.
- **The Roanoke Regional Small Business Development Center (SBDC) expansion project** will provide small business counseling, training, and business resources to the New River Valley region (counties of Floyd, Giles, Montgomery, and Pulaski, and City of Radford). The project will deliver new programs and services that are tailored to the specific needs of New River Valley small businesses and entrepreneurs in priority industry sectors (advanced manufacturing, life sciences, food processing, and IT/technology). The project provides the resources to dedicate a full-time Business Advisor to serve the New River Valley exclusively, greatly increasing the time and effort the Roanoke Regional SBDC can devote to serving New River Valley businesses and strengthening the relationships between New River Valley communities and the SBDC network.
- **Increasing the Birth Rates of New High Growth Companies for Region 2** is led by The Advancement Foundation (TAF). The project focuses on leveraging business resources, entrepreneur resource partners, industry experts, and partners to increase business readiness and success rate for new high growth companies. The goal of this project is to define and expand the region's entrepreneurial pipeline for new and early stage companies.

Taken as a whole these projects are a concerted effort to strengthen the region's entrepreneurial ecosystem.

In addition, there have been several other developments in the region over the past two years. Virginia Tech and Carilion have created a \$15 million venture capital fund that will help startups take root around the research institute. They expect to spin off more lab discoveries into new businesses, and they anticipate that other businesses will develop around the campus to support the additional faculty and students. Coworking and incubator spaces in the region have developed or expanded including in Botetourt County, Roanoke city, the city of Lynchburg, Salem, Roanoke County, Blacksburg and others. A coalition of entrepreneur support organizations in the Roanoke region has been meeting regularly over the past year and identifying better ways to support the entrepreneur ecosystem.

In addition, the Council supported a state-wide study of innovation and entrepreneurship led by TEconomy Partners. TEconomy Partners, LLC was engaged by the GO Virginia Statewide Board to provide each GO Virginia region an independent and objective assessment of its entrepreneurial development position, to facilitate a situational assessment of the region's entrepreneurial ecosystem, and to help identify priority actions with local leaders to help strengthen the ecosystem.

For instance, that report found that from 2007-2017, there were 1,673 surviving traded sector start-ups in Region 2. Total traded sector employment in Region 2 decreased by 9,187 during that same period. The report concluded that, "... entrepreneurial growth has been a buffer in Region 2 offsetting the overall declines in the region's traded sector industry employment from the heights reached before the Great Recession of 2008-2009."

The report assessed regional conditions related to four stages of entrepreneurial development: ideation, commercial viability, market entry, and growth & scalability.

For ideation, the report noted a few the same strengths and challenges as those outlined in this plan. Strengths included a diverse range of traded sector startups across industry types and across all three sub-regions, the high amount of university research and development compared to benchmark regions, the presence of new programs and initiatives.

The study noted that startups, patent innovation and talent attraction are all lagging in the region, despite a strong and growing university research base and increased activities to promote ideation in the region.

For commercial viability, the report noted SBIR/STIR activities and creation of RAMP and LU Research Labs and activities of Virginia Tech Corporate Research Center as strengths while Virginia Tech's commercialization activities compared to national averages and benchmark regions was highlighted as a weakness. TEconomy observed that the weakness in university research commercialization holds back region's potential despite base of small business innovation in the region. The report notes a major re-invention of technology transfer is underway at Virginia Tech.

For market entry, the strengths included a high amount of early stage company activity (58% of Region 2's quarterly employment growth over past five years was generated, on average, by firms under five years old compared to 34% for mid-sized benchmark regions). The presence of early stage capital for life sciences firms and the creation of new innovation spaces in the region were also cited as strengths.

Gaps and weaknesses in market entry included low amounts of risk capital for entrepreneurs. TEconomy found a lower presence of available risk capital in Region 2 compared to benchmark regions. The report noted a weakness as the low level of earliest forms of risk capital, including pre-seed (accelerator/incubator), angel investor and seed funding. TEconomy discovered a total of only 32 deals that took place in Region 2 from 2010-2017, according to Pitchbook.

In terms of growth and scalability, the TEconomy report identified strengths that included a growth of 84% in the ICT (information technology and communication services) cluster and a relatively high number of surviving higher growth startups since 2007, with those firms creating 3,306 jobs through 2017. Weaknesses include the low level of Inc. 5000 fastest growing companies in Region 2. There were only 2, with 13 being the average for comparable regions. Likewise, talent availability was highlighted as a challenge. TEconomy also found lower levels of SBA 7(a) loans used to support growth-oriented small businesses (1.7 loans per capita here as opposed to 2.7 in benchmark regions).

The report recommended four priority actions for Region 2 which mirror some of the strategies from our 2017 plan:

- Generate increased ideation and greater activities in commercial viability for traded sector, high growth-oriented businesses, integrated with VT's and LU's technology commercialization efforts
- Advance innovation networks bringing together startups and existing companies focused on advancing commercialization and increasing talent connections
- Address need for more startup risk capital for market entry, including establishing an angel investor network and micro loan fund
- Concept of a "Regional Entrepreneurial Quarterback"

For the last recommendation, the state GO Virginia Board has made available a new funding stream to support regions identify and fund a "Quarterback" type entity. The Council is amid responding to this opportunity and has solicited proposals from interested entities. The Council has discussed the nature and role of such an entity, suggesting that a coaching function may be closer in nature to the preferred role for such an organization, that could also be tasked to help plan for further growth and project development associated with regional entrepreneurship, under the direction of the Region 2 Council and support organization.

Technology Development

The first part of this section is largely identical to the 2017 plan. The last part of this section includes an update on progress and related activities in Region 2.

GO Virginia emphasizes a focus on existing or potential industry clusters that can support scalable, sustainable future growth. Across Region 2, Comprehensive Economic Development Strategy (CEDS) plans, target industries identified by regional Economic Development Organizations (EDOs), and strategic plans required by workforce development organizations share several common features and targets concerning key industry sectors. All three of the economic development organizations in the sub-regions (New River Valley; Roanoke-Alleghany; and Lynchburg/Lynchburg Region) have recently completed new target industry studies or plans. The Roanoke Regional Partnership lists nine targets on its website: transportation manufacturing; advanced manufacturing; life sciences; finance & insurance; printing & packaging; technology & innovation; food & beverage; outdoor industry; and foreign investment. The New River Valley Economic Development Alliance prioritizes four primary target industry clusters: advanced manufacturing; information technology; food and beverage processing; and unmanned systems and identifies several specific sub-sectors of interest for each of the four. The Lynchburg Regional Business Alliance identified five primary target sectors: food and beverage; steel and metals; nuclear technology; wireless infrastructure and communication; and financial and business support services. The Alliance also identified four additional long-term niche opportunities: nuclear medicine, alternative energy, cybersecurity, unmanned autonomous systems (UAS), and educational technology.

By looking more closely at total employment, growth projections, higher wage job possibilities, and out-of-region versus in-region purchase percentages, this plan for GO Virginia recommends narrowing the list to four priority clusters that serve as existing or potential industry "drivers":

- ▶ Manufacturing,
- ▶ Life Sciences (and health),

- ▶ Food and Beverage Processing, and
- ▶ Emerging Technologies and Information Technology (IT).

Planning documents across Region 2 consistently mention technology, information technology, or cybersecurity as important sectors for future growth. Industry sector data from Section 2 of this report projects job growth of 5.2% from 2019-2024, higher than the state’s projected growth of 4.8% over the same period. The salary for Region 2 workers in this sector was \$45,783 in 2019. The professional, scientific, and technical services sector (2-digit NAICS level) had a 7% increase in jobs in Region 2 over the last 10 years. As part of the GO Virginia planning process, stakeholders reiterated the need to prioritize attention on industries with higher-wage jobs, high growth potential, and that position the region to attract revenue from outside the state. Focusing on the region’s technology sector and emerging industries aligns well with this priority.

Numerous informants urged the region to focus on technologies with potential for future growth, many of which cut across several traditional industry sectors. Unmanned Autonomous Systems (UAS) is a common and widely mentioned example in the region given a few existing assets, some of which are mentioned below. Energy and renewable energy technology are another example discussed by stakeholders and Council. Stakeholders recommended a continual exploration of the technology horizon for opportunities (what new technologies and systems are on the horizon and cut across multiple industries). Technologies related to systems and Internet of Things (IoT) cut across several industries, and there may be regional entrepreneurial opportunities related to helping companies better employ technology. There are a few existing assets in the Region 2 that support innovation and technology for high-potential industry clusters:

Table 18. Target Cluster Assets

Sector	Sub-areas of note	Selected Assets in region
Manufacturing	Transportation; electrical equipment; metals and materials	High schools and CTE programs (including new investments and programming in Botetourt County Technical Education Center, Staunton River High School, and Giles County Technology Center); the Franklin Center for Advanced Learning and Enterprise; community colleges including the Advanced Technology in Mechatronics at Virginia Western Community College and the Advanced Manufacturing & Packaging Technology Program at Dabney S. Lancaster Community College; the Virginia Tech Center for High Performance Manufacturing; GenEdge; Liberty University’s Center for Advanced Engineering and Research; Virginia Tech College of Engineering; existing employers such as Volvo, Tecton, AREVA, BWX Technologies; etc.
Life Sciences and Health Care	Biotechnology; Health Care; Hospitals; Pharmaceuticals	Virginia Tech Carilion Research Institute; RAMP Accelerator; Jefferson College of Health Sciences; Radford University; Edward Via Virginia College of Osteopathic Medicine; Fralin Life Science Institute; Virginia Tech Corporate Research Center; Liberty University; community colleges; high schools and CTE programming; Roanoke Valley Governor’s School; employers such as Carilion Clinic, Centra Health, Plastics One, Novozymes, Intrexon, Luna Innovations, and more.

Sector	Sub-areas of note	Selected Assets in region
Food and Beverage Processing	Beverage Manufacturing; Packaging	Virginia Tech Food Sciences; community colleges; high schools and CTE programs; employers such as Ballast Point, Aardagh, Phoenix Packaging; Tetra; Wholesome Harvest Baking, Homestead Creamery, Westover Dairy, Central Virginia Foods, Frito-Lay and more.
Technology and Information Technology	Unmanned Autonomous Systems	Alleghany Highlands “Drone Zone” and Flying Circus FPV Festival; Liberty University School of Aeronautics; AUVSI chapter; Mid-Atlantic Aviation Partnership; Virginia Tech Transportation Institute; Community Colleges; Industry such as Aeroprobe, Moog, TORC Robotics, VPT, and AFT.
	IT (including digital media, etc.)	Roanoke-Blacksburg Tech Council; RAMP Accelerator; Virginia Tech Corporate Research Center; Radford University (including National Center of Academic Excellence in Cyber Defense Education designation and M.S. program in Data and Information Management); Liberty University; community colleges; Virginia Tech cybersecurity and IT research entities and educational programming; broadband access and speeds in key nodes; employers such as Rackspace, GE Digital, Cox Communications, and more.

Regional stakeholder input affirmed a desire for the region to identify and focus on high potential emerging industries and to better support and leverage our higher education institutions as engines for technology and entrepreneurial development. There is a critical need to improve connectivity and leverage university research assets and activities in support of emerging regional industries and start-ups. The region should also better capitalize on opportunities for the region’s universities to help attract and partner with larger companies. Universities can continue to enhance research assets and secure greater research funding that aligns with regional cluster activity.

Once again, Council members and working group participants emphasized the region’s higher education institutions as assets, but also called attention to areas of underperformance and disconnectedness. As the region’s major research university, Virginia Tech is both an exemplar and a weak link. Region 2 lags peer regions in university research commercialization. A comparison of the ratio of university research to venture capital investment showed the region scoring in the bottom third among peers (National Science Foundation, National Venture Capital Association). While the region has some access to angel and early stage funds it lacks a resource dedicated to seeking out promising technologies, “de-risking” them and putting them on a path to market. Some stakeholders suggested a need for the region’s colleges and universities to collaborate more closely around economic development and regional innovation. The growth of institutions such as Radford University, Jefferson College of Health Sciences, and Liberty University may represent more entrepreneurial and innovation possibilities and could serve to learn more from each other, streamline approaches, and identify shared aims for regional innovation. Virginia Tech, and other institutions, may need incentives or outside impetus to spur regionally focused commercialization and entrepreneurial activities.

The table below includes regional strategies, examples of funding opportunities, and possible success measures for projects through GO Virginia related to promoting innovation and technology for critical and high-potential clusters:

Table 19. Technology Development Strategies, Opportunities, and Metrics

Strategies	Opportunities	Metrics
Increase investments and support for emerging and critical industries and innovative technologies	Activities to encourage development of pre-seed and early-stage seed funding	Number & dollar amount of deals and grants in region over time <ul style="list-style-type: none"> ○ Jobs created >20% above regional annual wage average ○ Number of knowledge-based economy jobs created ○ Number of new jobs attributed to incubators and accelerators ○ Number of new jobs attributed to ideas translated from universities, research institutes, labs, etc.
	Activities that connect regional companies to investors outside the region.	
	Activities that enhance support services and technical assistance capabilities for small-to mid-sized companies in important and emerging industries.	
	Activities to support the growth and viability of companies exploring “game-changing” technologies in such areas as Unmanned Autonomous Systems, additive manufacturing, and similar.	
	Activities that support entrepreneurs in acquiring government and private funding	
Expand and enhance technology transfer and research commercialization to spur regional company growth and venture creation.	Activities to better connect regional companies (including small to medium sized enterprises) with universities and research centers.	Company funding and exits <ul style="list-style-type: none"> ○ Number and amount of new Angel and VC funding to regional firms ○ Number successful exits (> \$5M- i.e. new regional wealth creation) ○ Number of firms (in priority industry clusters) receiving funding over time
	Activities that help formalize and sustain regional research networks and consortiums.	
	Activities to expand incubator/accelerator activities that provide mentorship and resources for new ventures engaged in commercialization.	
	Activities that would incentivize universities and researchers to increase regionally focused start-ups and commercialization opportunities.	
Support and enhance regional talent attraction efforts.	Activities to help measure, market, and illustrate the region’s assets, stories, and quality of life.	Number of new company startups emanating from: <ul style="list-style-type: none"> ○ Incubators and accelerators ○ Attributed to ideas translated from universities, research institutes, labs, etc. ○ Attributed to licensed technology from universities, research institutes, labs, etc.
	Activities that target, recruit, and market to workers and highly skilled individuals outside Virginia.	
Grow the number of individuals entering and	Activities that market higher wage job opportunities and training and education programs to younger people (K—12 level).	<ul style="list-style-type: none"> ● Number of education and training program participants over time

Strategies	Opportunities	Metrics
completing training and educational programs for higher-wage in-demand occupations.	Activities that help raise awareness and appeal of industries and occupations such as advanced manufacturing.	<ul style="list-style-type: none"> • Survival rates of targeted/served companies • Revenue and jobs of targeted/served companies • Survey/Interview data illustrating increased collaboration among regional cluster-serving entities, assets, and companies.
	Activities to offer more varied, innovative, and accessible training and educational opportunities for higher-wage in-demand occupations (web-based, distance learning, intensive boot-camp learning, pre-apprenticeships, etc.)	

Key Points: Technology Development

Why is this important?

- Planning documents across Region 2 consistently mention technology, information technology, or cybersecurity as important sectors for future growth
- Projected job growth of 5.2% from 2019-2024 higher than the state's projected growth of 4.8%
- Average Salary for Region 2 workers was \$45,783

Strategies

- Increase investments and support for emerging and critical industries and innovative technologies
- Expand and enhance technology transfer and research commercialization to spur regional company growth and venture creation
- Support and enhance regional talent attraction efforts
- Grow the number of individuals entering and completing training and educational programs for higher-wage in-demand occupations

2019 Update for Technology Development Strategy

Many of the projects funded by Council and listed in other strategic areas are ones that include a technology component. These include:

- Capital Ecosystem Development (Enhanced Capacity Building) is led by the Valleys Innovation Council. The project examines the Region 2 capital ecosystem to understand the current landscape and find ways to strengthen formal pathways to capital for businesses and entrepreneurs. The project will create a Capital Landscape Study to understand and describe the various sources of capital in the region through surveys and interviews with entrepreneurs and

investors in the region. Through this study, analysis will determine a capital access plan that would be most effective for Region 2 to connect businesses and entrepreneurs with investors throughout the region.

- The Regional Acceleration and Mentorship Program (RAMP) Expansion is led by the Roanoke-Blacksburg Technology Council, in partnership with the City of Roanoke and Virginia Western Community College. The project assists technology-based startups with access to classroom education, mentoring, and assistance in identifying capital. RAMP has previously supported one cohort through the program and current funds will help build a diverse mentor network, provide mentors and entrepreneurs with education and tools to help grow and develop, and build a pipeline of companies who wish to apply to RAMP, the region's only accelerator program. Through Pitch-and-Polish clinics, pairing mentors and startups, and beginning a second RAMP cohort, RAMP will strengthen the job and resource network in Region 2.
- Increasing the Birth Rates of New High Growth Companies for Region 2 is led by The Advancement Foundation (TAF). The project focuses on leveraging business resources, entrepreneur resource partners, industry experts, and partners to increase business readiness and success rate for new high growth companies. The goal of this project is to define and expand the region's entrepreneurial pipeline for new and early stage companies.
- Center for Energy Research and Education (CERE) Industry Labs is led by Liberty University. The project works with industry partners such as Framatome (AREVA Inc.) to create four industry labs including: Chemical/Material Lab, EMC Lab, Calibration Lab, and a Non-Destructive Testing Lab through site preparedness on a 28-acre lot in Bedford, VA. Through developing the land and establishing the labs, the region will be able to attract and build industry support for leading innovations and attract high-growth energy companies to the region.
- Liberty University also leads the Additive Manufacturing Partnership Labs (AMPL). The project is a collaborative effort between Liberty University (LU), The Center for Advanced Engineering and Research (CAER), Central Virginia Community College (CVCC), the XLR8 STEM Academy, local partners BWX Technologies, FarField NDT, and Bedford County to support the collective goal of building the Additive Manufacturing (AM) base and educating the AM workforce. GO Virginia funding will purchase the AM equipment needed to establish the lab. LU will outfit the AM laboratory with: two Markforged Metal X 3D Printers, one Markforged X7 3D Printer, one Geomagic Capture Scanner, and smaller 3D printers in support of the STEM Academy. The 2,400 square-foot facility will include several AM systems capable of full consolidation of nylon, carbon fiber, polymeric, metallic, and ceramic material systems, as well as a prototyping laboratory which includes a host of characterization techniques.
- Enhancing the Region through New Technology for Unmanned Systems is led by Dabney S. Lancaster Community College (DSLCC). The project seeks to build a unique and innovative partnership in the DSLCC Service Region and supports a new drone technology program to meet the needs of the Alleghany Highlands Drone Zone. The project will create 18 high-wage jobs and attract three to five new businesses to the area. The project focuses on exhibiting pathways to middle and high school students in the region, so students become aware there are a growing number of interesting, challenging, and rewarding jobs available and what the foundational knowledge and skill sets needed to perform these jobs are in the region. Funds are used to purchase and roll out drone technology training courses to develop the Alleghany Highlands Drone Zone program to train students for potential employers.

The technology development strategies overlap in many ways with the entrepreneur development areas. Still, there are opportunities to continue to support projects that seek to take advantage of research and innovation assets in the region to spark company formation and growth. Emerging areas continue to include cybersecurity, unmanned systems, blockchain, and other areas.

There has been notable progress across the region by localities, industry, higher education and others. The Ridge and Valley Chapter of the Association for Unmanned Vehicle Systems International continues to support unmanned systems industry growth across the region. Private entities such as Torc Robotics, Block One, 1901 Group, BWXT, and others continue to grow in the region.

SECTION 4: APPLICATION PROCESS AND ASSESSMENT CRITERIA

This plan should guide the Region 2 Council in assessing projects to support and guide applicants in designing and submitting fundable projects.

This section outlines the standard process for project screening, beginning with a first-stage, baseline, screening by Region 2 support organization staff. Staff and Council continue to encourage any interested party to discuss funding opportunities.

Potentially interested applicants are required to submit a no more than 2-page letter of interest that could speak to some or all of these points:

- Includes the name and contact information of the expected primary applicant
- Identifies Region 2 jurisdictions to be impacted/involved
- Includes list of likely partners and collaborators
- Provides a brief narrative description of the project
- Identifies likely total costs including anticipated GO Virginia request and matching fund sources
- Includes a clear description of expected outcome or result - clearly describing how the project would spur growth of higher-wage jobs in one or more of Region 2's priority clusters AND respond to one or more of the identified strategies in the Region 2 Economic Growth and Diversification Plan

All those potentially interested are encouraged to submit a letter, even if brief and incomplete in order to begin the process of engaging with support staff personnel. Letters may be submitted that do not yet have some of these details in order to accelerate staff feedback and ensure that applicants are able to access and complete the full application in a timely manner. Interested applicants should review the Region 2 Growth & Diversification Plan prior to submitting their inquiry or application.

The letter of interest process supports possible applicants by eliciting feedback and guidance on the appropriateness of potential projects for GO Virginia funding. Letters of interest should be submitted electronically to support organization staff at the Virginia Tech Office of Economic Development.

Eligible Applicants:

Region 2 includes the counties of Alleghany, Amherst, Appomattox, Bedford, Botetourt, Campbell, Craig, Floyd, Franklin, Giles, Montgomery, Pulaski, and Roanoke; as well as the independent cities of Covington, Lynchburg, Radford, Roanoke, and Salem. Proposals require the collaboration of at least two localities, which may be any combination of counties, cities and towns and/or political subdivisions, public bodies corporate and politic, along with other public or private entities. Political subdivisions or public bodies corporate that represent the same county or city will not be counted as a separate locality. Public or private entities that may pursue and administer grant funding include, but are not limited to, other political subdivisions of the state, foundations, non-profit entities, colleges and universities, other educational entities, economic development organizations, workforce boards, local governments, regional council support organizations, and other stakeholders. A town, with the county that surrounds

it, may petition the Board for the ability to apply for a grant, if the parties can demonstrate that their collaboration is substantive and aligned with the goals of GO Virginia.

While a private company may apply, in cooperation with the collaborating localities and other stakeholders, to participate in or manage a project, grant funds are not to be used as economic development incentive payments or to promote the activities of a single entity. Instead, grant funds are to be used to support the implementation of requests aligned with plan priorities and that offer broad community benefits. Financial participation by the collaborating localities is required as part of any application for a grant allocation, and the minimum threshold for such participation is outlined in the funding match section of these guidelines. The roles of the various participants in applying for and administering a proposed project shall also be set forth in the grant application.

Project evaluation criteria:

- Economic impact (35%):
 - To what extent does the project spur the growth of higher-wage jobs in one or more of Region 2's priority clusters: manufacturing; life sciences and health care; food and beverage processing; and emerging technologies and IT?
 - To what extent does the project respond to one of the strategies in the Region 2 Economic Growth and Diversification Plan related to: advancing technology and high-growth clusters; growing skilled talent; supporting entrepreneurship; and collaborative development of sites and buildings?
 - To what extent, does the proposal outline the expected return on investment of the proposed project and the timeline for achieving that return?
- Regional collaboration (30%)
 - To what extent does the project show evidence of widespread benefit to the larger region?
 - To what extent does the project engage localities and partnerships (including private or corporate partnership)?
 - To what extent does the project identify cost efficiencies, repurposing of existing funds, leveraging of existing assets or other evidence of collaboration benefits?
 - To what extent has the project involved businesses, colleges and universities, and other public and private entities within the region in the conceptualization of and the implementation of the project?
 - To what extent does the amount, timing, and form of the proposed project match indicate the depth of the commitment by the public and private funding partners to the effort?

- To what extent does the proposed project inventory related efforts and seek to ensure it is not duplicative of, but additive to, other efforts to support economic diversification and the creation of more higher-paying jobs?
- Project readiness (20%)
 - To what extent do the applicant and project partners demonstrate and describe capabilities to successfully execute the project?
 - To what extent does the proposed project fully assess the barriers to successful implementation and other associated risks along with a plan to overcome them?
 - To what extent do the project partners and lead entities have sufficient financial management, personnel, and organizational capacity to ensure effective management and compliance?
- Project sustainability and innovation (15%)
 - To what extent is the project innovative, forward looking, and offers potential to promote sustainable long-term economic growth in the region?
 - To what extent does the project provide a plan for sustainability beyond GO Virginia funding, if appropriate?
 - To what extent does the project demonstrate leverage above the required amounts, from any source?

The anticipated return on investment of a proposed project resulting from the GO grants is one of the key measures to be used by the Board in making funding allocations. In calculating the anticipated return on investment for proposed grant requests, applicants should outline the anticipated jobs and capital investment that could accrue from the project over a two-year period that aligns with the likely payout schedule of a grant, as well as over the longer term. Using those factors, the applicant should outline the anticipated state and local tax revenues that will result from the proposed activity.

When determining the economic impact of a proposed grant request, the Board will give preference to those applications which can demonstrate that the GO Virginia portion of the grant is recouped within three years, however, projects that may have a smaller return in the initial phases, but a larger anticipated longer-term impact (considering the likelihood of future success) will received special consideration. In addition to these objective factors, applicants should outline other measures of success, such as new collaborative agreements, revenue sharing, cost savings and efficiencies resulting from the project, or other items that can be used by the Board to understand the financial viability of the project. Another variable that the Board will use in determining the return on investment is any information provided by the applicant about previous successes involving the applicant on similar initiatives. It is

understood that certain project types will have a longer timetable to achieve their expected return on investment.

Projects will NOT be eligible for Council funding if the funds impact only a single locality; focus on quality of life activities; support trade missions; fund construction or transportation projects; fund museum or entertainment venues; or lack alternative or matching funding.

All GO Virginia Per Capita and Competitive grants must be matched \$1:1 by non-state resources such as federal, private, non-profit, and local entities. Those matching funds should include a local contribution of no less than 20% of the required \$1:1 match, or \$50,000 whichever is greater. Application budgets should reflect adequate funding through committed match and the requested funds to cover the full cost of the proposed project.

The goal of the local contribution is to ensure localities are truly invested in the collaborative nature of the GO Virginia process as well as to ensure that proposed grant requests are of a substantial nature and meet the highest priorities identified in the regional growth and diversification plans. The local contribution may come from any combination of the participating localities (cities, counties, towns) and political subdivisions thereof (school systems, EDA, IDA, RIFA, etc.). The local contribution may take the form of cash, revenue sharing, dedication of locally owned or controlled assets to the proposed regional project, reallocation of existing funds, or in-kind contributions.

SECTION 5: IMPLEMENTATION AND SUSTAINABILITY

This plan recognizes that significant work has transpired in the region and around the Commonwealth since 2017. The Region 2 Council has established a strong track record per its ability to identify, assess, and support worthwhile projects.

Nonetheless, the Council and support organization may find that more work will be needed to grow the regional project pipeline in the future, as many “ready-to-go” projects have already been funded. One challenge may be working more closely with organizations less familiar with GO Virginia or with less existing capacity to pursue funding. That may mean a more intentional strategy for outreach and project cultivation as well as a more intensive coaching process for potential applicants.

Implementing the Plan and Advancing GO Virginia Goals

The Council will continue to focus on strategies and activities that support the creation of higher wage jobs and generate new revenues from out-of-state sources. These include:

- Grow skilled talent
 - Core strategies include:
 - Strengthen the pipeline from K-12 to higher education to career for each target sector
 - Increase completions of degrees applicable to target industry sectors
 - Improve knowledge and promotion of complementary workforce and training services
 - Enhance employer engagement activities that will encourage more aligned skill development, create opportunities for regional employment post-graduation, and promote the hiring of in-demand occupations
 - In this focus area, the **key implementation charge** is to:
 - Support strategies to grow, attract, and retain skilled talent by enhancing regional coordination and increasing the talent pipeline for critical higher wage occupations.
 - In addition to the broader criteria, applicants may be asked to:
 - Explain how their project supports one or more core strategies in this focus area
 - Align their activities with three or more of the success metrics listed in the focus area description; and
 - Describe how their project will address one or more of the gaps identified in the talent development and retention section (talent, interest, affordability, coordination).
- Collaborate in development of sites and buildings
 - Core strategies include:
 - Improve information about site and buildings characteristics and market demand for sites and buildings
 - Incentivize collaboration at all stages of joint site/building development
 - Develop and implement real estate strategies to leverage special assets
 - In this focus area, the **key implementation charge** is to:

- Support strategies that increase the number of collaboratively developed prospect-ready sites and buildings on the market, improving their market positioning, and meaningfully engaging sites and buildings by leveraging special assets.
 - In addition to the broader criteria, applicants may be asked to explain how their project supports one or more core strategies in this focus area and align their activities with three or more of the success metrics listed in the focus area description.
- Enhance access to capital and business mentorship
 - Core strategies include:
 - Increase the presence of and access to capital investors
 - Expand and coordinate mentorship and training resources
 - Improve awareness of existing capital, mentorship & training resources
 - In this focus area, the **key implementation charge** is to:
 - support the development of young and growing firms in the region
 - In addition to the broader criteria, applicants may be asked to explain how their project supports one or more core strategies in this focus area, align their activities with three or more of the success metrics listed in the focus area description, and describe how their project will:
 - Increase the number of deals in the region,
 - Create and sustain companies in the region, and
 - Promote startups or expanding businesses that support higher than median wage jobs.
- Promote innovation and technology for targeted and high-potential industry clusters
 - Core strategies include:
 - Increase investments and support for emerging and critical industries and innovative technologies
 - Expand and enhance technology transfer and research commercialization to spur regional company growth and venture creation.
 - Support and enhance regional talent attraction efforts.
 - Grow the number of individuals entering and completing training and educational programs for higher-wage in-demand occupations.
 - In this focus area, the **key implementation charge** is to:
 - Support strategies that strengthen emerging industries and better leverage higher education institutions as engines for technology and entrepreneur development.
 - In addition to the broader criteria, applicants may be asked to explain how their project supports one or more core strategies in this focus area, align their activities with three or more of the success metrics listed in the focus area description, and describe how their project will:
 - Increase the number of higher wage jobs in the region,
 - Create and sustain companies in the region, and
 - Promote startups or expanding businesses that support higher than median wage jobs.

While the Council has funded projects that address each of these strategic areas of focus, there are some areas that have not yet been addressed as directly or as substantively by funded projects. In the technology development area, there remains a need to more directly and actively support research commercialization and technology transfer. The new state opportunity for a Regional Entrepreneurship Initiative should help in this regard. A lead entity will be identified to develop a plan and conduct outreach to actively grow projects in this area.

There may also be missing gaps related to higher education institution incentives, coordination or activities related to commercialization and technology transfer, particularly with Virginia Tech, as noted in the TEconomy report.

Access to capital remains a challenge and the study funded by Council should help identify opportunities for future projects to address the disparity between Region 2 and benchmark regions.

There have been few projects focused directly on the food processing or life science sector companies. These may represent future project opportunities.

This amendment continues to identify a desire by the Council, and a sentiment among stakeholders, for selectivity in terms of project funding. One stakeholder described this as supporting “move the needle” projects that do not just add funding to business as usual activities, but rather prioritize a vigilant focus on projects that stimulate growth, serve a catalyzing effect, and hold promise to make substantive economic impact for the region. Sometimes this may require a longer-term vision in terms of timeframe.

Given funding limitations as well as the size and varied geography of the region, this plan supports that desire for a vigilant selectivity and strong preference for “move the needle” projects. These need not all be large-scale. Sometimes a small amount of investment can jumpstart a powerful pilot initiative, lay the early groundwork for additional funding at a later stage, or significantly expand the boundaries of an already successful program.

The capacity building projects funded by Council since 2017 are perfect examples. The Stopping the Brain Drain project has highlighted the talent challenge and spurred several other organizations to offer project ideas for new or expanded internship or talent retention initiatives.

Beyond the desire for selectivity and impact, there is a continued concern for recognition of the varied nature of the region. Region 2 includes three metropolitan areas, each with a mixture of rural and urban characteristics. Some localities are more rural in nature and may lack some of the infrastructure, assets, and benefits associated with the more urban locations in the region. For example, Craig County is in the Roanoke-Alleghany MSA but may be among our most rural counties, with a sparse population and little in-county entrepreneurial activity outside of the agriculture and outdoors sectors. Alleghany County is also quite rural but does have larger towns, a community college, and a significant manufacturing presence.

Council has funded fewer projects initiated by more rural localities. There has been one project funded with a primary focus on the Alleghany region. However, Alleghany Highlands stakeholders have been very involved in council activities and planning processes and there are opportunities for project development there. Similarly, counties such as Floyd, Franklin, Campbell or others might find common ground around projects with a food processing/agriculture focus and initiate projects in that arena.

Some of our region's leading institutions and organizations have not yet been active seekers of GO Virginia funding. Virginia Tech will have two new project proposals for Council to consider in August of 2019 but has been less active until this point. Radford University, New River Community College and colleges such as Roanoke College, Hollins University, Ferrum College and the University of Lynchburg have not yet sought funding. The Fralin Biomedical Research Institute at Virginia Tech in Roanoke was cited by several during the planning process as a strength we should build on, but there has also not been a proposal to that end.

The United Way of Southwest Virginia successfully brought forward a project to serve some of the localities in the New River Valley but so far many of the region's United Ways, Chambers, and larger non-profit type entities have been less involved in project development. The Region 2 Council and staff will continue to conduct an annual review of this plan and perform updates as agreed upon by the Council. The review will incorporate a discussion and consideration of overall GO Virginia Performance Metrics provided by the Virginia Department of Housing and Community Development. The review will include both project impacts, pipeline indicators and outcome measures to the extent that data is available.

In Region 2, applicants are expected to provide meaningful project match and the presence of match is a weighted element for project assessment. By prioritizing substantive applicant match, the Council seeks to enhance impact, leverage available funding, and ensure broad-based support for implementation.

In terms of overall sustainability of the Region 2 Council, there are serious reservations as to whether the Council is sustainable without dedicated state funding support at some level. That said, Council is seeking to reduce operational costs and enhance administrative efficiencies. This is evidenced in a number of ways – such as the streamlining of support and consulting functions in one entity and the preservation of significant funds for strategic reserve.

There are a few challenges to sustainability. Funds for regional and local economic development are a limited pool and regional economic development organizations are also amid their own fundraising campaigns. Soliciting GO Virginia funds threatens to divert funds from EDOs, and those funds are critical to regional industry attraction and targeting activities. GO Virginia Council members have visited the local government bodies across the region to share program information, discuss locality contribution requirements, and encourage proactive identification of possible matching funds by localities for future projects. This proactive outreach has been well-received, but the limited nature of local government resources will continue to make the locality contribution requirement a high bar for many future projects.

Another ongoing challenge is monitoring, coaching, reporting and evaluation of funded projects. As the number of active projects increases, these tasks increase in volume and complexity. Still, Region 2 is actively working to monitor, coach, support, and evaluate funded projects,

All grantees will continue to be monitored and their progress evaluated against their contractual obligations and their contribution to the overall goals of GO Virginia. Every quarter, grantees are asked to provide updates on their progress over the last three months. This includes the following:

- 1) Narrative description of activities and outcomes.
- 2) An indication as to whether or not the milestones for a given quarter have been achieved, a description of progress according to that milestone, and if the milestone was not met,

a description of both the progress and the barriers. These milestones are taken directly from the contract.

3) A tally of metrics and products, according to contractual deliverables

Staff reviews these reports for completeness and goes back to grantees with any needed clarification. If grantees have not met a milestone, staff follows up with the grantee to make sure we understand the reasons for not meeting a milestone in order to provide a complete report to council and DHCD. In some cases, support organization staff will aid the grantee to help them meet the milestone for the following quarter.

Progress is also tracked against remittance requests and matching fund documentation reports to flag cases where activities and funding do not align.

Staff summarizes these reports into a “stoplight” report for council. Grantees that have met all milestones and are on track with funding are assigned a “green” color. Grantees that need to be monitored by staff in the subsequent quarter, either because of milestone deviation, lags in funding, or other issues are given a “yellow” light. Grantees that are far behind their milestones and have not indicated plans to catch up are given a “red” light, indicating staff intervention.

Each grantee also responds to a short survey via Qualtrics. This survey asks them to describe in greater detail their activities, outputs, and outcomes, framed by elements of the program logic model. All grantees describe their major partnerships for the previous quarter, which answers the question: “how does GOVA funding change the nature of relationships between local government and other partners around economic development”.

Projects in talent, entrepreneurship, technology, and sites and buildings each have unique subsets of questions that speak directly to the ways in which investments in these areas lead to higher than median wage jobs and investment. For example, projects in the talent space ask the grantee to describe the number of employees placed into upskilling programs, the skills learned, and the expected occupation of the employee upon completion of the program.

The survey responses are reviewed and aggregated. The data monitored quarterly and evaluated in full annually. The next annual evaluation report using this data will be shared in the Fall.

For this next fiscal year, Region 2 support organization staff plan on working individually with each grantee to ensure they are collecting data from their clients needed to evaluate the extent to which these investments are leading to impact. This could include data from businesses about the starting and ending salary of upskilled employees, the amount of outside region investment given to a startup, or the extent to which middle-school attendees of a career expo have become interested in a manufacturing career.

Proposed GO Virginia Region 2 Peer Regions

In considering long-term growth and impact, Region 2 developed a set of eight possible peer regions in 2017. The process began with the identification of 28 possible metropolitan regions (MSAs) with comparable higher education institutions to account for research, human capital and possible spinout tech companies. Factors that were taken into consideration for each of the 28 MSAs were:

- Population Density and Growth

- ▶ Urban to Rural Ratio (Designate Places with 50,000 or more residents)
- ▶ Comparable industry sectors
- ▶ Per Capita Income
- ▶ Median Household Income
- ▶ Gross Regional Product per Capita

Composition of population in terms of age and education attainment (within 1-5% difference compared to Region 2 among different categories e.g. those with Bachelors)

These factors led to the selection of eight proposed peer regions. The areas are comparable to Region 2 but also may have strengths in certain industries or activities from which this region could learn. For instance, some peer regions seem to be making great strides in advanced manufacturing, life sciences, and/or entrepreneurship.

Table 20. Possible GOVA Region 2 Peer Regions

METROPOLITAN AREA	POPULATION (2014)	POP GROWTH (2004-2014)	POPULATION PER SQ. MILE	PER CAPITA INCOME (2015)	MEDIAN HOUSEHOLD INCOME (2014)	GRP PER CAPITA (2015)	CITY-RURAL RATIO
REGION 2	761,789	12%	128	\$39,071	\$47,706	\$35,602	0.42
BIRMINGHAM, AL	1,143,772	6%	217	\$44,568	\$47,046	\$50,257	0.35
CHAMPAIGN-URBANA, IL	238,680	11%	124	\$42,863	\$48,063	\$40,833	0.55
CHATTANOOGA, TN-GA	488,129	11%	228	\$41,225	\$46,600	\$44,398	0.47
COLUMBIA, SC	800,752	17%	216	\$40,420	\$50,091	\$42,692	0.20
GREENEVILLE, SC	862,463	48%	432	\$39,213	\$44,783	\$39,777	0.08
LAFAYETTE, IN	211,515	17%	165	\$35,120	\$46,109	\$41,770	0.50
LANSING, MI	470,458	3%	277	\$37,863	\$49,697	\$39,797	0.53
STATE COLLEGE, PA	158,742	13%	143	\$41,344	\$51,367	\$46,276	0.36

The above data is from 2017 and support organization staff will revisit Region 2 performance compared to peer regions over the next two years.

CLOSING

This Growth and Diversification Plan amendment retains most elements of the 2017 plan and includes progress and data updates. The plan continues to offer a case for action grounded in a thoroughly researched and deliberated understanding of the economy and labor markets in Region 2. The document brings four target clusters into focus: advanced manufacturing, life sciences and health care, food and beverage processing, and emerging technology and IT. The plan further provides strategies and metrics for meeting the needs these clusters have in areas such as skilled talent development and retention, collaborative development of sites and buildings, entrepreneurship and business development, and technology development.

APPENDIX A: INDUSTRY CLUSTER DEFINITIONS

Below is the list of industries comprising Region 2's four industry clusters. Region 2 began with the Harvard industry cluster definitions explored in the McKinsey Group data provided through GO Virginia and DHCD, as well as other sources (e.g. clustermapping.com and Economic Modeling Specialists Inc.). With input from stakeholders and a local understanding of the data, the region tailored specific clusters according to regional strengths. All data presented here is from the Economic Modeling Specialists Incorporated (EMSI), a proprietary economic and workforce development software. We provide the most recently available dataset from 2017Q3.

Manufacturing Cluster

NAICS	Description	2019 Jobs	2024 Jobs	2019-2024 % Change	2019 LQ	Competitive Effect	2019 GRP (millions)	Avg. Earnings Per Job
MANUFACTURING CLUSTER		17,220	17,458	1%	6.48	206	3,189	88,206
AUTOMOTIVE		5,744	5,846	-8.9%	8.23	-12	1,036	76,554
331511	Iron Foundries	234	146	-37.6%	2.88	-64	31	\$76,619
336120	Heavy Duty Truck Manufacturing	3,281	3,417	4.1%	43.88	-35	753	\$80,720
336211	Motor Vehicle Body Manufacturing	370	411	11.1%	2.75	40	19	\$46,871
336310	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing	94	104	10.6%	0.63	10	19	\$129,734
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	1,074	1,059	-1.4%	5.46	-48	120	\$72,115
336360	Motor Vehicle Seating and Interior Trim Manufacturing	38	17	-55.3%	0.21	-23	3	\$45,317
336390	Other Motor Vehicle Parts Manufacturing	651	692	6.3%	1.80	34	92	\$84,502
DOWNSTREAM CHEMICAL PRODUCTS		1,964	1,941	0.75%	8.14	1	455	\$77,930
325130	Synthetic Dye and Pigment Manufacturing	<10	<10	Insf. Data	0.07	-1	\$0.63	Insf. Data
325510	Paint and Coating Manufacturing	158	167	5.7%	1.72	12	\$33	\$81,405
325611	Soap and Other Detergent Manufacturing	11	<10	Insf. Data	0.18	-3	\$11	\$84,806
325612	Polish and Other Sanitation Good Manufacturing	146	168	15.1%	2.70	23	\$43	\$69,209
325620	Toilet Preparation Manufacturing	551	555	0.7%	4.35	5	\$133	\$52,733
325920	Explosives Manufacturing	856	826	-3.5%	50.36	-26	\$186	\$95,565
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing	97	92	-5.2%	4.19	10	\$16	\$72,478
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	144	132	-8.3%	1.56	-10	\$32	\$89,317
METALWORKING TECHNOLOGY		3,319	3,652	5.5%	4.03	37	468	\$77,930
327910	Abrasive Product Manufacturing	58	63	8.6%	2.35	6	\$18	\$62,357
332313	Plate Work Manufacturing	2,600	2,917	12.2%	24.10	276	\$394	\$115,245

332721	Precision Turned Product Manufacturing	33	39	18.2%	0.35	6	\$4	\$55,173
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	42	54	28.6%	0.31	11	\$3	\$38,369
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	68	44	-35.3%	0.49	-22	\$6	\$51,034
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	278	306	10.1%	1.93	39	\$16	\$55,459
333515	Cutting Tool and Machine Tool Accessory Manufacturing	<10	<10	Insf. Data	0.15	-4	\$2	\$148,499
333517	Machine Tool Manufacturing	239	230	-3.8%	2.52	-11	\$25	\$87,502
PAPER AND PACKAGING		2,906	2,926	7.39%	4.99	13	840	\$77,930
322121	Paper (except Newsprint) Mills	53	44	-17%	0.44	-2	\$11	\$78,170
322130	Paperboard Mills	1,882	1,755	-6.8%	26.64	-78	\$735	\$111,500
322211	Corrugated and Solid Fiber Box Manufacturing	336	389	15.8%	1.53	56	\$32	\$70,997
322212	Folding Paperboard Box Manufacturing	151	186	23.2%	2.35	32	\$15	\$71,428
322219	Other Paperboard Container Manufacturing	92	95	3.3%	1.60	2	\$8	\$59,002
322220	Paper Bag and Coated and Treated Paper Manufacturing	185	217	17.3%	1.44	40	\$23	\$75,630
322230	Stationery Product Manufacturing	207	240	16%	5.69	58	\$16	\$56,258
322299	All Other Converted Paper Product Manufacturing	<10	<10	Insf. Data	0.21	-2	\$0.77	Insf. Data
LIGHTING AND ELECTRICAL EQUIPMENT		3,263	3,069	-5.6%	7.35	-18	391	\$77,930
335121	Residential Electric Lighting Fixture Manufacturing	131	150	14.5%	6.06	21	\$12	\$69,971
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	443	471	6.3%	8.22	18	\$39	\$64,462
335311	Power, Distribution, and Specialty Transformer Manufacturing	581	608	4.7%	9.71	17	\$65	\$94,472
335312	Motor and Generator Manufacturing	1,463	1,357	-7.3%	18.20	-19	\$181	\$85,029
335314	Relay and Industrial Control Manufacturing	536	401	-25.2%	5.29	-125	\$75	\$116,807
335921	Fiber Optic Cable Manufacturing	110	81	-26.4%	3.90	-36	\$19	\$75,062
335931	Current-Carrying Wiring Device Manufacturing	<10	<10	Insf. Data	0.06	0	\$0.71	Insf. Data

Life Sciences and Health Care Cluster

NAICS	Description	2019 Jobs	2024 Jobs	2019-2024 % Change	2019 LQ	Competitive Effect	2019 GRP (millions)	Avg. Earnings Per Job
LIFE SCIENCES AND HEALTHCARE CLUSTER		37,175	40,432	9%	0.96	719	\$3,099	\$61,008

BIOPHARMACEUTICALS AND MEDICAL DEVICES (EXCEPT R&D)		651	639	5%	0.75	-16	\$109	\$69,283
325412	Pharmaceutical Preparation Manufacturing	237	169	-29%	0.56	-63	\$53	\$71,578
325414	Biological Product (except Diagnostic) Manufacturing	11	<10	Insf. Data	0.18	-11	\$5	\$70,839
339113	Surgical Appliance and Supplies Manufacturing	348	397	14%	1.42	40	\$43	\$63,222
339115	Ophthalmic Goods Manufacturing	56	73	30%	0.85	18	\$7	\$71,493
HEALTHCARE PROVIDERS		36,524	39,793	9%	1.00	734	\$2,991	\$69,999
339116	Dental Laboratories	69	74	7%	0.57	5	\$4	\$53,374
621111	Offices of Physicians (except Mental Health Specialists)	6,130	6,628	8%	1.02	-110	\$707	\$106,167
621112	Offices of Physicians, Mental Health Specialists	115	134	17%	0.71	6	\$15	\$81,844
621210	Offices of Dentists	1,873	2,007	7%	0.82	-30	\$151	\$68,606
621310	Offices of Chiropractors	370	407	10%	1.00	18	\$15	\$38,661
621320	Offices of Optometrists	278	274	-1%	0.85	-30	\$16	\$47,735
621330	Offices of Mental Health Practitioners (except Physicians)	393	431	10%	1.25	-10	\$27	\$41,954
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists	961	1,138	18%	0.96	1	\$55	\$50,863
621391	Offices of Podiatrists	63	69	10%	0.75	2	\$4	\$51,405
621399	Offices of All Other Miscellaneous Health Practitioners	280	345	23%	0.72	13	\$29	\$48,924
621420	Outpatient Mental Health and Substance Abuse Centers	785	887	13%	1.30	-1	\$53	\$45,471
621492	Kidney Dialysis Centers	279	314	13%	0.86	-10	\$21	\$49,327
621493	Freestanding Ambulatory Surgical and Emergency Centers	592	728	23%	1.52	23	\$51	\$60,062
621498	All Other Outpatient Care Centers	207	274	32%	0.44	25	\$24	\$82,126
621511	Medical Laboratories	437	411	-6%	0.94	-84	\$38	\$56,614
621512	Diagnostic Imaging Centers	186	246	32%	0.93	38	\$20	\$79,920
622110	General Medical and Surgical Hospitals	15,495	16,728	8%	1.41	615	\$1,408	\$76,945
623110	Nursing Care Facilities (Skilled Nursing Facilities)	5,177	5,461	5%	1.39	249	\$216	\$38,158
623311	Continuing Care Retirement Communities	2,267	2,691	19%	1.90	52	\$83	\$34,466
902622	Hospitals (State Government)	567	543	-4%	0.67	-37	\$56	\$74,429

Food and Beverage Processing Cluster

NAICS	Description	2019 Jobs	2024 Jobs	2019- 2024	2019 LQ	Competitive Effect	2019 GRP (millions)	Avg. Earnings Per Job
FOOD AND BEVERAGE PROCESSING CLUSTER		5,615	5,940	6%	2.12	163	\$827.83	\$46,140
AGRICULTURAL INPUTS AND SERVICES		1,913	2,015	5%	0.67	97	\$299.27	\$29,151
111000	Crop Production	564	611	8%	0.30	45	\$98.39	\$29,009
112000	Animal Production	717	674	-6%	0.74	-26	\$173.43	\$29,262
115115	Farm Labor Contractors and Crew Leaders	249	276	11%	0.33	15	\$5.82	\$22,531
115210	Support Activities for Animal Production	97	104	7%	0.97	2	\$4.22	\$30,701
311611	Animal (except Poultry) Slaughtering	248	328	32%	0.67	75	\$13.64	\$35,263
424520	Livestock Merchant Wholesalers	38	23	-39%	1.02	-13	\$3.78	\$31,716
FOOD PROCESSING, MANUFACTURING, AND DISTRIBUTION		3,702	3,925	6%	2.85	65	\$528.56	\$57,648
311119	Other Animal Food Manufacturing	379	407	7%	4.58	18	\$49.97	\$57,908
311211	Flour Milling	35	37	6%	1.10	2	\$5.93	\$63,974
311511	Fluid Milk Manufacturing	125	150	20%	0.92	26	\$19.52	\$85,000
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing	601	620	3%	14.5	-30	\$165.52	\$66,712
311811	Retail Bakeries	143	151	6%	0.61	1	\$4.91	\$28,618
311812	Commercial Bakeries	727	764	5%	2.19	31	\$46.81	\$52,720
311919	Other Snack Food Manufacturing	445	446	0%	4.66	-5	\$84.43	\$63,247
312111	Soft Drink Manufacturing	381	403	6%	2.03	32	\$45.45	\$74,076
312120	Breweries	120	156	30%	0.61	15	\$23.06	\$35,235
312130	Wineries	151	168	11%	0.92	5	\$5.88	\$13,971
424490	Other Grocery and Related Products Merchant Wholesalers	167	161	-4%	0.32	-13	\$17.13	\$54,266
424810	Beer and Ale Merchant Wholesalers	429	463	8%	1.64	-16	\$59.95	\$56,305

Emerging Technology and IT Cluster

NAICS	Description	2019 Jobs	2024 Jobs	2019- 2024	2019 LQ	Competitive Effect	2019 GRP (millions)	Avg. Earnings Per Job
EMERGING TECH AND IT CLUSTER		65,199	68,594	5%	0.91	85	\$4,229	\$68,748
AUTONOMOUS SYSTEMS		331	363	10%	0.37	28	\$45	\$68,342
334290	Other Communications Equipment Manufacturing	20	19	-5%	0.46	0	\$1	\$36,395
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	<10	<10	Insf. Data	0.02	0	\$1	Insf. Data
334511	Search, Detection, Navigation, Guidance, Aeronautical, and	58	77	33%	0.18	22	\$13	\$108,627

	Nautical System and Instrument Manufacturing							
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	13	<10	Insf. Data	0.40	-6	\$1	\$74,583
336412	Aircraft Engine and Engine Parts Manufacturing	23	24	4%	0.12	1	\$5	\$87,811
423410	Photographic Equipment and Supplies Merchant Wholesalers	61	87	43%	1.58	23	\$6	\$65,797
423860	Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers	<10	<10	Insf. Data	0.04	-1	\$1	Insf. Data
488190	Other Support Activities for Air Transportation	40	33	-18%	0.15	-11	\$3	\$50,189
541370	Surveying and Mapping (except Geophysical) Services	93	91	-2%	0.77	-4	\$8	\$54,988
541922	Commercial Photography	10	12	20%	0.24	3	\$4	Insf. Data
611512	Flight Training	<10	<10	Insf. Data	0.13	0	\$1	Insf. Data
IT & CYBERSECURITY		17,205	17,676	8%	1.17	-583	\$1,831	\$73,156
237130	Power and Communication Line and Related Structures Construction	822	877	7%	1.78	-88	\$102	\$85,212
334118	Computer Terminal and Other Computer Peripheral Equipment Manufacturing	112	103	-8%	1.37	4	\$15	\$71,262
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	136	158	16%	1.14	39	\$33	\$91,996
445110	Supermarkets and Other Grocery (except Convenience) Stores	6,187	6,123	-1%	1.07	-142	\$222	\$23,234
511210	Software Publishers	90	96	7%	0.10	-5	\$27	\$95,955
517311	Wired Telecommunications Carriers	700	571	-18%	0.58	-91	\$259	\$92,043
517312	Wireless Telecommunications Carriers (except Satellite)	131	124	-5%	0.49	3	\$65	\$54,351
517911	Telecommunications Resellers	130	116	-11%	1.13	4	\$17	\$72,485
517919	All Other Telecommunications	22	26	18%	0.27	3	\$4	\$99,948
518210	Data Processing, Hosting, and Related Services	250	228	-9%	0.34	-44	\$74	\$84,561
519130	Internet Publishing and Broadcasting and Web Search Portals	54	69	28%	0.08	2	\$11	\$61,112
519190	All Other Information Services	15	18	20%	0.27	-1	\$2	\$66,361
541330	Engineering Services	3,161	3,282	4%	1.37	-84	\$432	\$108,738
541511	Custom Computer Programming Services	714	711	0%	0.32	-83	\$91	\$85,153
541512	Computer Systems Design Services	1,186	1,282	8%	0.48	-46	\$149	\$93,599
541513	Computer Facilities Management Services	2,201	2,430	10%	11.6 9	-105	\$147	\$47,982
541519	Other Computer Related Services	61	60	-2%	0.21	-5	\$9	\$62,825
541690	Other Scientific and Technical Consulting Services	292	289	-1%	0.53	-22	\$35	\$86,153
541990	All Other Professional, Scientific, and Technical Services	388	449	16%	0.60	-8	\$94	\$64,628

561210	Facilities Support Services	114	156	37%	0.28	32	\$10	\$54,684
561621	Security Systems Services (except Locksmiths)	167	185	11%	0.52	6	\$15	\$78,526
624230	Emergency and Other Relief Services	85	106	25%	1.20	14	\$9	\$104,375
811212	Computer and Office Machine Repair and Maintenance	136	157	15%	1.10	25	\$5	\$35,761
811213	Communication Equipment Repair and Maintenance	52	62	19%	1.17	9	\$2	\$34,796
KNOWLEDGE CREATION AND R&D		47,676	50,576	5%	0.89	639	\$2,353	\$58,452
541380	Testing Laboratories	222	226	2%	0.56	-1	\$19	\$70,053
541714	Research and Development in Biotechnology (except Nanobiotechnology)	<10	<10	Insf. Data	0.02	-4	\$3	Insf. Data
541715	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	287	256	-11%	0.31	-40	\$41	\$109,381
541720	Research and Development in the Social Sciences and Humanities	58	52	-10%	0.40	-2	\$7	\$87,056
611210	Junior Colleges	137	150	9%	1.30	29	\$4	\$24,319
611310	Colleges, Universities, and Professional Schools	15,951	18,951	19%	3.34	1766	\$646	\$31,795
813920	Professional Organizations	61	72	18%	0.29	9	\$4	\$62,967
902612	Colleges, Universities, and Professional Schools (State Government)	12,466	12,541	1%	2.05	-441	\$685	\$54,995
903611	Elementary and Secondary Schools (Local Government)	18,443	18,278	-1%	1.13	-674	\$939	\$50,605
903612	Colleges, Universities, and Professional Schools (Local Government)	17	25	47%	0.01	7	\$1	\$54,558
903619	All Other Schools and Educational Support Services (Local Government)	33	25	-24%	0.33	-10	\$1	\$38,787

APPENDIX B: ADDITIONAL WORKFORCE DEMAND DATA

Workforce demand is dependent on many variables including retirement trends, rate of industry growth, changing occupation needs, the strength of the career pipeline (i.e. number of students moving toward different career types), and the degree of skill specialization for each occupation. This section provides some description and indicators used to determine workforce demand. Indicators include

- *Jobs Postings*: Jobs postings data provides number of “unique” jobs postings, or number of jobs that companies have advertised for in an average month. The number of regional jobs postings in an average month compared to national or state numbers can indicate high demand for a specific occupation. Similarly, the number of total job postings for an occupation compared to the number of hires may show that companies are having to work harder to find qualified talent. However, not all positions are publicly posted, or they are posted using more local communication channels.

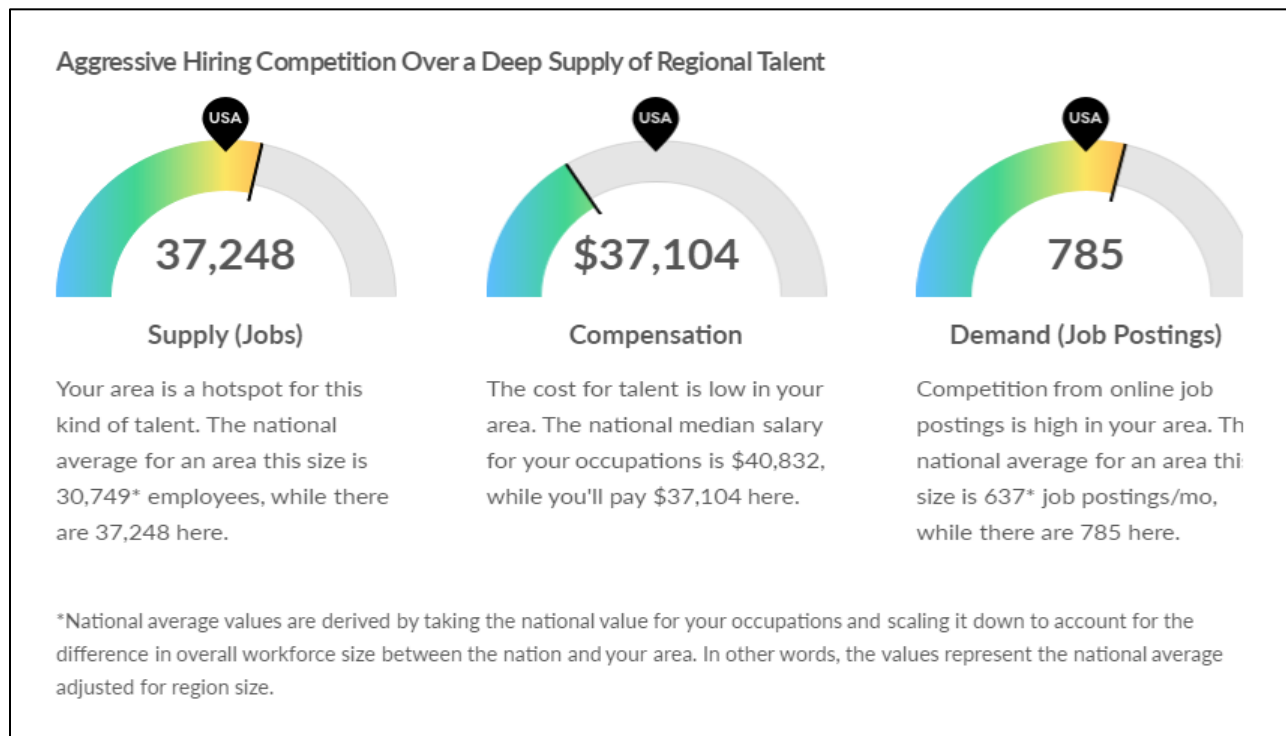
- ▶ *Annual Openings*: Average annual openings over a period illustrate how many job openings due to retirements and industry growth may be expected in an average year. This indication provides some insight into how many new workers may be required in the region. This number is an estimate based on national and regional industry trends.
- ▶ *Regional Completions*: Number of graduates in the region who are academically qualified to fill a position. This data is mostly from the National Center for Education Statistics and does not necessarily include workforce program completions and professional credentials.

Note that most workforce demand indicators are not 100% reliable. Indeed, they are best used as initial indicators of demand that researchers verify and contextualize with local stakeholders. Occupation descriptions in the main text provide this analysis.

Based on this data as well as input from stakeholders, Region 2 discovered talent demands exist across different occupations types, depending on the level of education and skill sets:

- ▶ **Entry-level Occupations**: Entry-level occupations have increase demand for two major reasons. First, many of these occupations do not have high enough wages to secure and retain qualified talent. Second, companies express a lack of basic mathematical skill sets among high school graduates and a dearth of soft skills such as problem solving, initiative, dependability, and timeliness. Many applicants or beginning workers do not demonstrate the aptitude to learn quickly on the job.
- ▶ **Middle-Skill Occupations**: These jobs often require a unique skill set acquired through 1-2 year certification programs, whether they are academic or workforce-based. Many of the occupations also involve professional accreditations and apprenticeship-style training. Technicians, machinists, Licensed Practical Nurses, computer support specialists, construction workers, etc. are all considered “middle-skill” jobs. As many of the workers employed in these kinds of occupations are aging out of the workforce (i.e. baby boomers), demand for new workers grows. Meeting this demand is a particular challenge due to lack of interest among younger generations. First, they may not know about the opportunities available to them, such as the higher than median income wages for many of these jobs. Second, our society has developed a stigma regarding these types of occupations; they are seen a manual labor and grunt work. Our education system and families tell students to go to a four-year college to be successful, and these occupations do not fall into that vision.
- ▶ **Mid-Level Managerial Positions and Higher**: This region may provide jobs for bachelor degrees or higher that are appropriate for those who have recently graduated. Fortuitously, this region also has higher than average numbers of graduates received bachelor’s, master’s and doctorates. Retaining these graduates is a challenge, however. First, four-year higher education institutions and companies in the region do not adequately collaborate to build a pipeline of graduates into regional employment opportunities. Second, as graduates gain experience and search for promotion opportunities, they do not find the mid-level careers or mid-level salaries they desire. As a result, they move elsewhere. Ironically, many companies in the region also leave because they express, they cannot find qualified applicants for middle-management positions.

Manufacturing Cluster



DESCRIPTION	2019 JOBS	2018 MEDIAN HOURLY EARNINGS	ANNUAL OPENINGS (2019-2024)	REGIONAL COMPLETIONS (2017)	TYPICAL ENTRY LEVEL EDUCATION	TYPICAL ON-THE-JOB TRAINING
General and Operations Managers	3,924	\$38.98	367	3,797	Bachelor's degree	None
Industrial Engineers	739	\$36.16	60	274	Bachelor's degree	None
Sales Representatives, Wholesale and Manufacturing	3,203	\$27.02	363	11	HS diploma or EQV	Moderate-term OJT
Industrial Machinery Mechanics	1,290	\$21.76	128	0	HS diploma or EQV	Long-term OJT
Maintenance and Repair Workers, General	4,083	\$17.30	449	0	HS diploma or EQV	Moderate-term OJT
First-Line Supervisors of Production and Operating Workers	2,050	\$27.35	221	0	HS diploma or EQV	None
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	1,261	\$16.37	145	90	HS diploma or EQV	Moderate-term OJT

Assemblers and Fabricators, All Other, Including Team Assemblers	7,056	\$15.07	832	0	HS diploma or EQV	Moderate-term OJT
Machinists	1,448	\$22.43	156	0	HS diploma or EQV	Long-term OJT
Welders, Cutters, Solderers, and Brazers	1,649	\$19.39	203	110	HS diploma or EQV	Moderate-term OJT
Inspectors, Testers, Sorters, Samplers, and Weighers	1,767	\$17.85	209	0	HS diploma or EQV	Moderate-term OJT
Paper Goods Machine Setters, Operators, and Tenders	822	\$21.33	90	0	HS diploma or EQV	Moderate-term OJT
Helpers--Production Workers	743	\$13.00	126	0	HS diploma or EQV	Short-term OJT
Production Workers, All Other	1,184	\$10.20	144	0	HS diploma or EQV	Moderate-term OJT
Laborers and Freight, Stock, and Material Movers, Hand	6,506	\$12.60	947	0	No formal educational credential	Short-term OJT

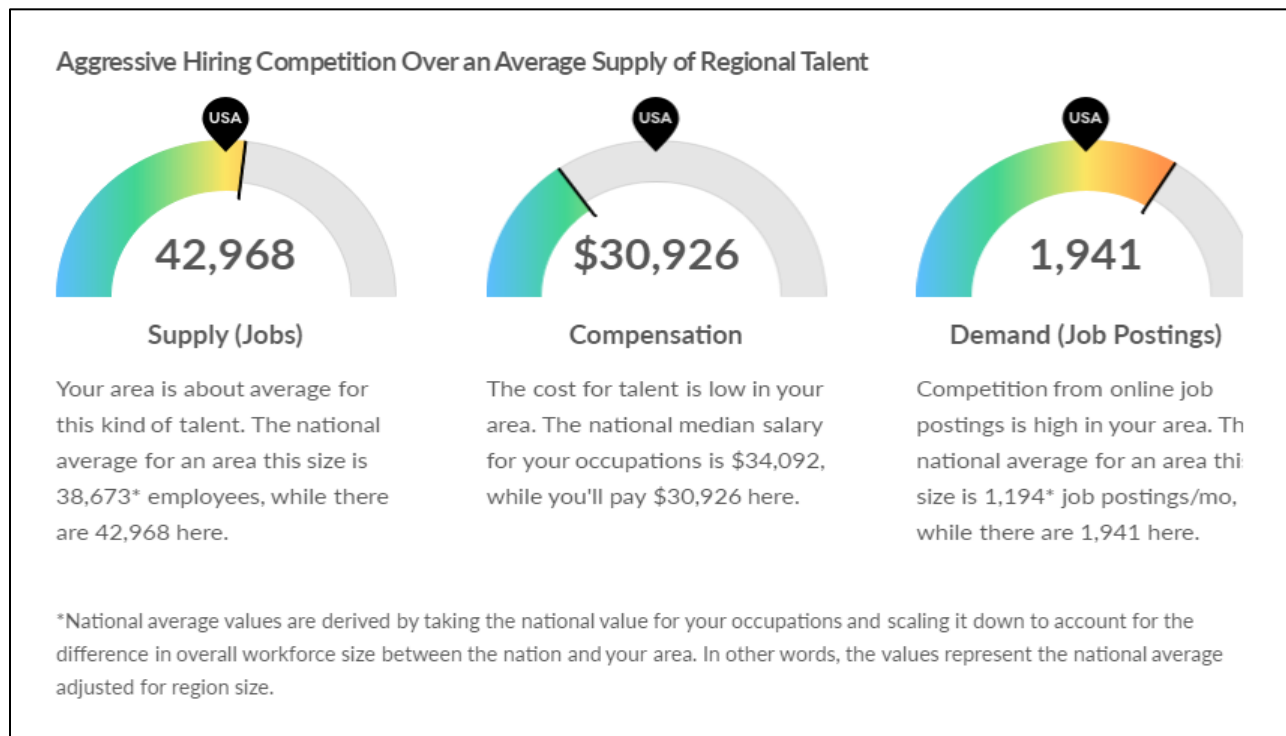
*Occupations highlights in green show characteristics of demand as indicated by jobs postings, annual openings versus completions, and local stakeholder data.

As stated previously, some of the regional completions data does not capture many of the workforce and professional certifications that employers desire today. In the manufacturing cluster, these credentials vary. For in-demand occupations, these credentials may include:

- **Industry Machinery Mechanics and Maintenance and Repair Workers:** Moderate to Long-term OJT, Apprenticeship, NCCER IM Mechanic Level 1-4 & NIMS Machining Level 1 (not available in region); Industrial Maintenance Technician Certifications: CMRT, Siemens Mechatronics Level 1, OSHA 10 General Industry, MT1, CRC Accreditation, Advanced Manufacturing Technology Certificate (DLCC)
- **Welders, Cutters, Solderers, and Brazers:** Moderate OJT, AWS Welding Accreditation, NCCER Welding Levels 1-3 Accreditation
- **Machinists:** Long-term OJT, CNC training with emphasis on CAD/CAM, NIMS Machining Level 1, MT1, Siemens Mechatronics Level 1

In addition to these middle skill credentials, companies in the region have expressed a need for soft skills in their workforce such as critical thinking, problem solving, timeliness, and dependability. These traits are necessary for all positions. Many manufacturers have found that they can usually train many positions on the job if applicants have these skill sets. Unfortunately, they have found that many do not have these skills, resulting in high employee turnover.

Health Care and Life Sciences Cluster



DESCRIPTION	2019 JOBS	2018 MEDIAN HOURLY EARNINGS	ANNUAL OPENINGS (2019-2024)	REGIONAL COMPLETIONS (2017)	TYPICAL ENTRY LEVEL EDUCATION	TYPICAL ON-THE-JOB TRAINING
Medical and Health Services Managers	937	\$48.18	95	544	Bachelor's degree	None
Family and General Practitioners	486	\$93.16	21	484	Doctoral or professional degree	Internship/residency
Physicians and Surgeons, All Other	1,241	\$99.98	54	576	Doctoral or professional degree	Internship/residency
Registered Nurses	7,803	\$29.78	579	1,066	Bachelor's degree	None
Radiologic Technologists	586	\$25.10	41	141	Associate's degree	None
Psychiatric Technicians	403	\$9.27	33	61	Postsecondary nondegree award	Short-term OJT
Licensed Practical and Licensed Vocational Nurses	2,637	\$20.34	222	113	Postsecondary nondegree award	None
Nursing Assistants	5,203	\$12.09	669	202	Postsecondary nondegree award	None

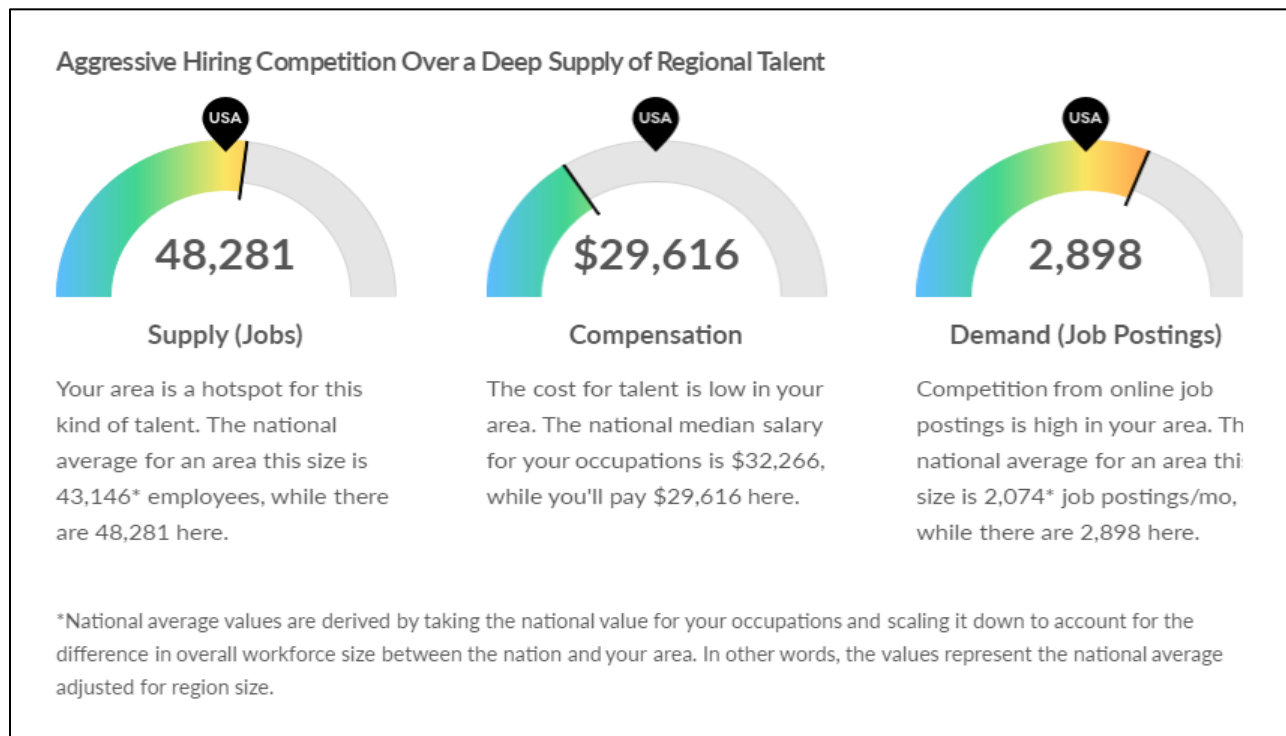
Dental Assistants	694	\$19.89	91	61	Postsecondary nondegree award	None
Medical Assistants	1,282	\$14.82	185	478	Postsecondary nondegree award	None
Maids and Housekeeping Cleaners	4,226	\$10.20	658	0	No formal educational credential	Short-term OJT
Personal Care Aides	4,634	\$9.12	836	378	HS diploma or EQV	Short-term OJT
Receptionists and Information Clerks	3,195	\$11.94	455	0	HS diploma or EQV	Short-term OJT
Medical Secretaries	905	\$16.46	135	183	HS diploma or EQV	Moderate- term OJT
Office Clerks, General	9,849	\$13.93	1,248	0	HS diploma or EQV	Short-term OJT

*Occupations highlights in green show characteristics of demand as indicated by jobs postings, annual openings versus completions, and local stakeholder data.

Completions data for health care is more reliable than manufacturing because training of these occupations has historically been integrated with education services. Some of the key in-demand occupations in health care include:

- **Registered Nurses:** Generally, requires an Associate's or Bachelor's degree. Applicants take a test to receive the RN License. Licensed Practical and Vocational Nurses hold many positions in this region that would normally be Registered Nurses due to lack of RN supply. Low pass rates for the RN exam and RNs leaving the region may be two contributing factors for the lack of supply.
- **Licensed Practical and Vocational Nurses:** LPNs/LVNs usually require a 1-2 year certificate and NCLEX-PN accreditation. As illustrated by the annual openings versus completions data in table above, there is not a sufficient supply of workers in the talent pipeline.
- **Nursing Assistants:** Nursing Assistants often require some post-secondary coursework accompanied by on-the-job training. Unfortunately, the hourly wage is so low for this occupation that there is little incentive for workers. Students studying to be RNs, LPNS, or LVNs may support these positions.
- **Personal Care Aides:** Many U.S. seniors today prefer to stay in their homes as long as possible, avoiding senior residential facilities. As the senior population grows, the demand for personal care aides will also increase. The challenge in this case is the increase demand for these positions combined with low hourly wages (which are sometimes necessary when considering senior's fixed incomes). This challenge may be outside the GOVA scope of service.

Food and Beverage Processing Cluster



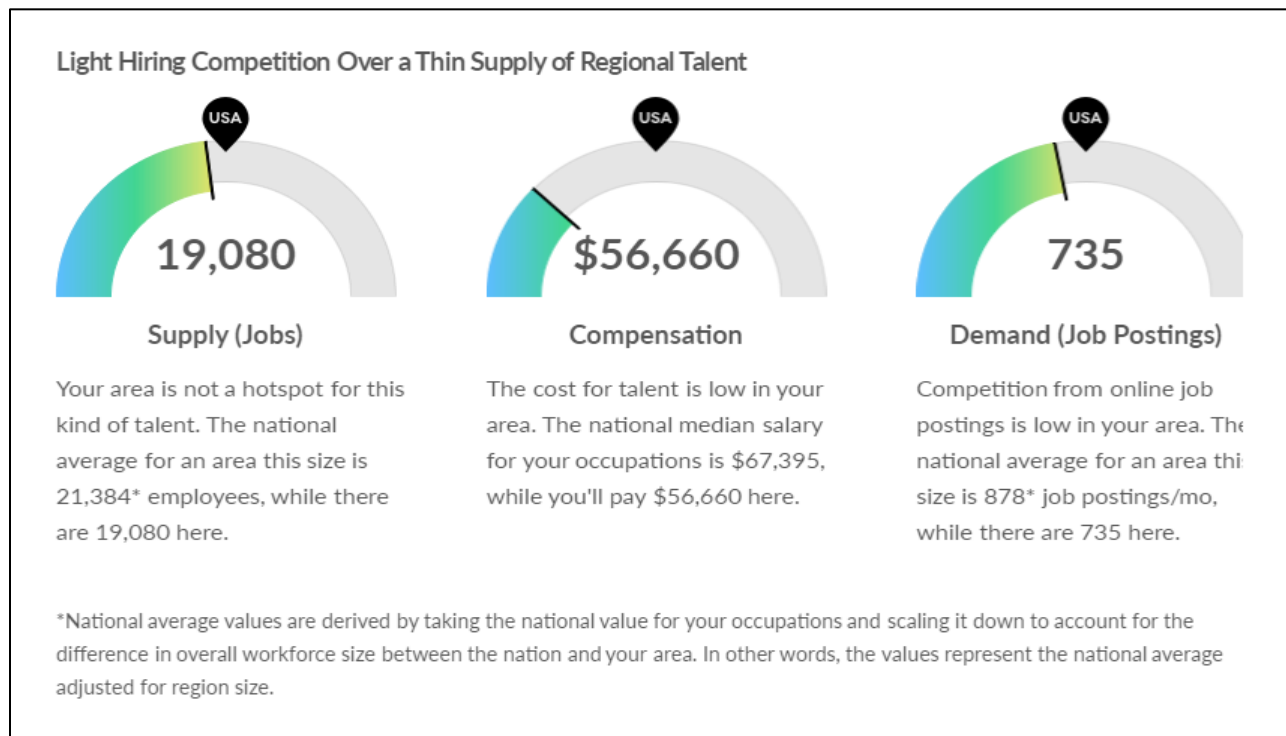
DESCRIPTION	2019 JOBS	2018 MEDIAN HOURLY EARNINGS	ANNUAL OPENINGS (2019-2024)	REGIONAL COMPLETIONS (2017)	TYPICAL ENTRY LEVEL EDUCATION	TYPICAL ON-THE-JOB TRAINING
Farmers, Ranchers, and Other Agricultural Managers	5,681	\$11.43	428	297	HS diploma or EQV	None
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	3,203	\$27.02	363	11	HS diploma or EQV	Moderate-term OJT
Stock Clerks and Order Fillers	5,731	\$11.44	760	0	HS diploma or EQV	Short-term OJT
Office Clerks, General	9,849	\$13.93	1,248	0	HS diploma or EQV	Short-term OJT
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	615	\$11.54	107	0	No formal educational credential	Short-term OJT
Farmworkers, Farm, Ranch, and Aquacultural Animals	604	\$9.37	116	0	No formal educational credential	Short-term OJT
First-Line Supervisors of Production and Operating Workers	2,050	\$27.35	221	0	HS diploma or EQV	None

Food Batchmakers	611	\$14.08	93	0	HS diploma or EQV	Moderate-term OJT
Packaging and Filling Machine Operators and Tenders	1,100	\$11.66	138	0	HS diploma or EQV	Moderate-term OJT
Driver/Sales Workers	800	\$10.87	88	0	HS diploma or EQV	Short-term OJT
Heavy and Tractor-Trailer Truck Drivers	6,357	\$19.32	743	0	Postsecondary nondegree award	Short-term OJT
Light Truck or Delivery Services Drivers	2,513	\$14.03	290	0	HS diploma or EQV	Short-term OJT
Industrial Truck and Tractor Operators	1,452	\$14.90	171	0	No formal educational credential	Short-term OJT
Laborers and Freight, Stock, and Material Movers, Hand	6,506	\$12.60	947	0	No formal educational credential	Short-term OJT
Packers and Packagers, Hand	1,730	\$11.27	268	0	No formal educational credential	Short-term OJT

*Occupations highlights in green show characteristics of demand as indicated by jobs postings, annual openings versus completions, and local stakeholder data.

As stated previously, some of the regional completions data does not capture many of the workforce and professional certifications that employers desire today. In the Food and Beverage Processing cluster, these credentials vary. Manufacturing companies that rely on transportation and distribution have expressed that they find a limited supply of drivers with Commercial Driver's Licenses (CDLs). Community Colleges, in partnership with other private entities, continuously offer trainings for these licenses. The challenge may be informing potential workers of these courses, facilitating their access to these courses, and increasing interest in these positions, some of which pay higher than median wage.

Emerging Technology and IT Cluster



DESCRIPTION	2019 JOBS	2018 MEDIAN HOURLY EARNINGS	ANNUAL OPENINGS (2019-2024)	REGIONAL COMPLETIONS (2017)	TYPICAL ENTRY LEVEL EDUCATION	TYPICAL ON-THE-JOB TRAINING
Computer Systems Analysts	735	\$34.60	57	398	Bachelor's degree	None
Software Developers, Applications	1,001	\$43.65	95	288	Bachelor's degree	None
Software Developers, Systems Software	502	\$48.46	39	305	Bachelor's degree	None
Computer User Support Specialists	1,626	\$21.15	159	88	Some college, no degree	None
Civil Engineers	649	\$36.87	56	339	Bachelor's degree	None
Electrical Engineers	726	\$44.97	52	268	Bachelor's degree	None
Biochemists and Biophysicists	51	\$21.83	5	143	Doctoral or professional degree	None
Medical Scientists, Except Epidemiologists	137	\$57.85	14	285	Doctoral or professional degree	None
Chemists	118	\$50.47	11	120	Bachelor's degree	None

Biological Technicians	136	\$14.44	14	7	Bachelor's degree	None
Postsecondary Teachers	5,258	\$33.94	475	2,529	Doctoral or professional degree	None
Elementary School Teachers, Except Special Education	3,029	\$23.56	228	706	Bachelor's degree	None
Middle School Teachers, Except Special and Career/Technical Education	1,220	\$23.40	92	506	Bachelor's degree	None
Secondary School Teachers, Except Special and Career/Technical Education	2,366	\$23.63	172	620	Bachelor's degree	None
Sales Representatives, Services, All Other	1,809	\$24.93	248	11	HS diploma or EQV	Moderate-term OJT

*Occupations highlights in green show characteristics of demand as indicated by jobs postings, annual openings versus completions, and local stakeholder data.

IT occupations cross most industry sector boundaries, and thus are expected to increase in demand in the coming years. Demand for Computer User Support Specialists may grow. Computer User Support Specialists exist across all industries. They are the resident IT people in most offices. These workers may have some post-secondary education, an Associate's or Bachelor's degree depending on the position and wage. In this region, some certificates offered are the Cisco CCNA Networking Career Studies Certificate and the Cyber Security Career Studies Certificate.

Shared knowledge (hard) skills for IT support workers include computers & electronics, engineering & technology, customer & personal services, and mathematics. Soft skills include critical thinking, coordination, monitoring, judgement & decision making, system analysis, problem sensitivity, and inductive & deductive reasoning.

Meanwhile, those in the higher education and research & development arm of this cluster often need a bachelor's degree or higher.

APPENDIX C: REGION 2 MEMBERSHIP

Council Members (as of August 2, 2019)

Marla Akridge,	Alleghany Highlands Economic Development Corporation
Fred Armstrong,	Wiley Wilson
Dr. Nathaniel Bishop,	Jefferson College
Ab Boxley,	Boxley Materials Company
Dr. John Capps,	Central Virginia Community College
Kenneth Craig,	Liberty University
Beverly Dalton,	English Construction
Sandy Davis,	BCR Property Management
Dr. John Dooley,	Virginia Tech Foundation
Watt Foster,	Foster Fuels
William Fralin,	Medical Facilities of America
Dr. Michael Friedlander,	VT Carilion Research Center
Don Halliwill,	Carilion Clinic
Mike Hamlar,	Hamlar-Curtis Funeral Home, PAC director
Dr. Brian Hemphill,	Radford University
Dr. Victor Iannello,	Radiant Physics, Radiant Ventures (R&D)
Terry Jamerson,	Roanoke Times
Dr. Pareena Lawrence,	Hollins University
Floyd Merryman,	Sonny Merryman
Marty Muscatello,	FoxGuard Solutions
Debbie Petrine,	Commonwealth Care of Roanoke
John Putney,	Town of Bedford IDA
Georgeann Snead,	EDM Inc.
Dr. Ray Smoot,	Union Bank and Trust
Matthew Stewart,	Celanese
John Williamson,	RCG Resources

Working Group Members from Original Plan Process in 2017

Collaborative Sites and Buildings

- John Putney, Town of Bedford Industrial Development Authority (chair)
- Traci Bildo Bedford County
- Kevin Byrd, NRVRC
- Brian Cossman, Hurt & Proffitt
- Beth Doughty, Roanoke Regional Partnership
- John Doyle, Lynchburg Regional Business Alliance
- Deborah Flipppo, Draper Aden Assoc.
- Rebekah Gunn, Roanoke Regional Chamber of Commerce
- Kathy Hodges, Franklin Center for Advanced Learning

- Jane Johnson, City of Salem
- Jon Lanford, County of Alleghany
- Rob Ledger, City of Roanoke
- Jill Loope, Roanoke County
- Joe Meredith, VTCRC
- Dan Motley, Norfolk Southern
- Peer Segelke, Lawrence Companies
- Tom Sibold, City of Covington
- John Smolak, Appalachian Power
- Danny Wilson, VA First Regional Industrial Facility Authority

Entrepreneurship and Business Development

- Dr. Victor Iannello, Radiant Physics, Radiant Ventures (chair)
- Gary Christie, Lynchburg Region
- Sam English, CIE Partners
- Greg Feldmann, Skyline Capital
- Don Halliwill, Carilion Clinic
- Victor Iannello, Radiant Physics, Radiant Ventures
- Fouds Kemper, Woods Rogers PLC
- Mary Miller, RAMP
- Rebekah Gunn, Roanoke Regional Chamber of Commerce
- Annette Patterson, The Advancement Foundation
- James Ramey, Middleland Capital
- Lisa Schoppmeyer, The Alleghany Foundation
- Samantha Steidle, Virginia Western CC
- Bryan Thompson, Highlands Community Bank
- Sheri Winesett, Botetourt County Chamber of Commerce

Talent and Workforce Development

- Dr. John Capps, Central Virginia Community College (chair)
- Ed Armentrout, Retired - Non-profits org.
- Ben Bowman, Lynchburg Region
- Scott Brabrand, Lynchburg City Schools
- Angela Falconetti, formerly Virginia Western Community College
- Lon Forehand, Business & Education Writer
- Jake Gilmer, Western Virginia Workforce Development Board
- Marty Holliday, New River/Mt. Rogers WDB
- Susan Martin, Bedford Area Chamber of Commerce
- Nancy Moga, Callaghan Elementary
- Leo Mulcahy, Retired
- Debbie Petrine, Commonwealth Care of Roanoke, Virginia Tech Board of Visitors
- Dr. John Rainone, Dabney S. Lancaster CC

- Doug Schuch, Bedford Public Schools
- Scott Stanley, Fostek Corporation
- Wayne Strickland, Roanoke Valley-Alleghany Regional Commission
- Leslie (Tyke) Tenney, Virginia Technical Institute

Technology Development

- Doug Juanarena, retired serial entrepreneur (chair)
- Marla Akridge, Alleghany Highlands EDC
- Bob Bailey, CAER
- Jay Brenchick, Roanoke County Economic Development
- Richard Diddams, CCCxA
- Rebekah Gunn, Roanoke Regional Chamber of Commerce
- Dr. Brian Hemphill, Radford University
- John Hull, Roanoke Regional Partnership
- Megan Lucas, Lynchburg Regional Business Alliance
- Nick Moga, Alleghany Highlands Economic Development
- Marc Nelson, City of Roanoke Economic Development
- Dennis Reece, Citizens Telephone Coop
- Lisa Schoppmeyer, The Alleghany Foundation
- Bob Stolle, Virginia Center for Innovative Technology
- Shannon Valentine, Commonwealth Transportation Board

APPENDIX D: REGION 2 SITES LIST

Region 2 has a total of 61 sites greater than 25 acres, according to the Virginia Economic Development Partnership. Six of these sites have been characterized under the Virginia Business Ready Sites program. The remaining 55 sites have not been characterized under this program, however, could be characterized following a successful application submission. Currently, there are 1,780.5 acres of characterized property within the region, 963 acres of which are available for development.

Table 1. GO Virginia Region 2 Certified Business Ready Sites⁵⁰

	Location	Tier	Total Property Size	Available Land	Largest Cont. Parcel	Utilities	Zoning	Topography
			Acres					
L. Barnes Brockman, Sr.	Amherst County		250	209	135	Electric, Natural Gas,	Industrial	Rolling

⁵⁰ Virginia Economic Development Partnership (2019) Sites and Buildings. <https://vascan.vedp.org/virginia/site>

Business and Industrial Park						Water, Sewer, Broadband		
Amelon Commerce Center	Amherst County		123	70	49	Electric, Natural Gas, Water, Sewer, Broadband	Industrial	Gentle Slope
Amelon Commerce Center Lot 6	Amherst County		14.6	14.6	14.6	Electric, Natural Gas, Water, Sewer, Broadband	M1 (Industrial)	Graded
Cardinal Pad Site at Summit View Business Park	Franklin County		59.5	32	32	Electric, Natural Gas, Water, Sewer, Broadband	REP (Industrial)	Pad Ready
Roanoke County Center for Research and Technology	City of Salem		375	154	56	Electric, Natural Gas, Water, Sewer, Broadband	PTD (Planned Technology Development District)	Level to gently rolling, 75% cleared
New River Valley Commerce Park	Pulaski	4	973	498	445	Electric, Natural Gas, Water, Sewer, Broadband	I (Industrial)	Gently rolling to hilly, 90% cleared

Table 2. Region 2 Sites Greater than 25 Acres⁵¹

	Location	Total Property Size	Available Land	Largest Cont. Parcel	Utilities	Zoning	Topography
		Acres					
Dillard Tract	Amherst County	552	552	423	Electric, Natural Gas, Water, Sewer, Broadband	Industrial	Wooded with gentle slopes

⁵¹ Virginia Economic Development Partnership (2019) Sites and Buildings. <https://vascan.vedp.org/virginia/site>

Ivy Creek Industrial Park	City of Lynchburg	479	300	262.76	Electric, Natural Gas, Water, Sewer, Broadband		
Appomattox Center for Business and Commerce	Appomattox County	485	450	115	Electric, Natural Gas, Water, Sewer, Broadband	M-IP (Industrial)	Gentle rolling, 80% cleared
New London Business and Technology Center	Bedford County	515	478	114	Electric, Natural Gas, Water, Sewer, Broadband	Planned Industrial	Typical slopes of 2%-25%
100 Acre Lot	Amherst County	100	100	100	Electric, Natural Gas, Water, Sewer, Broadband	P-1	Rolling
McConville Tract	City of Lynchburg	63	50	50	Electric, Natural Gas, Water, Sewer, Broadband	B-5C (General Business District)	Rolling
Centra Health Tract	City of Lynchburg	75	50	50	Electric, Natural Gas, Water, Sewer, Broadband	B-3C, R-4C, RC (Community Business Districts)	Rolling
Valencia Properties	City of Lynchburg	59.679	50	50	Electric, Water, Sewer, Broadband	B-3C, R-1, R-2 (Community Business Districts)	Rolling
Little Otter Business Park	Bedford County	50	50	47.84	Electric, Natural Gas, Water,	I-2 (Light Industrial/Commercial)	Gently rolling, 90% cleared

					Sewer, Broadband		
Rosedale	City of Lynchburg	62	43	43	Electric, Natural Gas, Water, Sewer, Broadband	B-3C, R-C (Community Business)	Rolling
Old Virginia Brick -1A	Amherst County	42	42	42	Electric, Natural Gas, Water, Sewer, Broadband	M1 (Industrial)	Wooded with some hills
English Tract 1	City of Lynchburg	58	40	40	Electric, Natural Gas, Water, Sewer, Broadband	B-5C (General Business District)	Wooded with some hills
Community College Tract	City of Lynchburg	100	40	40	Electric, Natural Gas, Water, Sewer, Broadband	I-2, B-3C, B- 3, R-3, R-C (Light Industrial)	Rolling
Bowen Tract	City of Lynchburg	40	30	40	Electric, Natural Gas, Water, Sewer, Broadband	I-1, B-1C, R- C (Industrial)	Rolling
Skinner Tract	City of Lynchburg	57	40	40	Electric, Natural Gas, Water, Sewer, Broadband	R-1, R-C (Light Reservation, Conservatio n District)	Rolling to level
Twiddy Tract	City of Lynchburg	32	32	32	Electric, Natural Gas, Water, Sewer, Broadband	B-5, R-C (General Business District, Conservatio n District	Rolling

Bedford Center for Business	Bedford County	64.6	38.4	30.9	Electric, Water, Sewer, Broadband	WCD (Workplace Campus District)	Gently Rolling, cleared, 9.5 acre are graded
Virginia Holding Corp.	City of Lynchburg	65	65	30	Electric, Natural Gas, Water, Sewer, Broadband	B-5, R-C (General Business District, Conservation District)	Rolling to steep
Ovrevik Tract	City of Lynchburg	35	30	30	Electric, Natural Gas, Water, Sewer, Broadband	I-2, R-3 (Light Industrial/Commercial)	Rolling
Heritage Baptist Tract	City of Lynchburg	57	30	30	Electric, Natural Gas, Water, Sewer, Broadband	B-5C, R-4, R-3, R-2 (General Business District)	Rolling
Poplar Forest Tract	City of Lynchburg	37	25	25	Electric, Natural Gas, Water, Sewer, Broadband	I-2C, B-3C, and R-C (light industrial)	Rolling
Melancon Tract	City of Lynchburg	36	25	25	Electric, Natural Gas, Water, Sewer, Broadband	R-1 & R-2 (Light Residential)	Rolling
Flipped Tract	City of Lynchburg	25	25	25	Electric, Natural Gas, Water, Sewer, Broadband	I-1, B-1C, R-4, R-C (Industrial)	Rolling
English Tract 2	City of Lynchburg	35	25	25	Electric, Natural Gas, Water,	B-5C (General Business District)	Rolling

					Sewer, Broadband		
Carvins- Hollins Site	Roanoke County	155	150	150	Electric, Natural Gas, Water, Sewer, Broadband	M-1, I-1C (Industrial)	Hilly to gently rolling, 65% cleared
Botetourt Center at Greenfield- Tract 1	Botetourt County	133	133	133	Electric, Natural Gas, Water, Sewer, Broadband	RAM (Research and Advanced Manufacturi ng)	Rolling
Botetourt Center at Greenfield	Botetourt County	484	360	133	Electric, Natural Gas, Water, Sewer, Broadband	RAM (Research and Advanced Manufacturi ng)	Rolling
Bradshaw Trust Site	Roanoke County	487	131	131	Electric, Natural Gas, Water, Sewer, Broadband	R-1, R-2 (Residential)	Gently rolling to steep
Shadwell- Beahm Industrial Site	Roanoke County	115	115	115	Electric, Natural Gas, Water, Sewer, Broadband	I-1 (Low intensity industrial)	Rolling
Wood Haven Technology Park	Roanoke City	109.7	109.7	109.7	Electric, Natural Gas, Water, Sewer, Broadband	PTD (Planned Technology Developmen t District)	Level to rolling
Whitesell Property	Botetourt County	130	100	100	Electric, Natural Gas, Water, Sewer, Broadband	A-1 (Agriculture)	Rolling

Former Virginia Brick Land	City of Salem	74.76	74.76	74.76	Electric, Natural Gas, Water, Sewer, Broadband	I-1 (Low intensity industrial)	Varied
Roanoke Centre for Industry and Technology	City of Roanoke	82	70	70	Electric, Natural Gas, Water, Sewer, Broadband	LM (Light Manufacturing)	Gently rolling, cleared
Shadwell Industrial Site	Roanoke County	64.62	64.62	64.62	Electric, Natural Gas, Water, Sewer, Broadband	I-1 (Low intensity industrial)	Level to gently rolling; 95% cleared
SR Investments	Botetourt County	57.23	57.23	57.23	Electric, Natural Gas, Water, Sewer, Broadband	B-2 (Business District)	Hilly
Brickyard Road Site	Botetourt County	55.17	55.17	55.17	Electric, Natural Gas, Water, Sewer, Broadband	M-3 (Industrial)	Rolling
Beahm Site	Roanoke County	50.47	50.47	50.47	Electric, Natural Gas, Water, Sewer, Broadband	I-1 (Low intensity industrial)	Gently rolling to hilly, 75% cleared
Painter Site	Botetourt County	33.6	33.6	33.6	Electric, Natural Gas, Water, Sewer, Broadband	B-2 (Business District)	Rolling
Scott Farm Property	City of Roanoke	32	32	32	Electric, Natural Gas, Water,	R-5 (Residential)	Rolling

					Sewer, Broadband		
Botetourt Center at Greenfield- Lot B	Botetourt County	30	30	30	Electric, Natural Gas, Water, Sewer, Broadband	RAM (Research and Advanced Manufacturi ng)	Pregraded
Botetourt Commons	Botetourt County	30	30	30	Electric, Natural Gas, Water, Sewer, Broadband	A-1 and SC (Agriculture)	Pregraded
Lot 3, Roanoke County Center for Research and Technology	City of Salem	27	27	27	Electric, Natural Gas, Water, Sewer, Broadband	PTD (Planned Technology Developmen t District)	Pregraded
Botetourt Center at Greenfield- Lot C	Botetourt County	25	25	25	Electric, Natural Gas, Water, Sewer, Broadband	RAM (Research and Advanced Manufacturi ng)	Rolling
Botetourt Center at Greenfield- Lot A	Botetourt County	25	25	25	Electric, Natural Gas, Water, Sewer, Broadband	RAM (Research and Advanced Manufacturi ng)	Rolling
Hardy Farm	Pulaski County	270	250	250	Electric, Natural Gas, Water, Sewer, Broadband	Industrial	Rolling hills

Falling Branch Corporate Park Phase II	Montgomery County	124	124	124	Electric, Natural Gas, Water, Sewer, Broadband	I-2 (Light Industrial/Commercial)	Gently sloping
Wheatland EcoPark	Giles County	130	120	110	Electric, Natural Gas, Water, Sewer, Broadband	Business/Light Manufacturing	Gently rolling
VCI Site	City of Radford	80	30	80	Electric, Natural Gas, Water, Sewer, Broadband	M-2 (Flat
Grede	City of Radford	68	68	68	Electric, Natural Gas, Water, Sewer, Broadband	M-2 (Flat
ShaeDawn Park	Pulaski County	112.5	78	63	Electric, Natural Gas, Water, Sewer, Broadband	Industrial	Level, 30% cleared, 70% wooded
Summit View Business Park	Franklin County	540	540	150	Electric, Natural Gas, Water, Sewer, Broadband	Regional Enterprise Park	Rolling, 90% cleared
Dogwood Site-Summit View Business Park	Franklin County	120	100	100	Electric, Natural Gas, Water, Sewer, Broadband	REP	Gently Rolling
West Franklin	Franklin County	56	50	50	Electric, Natural Gas, Water,	None	Gently Rolling, 90% Wooded

Business Park					Sewer, Broadband		
Floyd Regional Commerce Center	Floyd County	169	82.2	50	Electric, Natural Gas, Water, Sewer, Broadband	None	Cleared, with 4 graded pads
Rocky Mount-Franklin County Industrial Park	Franklin County	59.3	27.6	27.6	Electric, Water, Sewer, Broadband	M-2 (Industrial)	Gently rolling, cleared