A major step in crafting a region’s economic development strategy focuses on the types of industries to target for expansion and retention. Industry targets are chosen to meet varying community goals ranging from diversifying the economic base, to increasing the average wage, to utilizing natural and labor resources more fully. A community’s economic development efforts should focus on industries in which the community has clear competitive advantages. Further, target industries should be economically, environmentally, and socially acceptable to the community.

This study is based on the concept of industry clusters, which are geographic concentrations of interconnected companies and institutions in a particular field.

Metro Denver and Northern Colorado Key Industry Clusters

Executive Summary

This study is based on the concept of industry clusters, which are geographic concentrations of interconnected companies and institutions in a particular field. Where an industry’s employment concentration is greater than the national economy, it is presumed that the production of goods and services is more than sufficient to meet local demand, and is therefore exported, either physically or financially. Where industries are highly concentrated, it is presumed that a high degree of specialization among firms exists, a feature of competitive industry clusters, commonly called primary jobs. These industries drive wealth creation within a region.

Nine major industry clusters in the nine-county Metro Denver and Northern Colorado region (Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer, and Weld Counties) are key to our economy, making them primary targets for national recruitment as well as economic development retention and expansion efforts to develop and expand the region’s industry cluster base.

This report summarizes key points about each industry cluster, including a brief description, employment concentration ranking compared to the 50 largest U.S. metropolitan areas, workforce profiles, and other major industry information. In addition, primary location factors are identified along with a brief assessment of the region’s competitive position and future viability in attracting additional employment in each industry cluster.
Nine major industry clusters drive the regional economy

- **AEROSPACE** – Colorado had the nation’s second-largest aerospace economy (behind California) in 2016 with 25,500 workers. Companies in the nine-county region employed about 79 percent of these workers, ranking the region second in private-sector aerospace employment concentration out of the 50 largest metropolitan areas. The aerospace cluster is anchored by four military commands, eight major space contractors, National Aeronautics and Space Administration research activities, and top ranked aerospace programs. The region’s companies and public agencies are leading the nation’s major commercial, civil, and military space missions.

- **AVIATION** – With 18,470 aviation workers, the region has the 14th-highest employment concentration out of the 50 largest metropolitan areas. The industry cluster includes companies that manufacture aircraft and provide air transportation services, with Denver International Airport (DEN) serving as the major economic engine for the region’s aviation industry. DEN added several domestic and international airlines in 2016, providing service to more than 185 destinations worldwide. Further, three reliever airports and five general aviation airports are strategically located throughout the region to facilitate commerce and air travel needs.

- **BEVERAGE PRODUCTION** – Companies in the beverage production cluster manufacture malt beverages, wines, distilled liquors, bottled drinks, and ice products. With 9,300 workers, the cluster ranked second among the 50 largest metropolitan areas for employment concentration. Beverage production is the region’s second-fastest growing industry, rising 7.5 percent in 2016 and increasing 28.1 percent between 2011 and 2016. The region has a lengthy history in America’s craft beer revolution and is often recognized as the “Napa Valley of Beer.”

- **BIOSCIENCE** – The region’s base of medical devices, diagnostics, biotechnology, and pharmaceuticals businesses employ nearly 15,870 workers at more than 670 companies. Between 2011 and 2016, the region’s bioscience cluster rose 6.5 percent compared with 3.6 percent nationally. The $5.4 billion, 578-acre Fitzsimons campus is the keystone of the region’s bioscience cluster, which includes the adjacent Anschutz Medical Campus and the Fitzsimons Innovation Campus.

- **BROADCASTING & TELECOMMUNICATIONS** – With 42,400 broadcasting and telecommunications workers, the region has the fifth-highest employment concentration out of the 50 largest metropolitan areas. Existing companies are developing next-generation products and all major technologies are represented including cellular, fixed wireless systems, and satellite. The region
is an established, nationally recognized center for the cluster and is the largest region in the United States to offer one-bounce satellite uplinks due to its unique geographic location in the Mountain time zone.

- **ENERGY** – The region is an energy powerhouse with fossil fuels and cleantech together employing 52,850 people at 3,230 companies. Further, the region ranks fourth for cleantech and sixth in fossil fuels employment concentration among the 50 largest metropolitan areas. The region has one of the highest per capita concentrations of federally funded science and research centers in the nation with 30 federal laboratories, including the U.S. Department of Energy’s National Renewable Energy Laboratory. World-class universities support the growing energy industry, such as the Colorado School of Mines, which is the only university in the nation to offer baccalaureate through doctorate degrees in all key energy fields.

- **FINANCIAL SERVICES** – The nine-county region is a global epicenter for financial services activities in three key market segments: banking and finance, investments, and insurance. The region is the largest financial center between Los Angeles and Chicago and is home to a growing financial services base of about 98,870 employees in more than 14,080 companies. Investments posted the strongest growth among the three subclusters in 2016, rising 6.6 percent. Further, the industry is supported by various associations and service firms, first-class universities and research institutions, and world-renowned financial services firms.

- **HEALTHCARE & WELLNESS** – The region is the healthcare and wellness center of the Rocky Mountain West and has one of the most active and fit populations in the nation. In fact, the region has one of the lowest rates of adult obesity, a high rate of physical activity, and low rates of diabetes and heart disease. With an employment base of 214,430 workers in 19,760 companies, the healthcare and wellness cluster is the region’s largest in terms of employment. The industry posted 5.4 percent employment growth in 2016, rising for its 13th-consecutive year.

- **INFORMATION TECHNOLOGY–SOFTWARE** – The region’s innovative ecosystem, growing startup businesses, and talented IT workforce create a premier hub for IT-software companies and industry activities. The region is a top location for young entrepreneurs and tech professionals, and ranks among the top regions that foster entrepreneurial growth. IT-software was the region’s fastest growing cluster in 2016 (+9.4 percent) as a result of landmark company expansion and venture capital activity. The region employs 54,580 workers in 5,180 companies and had the eighth-highest employment concentration out of the 50 largest metropolitan areas.
Factors driving company location and expansion decisions

Location decisions are driven by a number of factors as companies within each of these industries examine communities in which to locate or expand. Some factors are industry specific. For example, proximity to military customers and prime contractors is important in aerospace company location decisions whereas fossil fuels energy companies focus on access to natural resources. Other key locational factors cut across numerous industries, focusing on broader community attributes. While the combination of factors that enhance company success varies by industry, there are several common themes:

- The ability to recruit and retain technical and scientific talent
- Affordable business operating costs
- Favorable tax policies and pro-business state and local governments
- A central location and easy global access
- A culture of innovation and entrepreneurism
- Proximity to quality colleges, research universities, and federal laboratories
- An overall better quality of life

Competitive positioning to create jobs and investment

- The ability to recruit and retain technical and scientific talent – Colorado has one of the nation’s most educated workforces, ranking second among the 50 states for percentage of residents (39.2 percent) with a bachelor's degree or higher. (U.S. Census Bureau, 2015 American Community Survey)

- Affordable business and operating costs – Colorado ranks No. 1 for labor supply, second for economic climate, and fifth overall on Forbes’ 2016 “Best States for Business and Careers” list. In addition, the Denver-Aurora-Broomfield metropolitan statistical area ranked among the top 10 for economic development and job growth in the “Leading Locations for 2016” list. (Forbes, 2016; Area Development, 2016)

- Favorable tax policies and pro-business state and local governments – Legislation passed in 2008 simplified Colorado’s corporate tax structure by establishing a single sales factor for multistate corporations. Single factor apportionment allows companies to pay taxes based solely on their sales in the state. Colorado’s corporate income tax rate of 4.63 percent is one of the lowest in the nation. (State of Colorado; The Tax Foundation)

- A central location and easy global access – Denver International Airport is the sixth-busiest airport in the nation and is 19th-busiest worldwide for passenger traffic. Denver’s strategic location near the geographic center of the U.S. makes the region a convenient transcontinental connecting point. The addition of new, nonstop service to international destinations has broadened the region’s global reach, including Germany, Iceland, the United Kingdom, Canada, Mexico, Costa Rica, Japan, and Panama. (U.S. Bureau of Transportation Statistics, 2016; Airport Council International, 2016; Denver International Airport, 2016)
• A culture of innovation and entrepreneurism – Metro Denver ranked ninth among the 40 largest metropolitan areas in the 2016 Kauffman Index: Startup Activity, with 360 people out of 100,000 adults becoming entrepreneurs each month. Denver ranked third among U.S. cities that foster entrepreneurial growth. (Ewing Marion Kauffman Foundation, 2016; U.S. Chamber Foundation, 2016)

• Proximity to quality colleges, research universities, and federal laboratories
  The University of Colorado Boulder’s (CU Boulder) aerospace engineering sciences graduate program ranked among the top four programs in the nation by the National Research Council and eighth by U.S. News & World Report in 2016. The Daniels College of Business at the University of Denver, the Leeds Schools of Business at CU Boulder, and the College of Business at Colorado State University ranked among Bloomberg’s top-100 undergraduate business programs. (National Research Council, 2016; U.S. News & World Report, 2016; Bloomberg Businessweek, 2016)

• An overall better quality of life – Denver was named as the best place to live in 2016. The city’s healthy job market and access to the outdoors contributed to its notable rank. The city also ranked third for attracting the most millennials relocating from another city. (U.S. News & World Report, 2016; Mayflower, 2016)

Ensuring economic growth through industry diversity

Successful companies rely on market research to guide their marketing efforts, and economic development is no different. Armed with in-depth data on the industries showing the most promising job growth over the long term, the Metro Denver EDC has a business plan to guide its job creation efforts. This industry data helps determine: which legislation will be conducive or detrimental to industry, what opportunities exist to reach industry decision makers and site selection consultants, where might a supplier recruitment strategy come into play, what are the current and future labor force needs, and most importantly, which factors are vital to companies analyzing a community for location or expansion.

The region’s diversified and growing industry clusters continue to drive the economy. The 13 clusters/subclusters represent 24 percent of the nine-county region’s employment base. Over the past five years, the region’s industry cluster employment base of 526,800 workers increased 17 percent, representing the addition of 76,540 jobs. During this period, 12 of the region’s 13 clusters/subclusters posted employment growth and nine clusters/subclusters grew at least 10 percent led by beverage production, IT-software, and healthcare and wellness. In 2016, 12 of the 13 clusters/subclusters posted positive employment growth and six clusters/subclusters ranked in the top 10 for employment concentration among the nation’s 50 largest metropolitan areas.

For additional information on Metro Denver’s major industry clusters, please contact 303.620.8092, info@metrodenver.org, or the industries section on www.metrodenver.org.
## Metro Denver Industries Employment Snapshot

<table>
<thead>
<tr>
<th>Metro Denver Industries</th>
<th>Aerospace</th>
<th>Aviation</th>
<th>Beverage Production</th>
<th>Bioscience</th>
<th>Broadcasting &amp; Telecom</th>
<th>Energy</th>
<th>Financial Services</th>
<th>Healthcare &amp; Wellness</th>
<th>IT &amp; Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Employment</strong></td>
<td>20,020</td>
<td>18,470</td>
<td>9,300</td>
<td>11,160</td>
<td>4,700</td>
<td>42,400</td>
<td>30,460</td>
<td>22,390</td>
<td>39,150</td>
</tr>
<tr>
<td><strong>Companies</strong></td>
<td>130</td>
<td>630</td>
<td>210</td>
<td>340</td>
<td>330</td>
<td>2,630</td>
<td>1,620</td>
<td>1,610</td>
<td>3,110</td>
</tr>
<tr>
<td><strong>Five-Year Employment Growth (2011-2016)</strong></td>
<td>2.3% (-3.2%)</td>
<td>22.4% (5.0%)</td>
<td>28.1% (28.8%)</td>
<td>10.8% (1.8%)</td>
<td>-2.5% (5.4%)</td>
<td>0.2% (-7.5%)</td>
<td>20.7% (-1.5%)</td>
<td>20.4% (17.6%)</td>
<td>1.4% (1.6%)</td>
</tr>
<tr>
<td><strong>One-Year Employment Growth (2015-2016)</strong></td>
<td>1.9% (-0.9%)</td>
<td>4.6% (1.8%)</td>
<td>7.5% (8.3%)</td>
<td>1.7% (0.9%)</td>
<td>3.2% (1.5%)</td>
<td>0.4% (-1.8%)</td>
<td>-3.7% (-8.4%)</td>
<td>6% (5.7%)</td>
<td>1.8% (1.1%)</td>
</tr>
<tr>
<td><strong>Direct Employment Concentration (2016)</strong></td>
<td>0.9% (0.2%)</td>
<td>0.8% (0.6%)</td>
<td>0.4% (0.2%)</td>
<td>0.5% (0.3%)</td>
<td>0.2% (0.3%)</td>
<td>1.9% (0.7%)</td>
<td>1.4% (1%)</td>
<td>1% (0.5%)</td>
<td>1.7% (1.5%)</td>
</tr>
<tr>
<td><strong>Average Wage</strong></td>
<td>$133,840</td>
<td>$60,520</td>
<td>$59,880</td>
<td>$75,400</td>
<td>$103,370</td>
<td>$99,120</td>
<td>$111,880</td>
<td>$79,690</td>
<td>$80,080</td>
</tr>
</tbody>
</table>
| **Employment Concentration Ranking (among 50 largest metros)** | 2 | 14 | 2 | 11 | 28 | 5 | 6 | 4 | 14 | 11 | 28 | 30 | 8
Metro Denver and Northern Colorado Industries Economic Performance Snapshot

Bubble charts are popular tools used to illustrate industry clusters. These charts allow multiple variables to be plotted within the same graph, making it easy to assess relative economic performance. Bubble charts are often used for pinpointing priority industries since they allow visual comparisons of economic measures.

This chart illustrates industry cluster relationships for the 13 industry clusters and subclusters. The following three variables are plotted:

- One-year direct employment growth, 2015 to 2016; on the x-axis (horizontal);
- The industry’s location quotient, 2016; on the y-axis (vertical); and
- Employment size of the industry, 2016; indicated by the size of the bubble.

Industry subcluster bubbles are color coded to reflect that they belong to the same cluster. For example, fossil fuels and cleantech are green, indicating that they belong to the energy cluster.

Bubble charts show the clusters in a state or region as measured by total employment size (the bigger the bubble, the larger the industry in terms of employment), employment growth (the further to the right on the graph, the more growth), and the location quotient (the further up in the graph, the higher the location quotient (LQ)).

The LQ is a ratio that compares the region’s employment share of a particular industry with the employment share nationwide. The following guidelines are used to evaluate the LQ:

- LQ > 1 indicates a significant employment concentration compared with the nation.
- LQ = 1 indicates that the region’s employment concentration is equal to that of the nation.
- LQ < 1 indicates that the region has less of an employment concentration compared with the nation.

The dotted red line on the graph represents the location quotient equal to 1 to easily identify the bubbles that are above this demarcation.

For example, IT-Software had substantial employment growth from 2015 to 2016, aerospace had a key locational advantage represented by its high LQ position on the graph, and healthcare and wellness had a significant number of employees represented by the size of its bubble. Looking at other clusters, broadcasting and telecommunications is a relatively large industry represented by its bubble size and has above-average employment concentration compared with the nation. Twelve of the 13 clusters and subclusters posted positive employment growth between 2015 and 2016, while fossil fuels was the only industry to contract. Further, the majority of the region’s industries have locations quotients greater than 1. This indicates that the Metro Denver and Northern Colorado region remains a competitive location for these clusters, making them priority industries to pursue.
Metro Denver and Northern Colorado Industries Economic Performance Snapshot

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This chart illustrates industry cluster relationships for the 13 industry clusters and subclusters. The following three variables are plotted:

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TOP INDUSTRIES

9 industries drive Metro Denver's economy

- Aerospace
- Aviation
- Beverage Production
- Bioscience
- Broadcasting & Telecom
- Energy
- Financial Services
- Healthcare & Wellness
- IT-Software

Industry Facts

- Rocket Scientists make among the highest wages - $133,840/yr
- CO's Energy Industry has 274,760 direct & indirect workers with a $14.9B annual economic impact

Top Job Growth 2015-2016

- 9.4% IT-Software

CHEERS!

- Beverage Production had the highest job growth of all industries from 2011-2016 - 28.1%

Int'l passenger traffic at Denver International Airport increased 27.9 percent between 2011-2015.

Why industries thrive in Metro Denver

- Nation's 2nd Most Highly Educated Workforce
- Quality Lifestyle = Easy Employee Recruitment
- Connectivity with expansive mass transit system
- Diverse Industries = Solid Economic Growth
- 30 Federal Research Laboratories & Research Centers

Click here for the full report!
Industry Overview

Colorado is an aerospace center of excellence, paving the way for new discovery in the frontier of space. The state has a rich history in aerospace development and is at the forefront of space travel, exploration, and leading aerospace research. In addition to its strategic location, the state’s educated workforce, dynamic atmosphere for business growth, and hub of high-tech innovation have revolutionized the state’s growing aerospace industry. Combined, these assets support Colorado’s position as a top aerospace state. In fact, Colorado ranked second in the nation in 2016 for both private aerospace employment as a percentage of total employment, and in total private-sector employment.

Colorado’s aerospace industry includes a broad range of companies, products, and systems for commercial, military, and civil space applications. Colorado’s aerospace companies research, develop, design, and manufacture guided missiles, spacecraft, satellites and communications equipment, as well as navigation and detection instruments. Colorado companies also produce planetary spacecraft and launch systems, and provide mission support. The state’s companies and public agencies have achieved some of the most innovative advancements in space exploration technology in recent history and are leading the nation’s major commercial, civil, and military space missions and projects.

Eight of the nation’s top aerospace contractors have significant operations in the state, leading the country’s space projects. Along with major U.S. Department of Defense (DoD) facilities and the National Aeronautics and Space Administration (NASA) research and development activities, the state’s universities are home to leading aerospace programs.

Colorado continues to experience growth in aerospace, with nearly 180 businesses classified as aerospace companies, and more than 400 companies and suppliers providing space-related products and services. Direct employment in the aerospace cluster totals 25,500 private sector workers and approximately 29,090 military personnel. These 54,590 workers in the aerospace cluster support an additional 133,690 workers in all industries throughout Colorado, bringing direct and indirect employment supported by the aerospace cluster to 188,280 workers. Further, Colorado’s aerospace cluster payroll exceeded $3.4 billion.

The majority of Colorado’s key aerospace businesses, facilities, and research institutions are located in the nine-county Metro Denver and Northern Colorado region. The region’s 20,020 private sector aerospace workers represent about 78.5 percent of all aerospace workers in Colorado. The region’s 130 aerospace companies represent 74 percent of the state’s total companies in the cluster.

Private Aerospace Economic Profile

The aerospace cluster consists of 19, six-digit North American Industry Classification System (NAICS) codes including search, detection, and navigation instrument manufacturing; guided missile and space vehicle manufacturing; satellite telecommunications; and research and development.

The nine-county region ranked second in the nation for its 2016 concentration of private aerospace employment. The region’s aerospace cluster ranked first out of the 50 largest metro areas in total private-sector employment.²

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¹ The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.

² Employment concentration is the private aerospace cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Private-sector employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Private-sector employment is estimated and ranked for the 50 largest MSAs.
Aerospace Employment

The nine-county region’s aerospace cluster directly employed about 20,020 workers in 2016. Employment in the region’s aerospace cluster rose 1.9 percent between 2015 and 2016, compared with a 0.9 percent decrease at the national level. From 2011 to 2016, employment in the region’s aerospace cluster increased 2.3 percent, compared with a 3.2 percent decline nationwide. Nearly 6 percent of the nation’s aerospace employment is located in the region. Additionally, aerospace companies employed 0.9 percent of the region’s total employment base, compared with a 0.2 percent employment concentration nationwide.

About 130 aerospace companies operated in the nine-county region in 2016, a 4.8 percent increase from 2015. The region’s aerospace cluster has a stronger concentration of large companies than any other industry in the region. Approximately 56 percent of the region’s aerospace companies employed fewer than 10 people (87.4 percent for all industries), while 12.2 percent employed 250 or more (0.3 percent for all industries).

### Aerospace Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th></th>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>20,020</td>
<td>347,470</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>130</td>
<td>5,270</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>1.9%</td>
<td>-0.9%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>2.3%</td>
<td>-3.2%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>0.5%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>0.9%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

Major Aerospace Contractors

Eight of the country’s major space contractors have a significant presence in Colorado. These companies support the U.S. Department of Defense (DoD) to procure, place, and manage national space assets for the military. They also provide manned and unmanned spacecraft, instrumentation, and ground control services for the National Aeronautics and Space Administration (NASA) and other agencies.

- **Ball Aerospace & Technologies Corp.,** based in Boulder, employs more than 2,300 workers in Colorado, and is known for its contributions in support of space and Earth science, exploration, national security and intelligence, and tactical programs. Ball Aerospace pioneers discoveries that enable its customers to perform beyond expectation and protect what matters most. Ball Aerospace creates innovative space solutions, enables more accurate weather forecasts, drives insightful observations of our planet, delivers actionable data and intelligence, and ensures those who defend our freedom go forward bravely and return home safely. [www.ballaerospace.com](http://www.ballaerospace.com)

- **The Boeing Company** has more than 1,800 employees at several locations throughout Colorado with the largest concentrations in Arapahoe County and Colorado Springs. Core business activities include: Jeppesen, a subsidiary of Boeing that provides navigational information to commercial, business, and military aviation; strategic missile defense systems, including Ground-based Midcourse Defense; space and intelligence and Global Positioning System (GPS) support; and Boeing military aircraft support at Fort Carson. Boeing spent nearly $481 million with 214 Colorado suppliers in 2015. [www.boeing.com](http://www.boeing.com)

- **Harris Corporation** has offices in Englewood, Broomfield, and Colorado Springs, altogether employing nearly 1,200 people. The **Critical Networks** segment provides managed services for air traffic
management, energy and maritime communications, ground network operation and sustainment, as well as information technology and engineering services. The Communications Systems segment provides tactical and airborne radios, night vision technology, and defense and public safety networks, while the Electronic Systems segment provides electronic warfare, avionics, wireless technology, C4I, and undersea systems and aerostructures. The Space and Intelligence Systems segment serves the nation’s space superiority mission out of Colorado Springs, is represented on the GPS Operational Control System program, and also includes the Geospatial Solutions group which provides software solutions and services for data and image analysis, visualization, image delivery, and rapid development for commercial, research, and government markets. www.harris.com

- **Lockheed Martin** employs more than 8,600 people in Colorado. Of these workers, about 5,200 are employed at the Space Systems Company unit headquartered in Jefferson County. Space Systems designs, develops, tests, and manufactures advanced technology systems for its government, international, and commercial customers. The company also develops products ranging from human space flight systems and navigation, meteorological, and communications satellites to ground station and missile defense systems. www.lockheedmartin.com

- **Northrop Grumman** provides a diverse portfolio of products and services related to systems integration, missile systems and national security technologies, defense electronics, marine and space systems, and battle management. The company also works with advanced aircraft, unmanned aircraft vehicles, naval vessels, and space technology. Northrop Grumman employs more than 2,100 people throughout Colorado. www.northropgrumman.com

- **Raytheon Company** employs about 2,800 people throughout the state, with the majority of employees located in Aurora. Raytheon Company manages spacecraft missions and analyzes post-launch data through a variety of technologies including radio frequency, GPS, communications and intelligence, and electro-optical/infrared. www.raytheon.com

- **Sierra Nevada Corporation (SNC)** has a significant presence in Colorado, employing over 1,000 people in the state. SNC’s Space Systems business area, located in Louisville, develops subsystems and components for space applications, is a prime contractor for small satellites, and owns and operates the Dream Chaser® spacecraft. The company’s two Centennial divisions—the Intelligence, Surveillance and Reconnaissance and the Information and Sensor Solutions—provide products and services for a variety of airborne systems. www.sncorp.com

- **United Launch Alliance (ULA)** celebrated its 10th year of operation in 2016 and is the nation’s premier launch company. ULA employs about 1,300 of its 3,400-person U.S. workforce at its Centennial headquarters. ULA’s program management, engineering, and mission support functions are concentrated in Colorado. This includes development of ULA’s new Vulcan Centaur rocket, which will launch in 2019. With its current and heritage launch vehicles, ULA has more than 100 years of combined launch experience, including launch of every operational GPS satellite and exploration of every planet in the solar system. Since ULA’s formation in 2006, ULA’s rockets have successfully delivered more than 110 satellites to orbit that provide critical capabilities for troops in the field, aid meteorologists in tracking severe weather, enable personal device-based GPS navigation, and unlock the mysteries of our solar system. www.ulalaunch.com

**Additional Major Private Aerospace Companies**

- ABSL Space Products www.abslspaceproducts.com
- DigitalGlobe, Inc. www.digitalglobe.com
- IHS Markit Aerospace, Defense & Security www.ihs.com
- Intrex Aerospace www.intrexcorp.com
- Merrick & Company www.merrick.com
- Research Electro-Optics, Inc. www.reoinc.com
- Rocky Mountain Instrument Company www.rmico.com
- Science Applications International Corp. www.saic.com
- SEAKR Engineering, Inc. www.seakr.com
- Surrey Satellite Technology US LLC www.sst-us.com
- Trimble Rockies www.trimble.com
- UP Aerospace Inc. www.upaerospace.com
AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

Military Aerospace Profile

Colorado is home to a diverse mix of U.S. Department of Defense (DoD) military installations and major command centers that foster important synergies between private aerospace companies and government entities. The state is also a national hub for cybersecurity and opened the National Cybersecurity Center in Colorado Springs in 2016, a first-of-its-kind partnership between industry, nonprofits, government entities, and academia. The state’s military installations significantly contribute to the economy, providing an annual economic impact of $27 billion to the Colorado economy and employing more than 170,000 military and defense-related civilian personnel—or 5.2 percent of the state’s workforce. Additionally, 7.5 percent of Colorado’s labor income is derived from DoD employment and 6.5 percent of the state’s Gross State Product is DoD-related.

Colorado plays a leading role in supporting cutting-edge defense assets such as the F-35 program. The F-35 is the fifth-generation fighter jet, which is designed to perform air defense missions and ground attack. Ball Aerospace is home to the high-tech manufacturing facility that develops, builds, and tests the F-35 antenna suite. The company expects to manufacture nearly 50,000 antennas for the program through 2040. Throughout the state, the F-35 has 22 suppliers and supports 750 direct and indirect jobs, providing an annual economic impact of $60 million to the state’s economy.

- **Buckley Air Force Base** in Aurora is home to the 460th Space Wing and supports more than 83 tenant organizations that represent all branches of the military. Tenants are located both on and off the base. The base is also home to the Aerospace Data Facility-Colorado, one of the nation’s three satellite ground stations operated by the National Reconnaissance Office. The facility is a multi-mission ground station responsible for supporting worldwide defense operations and multi-agency collection, analysis, reporting, and dissemination of intelligence information. The base also hosts the Colorado Air National Guard 120th Fighter Squadron and its F-16C fighters.

- **Air Force Bases** in Colorado Springs include Peterson Air Force Base, Cheyenne Mountain Air Force Station, and Schriever Air Force Base.
  - **Peterson Air Force Base** is the home of the 21st Space Wing (SW) as well as the North American Aerospace Defense Command (NORAD), the U.S. Northern Command (USNORTHCOM), Air Force Space Command (AFSPC), U.S. Army Space and Missile Defense Command/U.S. Army Forces Strategic Command (SMDC/ARSTRAT), the 302nd Airlift Wing, as well as a number of other smaller tenant units. The 21st SW is responsible for worldwide missile warning, space control, and missile defense.
  - **Cheyenne Mountain Air Force Station** is owned and operated by Air Force Space Command. It hosts the NORAD and USNORTHCOM Alternate Command Center and other national security activities.
  - **Schriever Air Force Base** is the home of the 50th SW as well as the Space Innovation and Development Center (SIDC), the 310th Space Wing, the Missile Defense Integration and Operations Center (MDIOC), the Joint Functional Component Command for Integrated Missile Defense (JFCC-IMD), and numerous tenant organizations. The 50th SW is responsible for the operation and support of 175 DoD satellites and installation support to 16 major tenant units. The 50th SW provides space combat capability through command, control, operations, and support of communication, navigation, warning, surveillance, and weather satellite weapons systems.

- **The United States Air Force Academy** in Colorado Springs was established in 1954 as an accredited college to educate officers in the U.S. Air Force. The 10th Air Base Wing is the host wing for the Air Force Academy and provides base-level support activities including medical, engineering, base logistics, fire response services, communications, security, and other key support for more than 25,000 military and civilian personnel. The Academy hosts more than 20 research centers, institutes, and multi-disciplinary research groups with more than 400 professionals and faculty dedicated to space, science, air, and atmospheric research, as well as modeling and simulation. Further, the Academy leads the Air Force in cooperative research and development agreements, allowing federal labs and industry partners to share resources. The Academy’s economic impact totaled nearly $1 billion in fiscal year 2015.
**Government Installation** | Personnel
--- | ---
Buckley Air Force Base | 9,500
Peterson Complex* | 8,410
U.S. Air Force Academy | 7,270
Schriever Air Force Base | 3,910

*Peterson Complex total includes personnel at Peterson Air Force Base and Cheyenne Mountain Air Force Station (including NORAD, USNORTHCOM, AFSPC, and SMDC/ARSTRAT).

### 2016 INDUSTRY MILESTONES

The nine-county region is at the forefront of the nation’s major commercial, civil, and military space missions and projects. Examples of these collaborative projects and their progress are highlighted below.

**Dream Chaser®**

Louisville-based Sierra Nevada Corporation’s (SNC) Space Systems business area continued to work rigorously on the Dream Chaser spacecraft through significant collaboration with other Colorado-based aerospace companies. The Dream Chaser is a winged, lifting-body spacecraft designed for both crewed and uncrewed missions to low Earth orbit (LEO) including providing cargo resupply to the International Space Station (ISS) for the National Aeronautics and Space Administration (NASA), as well as international and commercial space missions. Program developments in 2016 included:

- In January, SNC was selected under NASA’s Commercial Resupply Services 2 (CRS2) contract to provide a minimum of six service missions to ISS from 2019 through 2024. SNC’s Dream Chaser Cargo System will provide up to 5,500 kilograms of upmass, as well as both return and disposal services.
- SNC passed the first two Integration Certification milestones under NASA’s CRS2 contract. NASA assessed and approved SNC’s detailed approach for delivering cargo and scientific research material to the ISS using the Dream Chaser spacecraft through 2024. SNC’s Dream Chaser capabilities will subject payloads to less stress while landing, and will allow scientists to access research samples in as little as three hours after wheel-stop.
- The Dream Chaser spacecraft was prepared for transport to NASA’s Armstrong Flight Research Center in California where it will undergo additional atmospheric flight testing. Program upgrades and initial hardware testing were successfully completed in Louisville. Upon arrival, SNC will begin a series of pre-flight ground evaluations to verify and validate the vehicle’s system and subsystem designs. After successful ground testing, the spacecraft will begin free-flight testing.
- SNC’s Space Systems added over 100 new employees in 2016 and will continue to increase its staff significantly in Louisville during 2017. SNC will also add manufacturing space to serve as the production home for the Dream Chaser.

**Global Positioning System (GPS)**

- Lockheed Martin Space Systems Co. received a $395 million contract to build the ninth and tenth Global Positioning System (GPS) III satellites for the U.S. Air Force (USAF) at the company’s advance satellite manufacturing facility in Jefferson County. GPS III—the most powerful GPS satellite ever built—will deliver three-times better accuracy, provide up to eight-times improved anti-jamming capabilities, and extend spacecraft life to 15 years. The company’s flexible, modular design for GPS III will allow the satellite to evolve to address changing mission needs and incorporate new technology as it becomes available in the future. The USAF plans to launch the first GPS III satellite in 2018.
- Raytheon completed both a qualification and a Critical Design Review milestone as part of its development of the GPS Next Generation Operational System (GPS OCX). The GPS OCX is the ground command and control system that will manage GPS satellites with significantly improved accuracy and precision, while providing unprecedented levels of cybersecurity. The company successfully completed
component-level testing of the OCX Black Wide Area Network (BWAN), which provides network connectivity to external interfaces for OCX.

- Harris supports the GPS mission in Colorado by developing and integrating the satellite navigation payloads for GPS III, and is providing the key navigation processing elements and precision monitor station receivers for the GPS OCX program.

The Imaging X-ray Polarimetry Explorer (IXPE) Mission

NASA has selected a science mission that will allow astronomers to explore, for the first time, the hidden details of some of the most extreme and exotic astronomical objects, such as stellar and supermassive black holes, neutron stars, and pulsars. The mission, slated for launch in 2020, will cost $188 million. Principal Investigator Martin Weisskopf of NASA’s Marshall Space Flight Center in Huntsville, Ala., will lead the mission. Ball Aerospace will provide the spacecraft and mission integration.

InSight

The Mars InSight lander, a NASA Discovery-class mission to understand the processes that shaped rocky planets such as Mars and Earth, was rescheduled to launch in 2018 on a ULA Atlas V rocket. Lockheed Martin Space Systems Co. constructed the Mars lander spacecraft for the mission. The team will also provide flight operations for the spacecraft.

Joint Polar-Orbiting Satellite System

- Ball Aerospace successfully completed environmental testing on the JPSS-1 satellite. The JPSS-1 is the nation’s next polar-orbiting, environmental satellite scheduled for launch in 2017. The JPSS-1 will continue the accurate and timely collection of operational polar-orbiting weather and climate data currently provided by the Ball-built National Oceanic and Atmospheric Administration (NOAA)/NASA Suomi National Polar-orbiting Partnership satellite.
- Ball Aerospace received a NOAA contract to build ozone-monitoring instruments for the next-generation of weather satellites. Under the initial $214 million contract, Ball Aerospace will develop, test, and deliver the Ozone Mapping and Profile Suite technology for the Joint Polar Satellite System (JPSS-3) and JPSS-4 missions. The contract is potentially worth $421 million, with the work to be performed over a 10-year period. This contract builds on the success of the JPSS-1 contract.

Juno

After a five-year, 1.76-billion-mile journey, Colorado-built Juno reached Jupiter and was inserted into elliptical polar orbit. Launched in 2011 by ULA, NASA’s $1.1 billion spacecraft is the first solar-powered mission to Jupiter and was constructed by Lockheed Martin Space Systems Co. to study the planet’s upper atmosphere and investigate the planet’s internal dynamics. Juno’s flight operations are controlled by a joint team at Lockheed Martin’s Mission Support Area near Denver and NASA’s Jet Propulsion Laboratory (JPL) in Pasadena, Calif.

SNC celebrated the early successes of Juno as it stabilized its orbit around Jupiter and began powering on the company’s electronic-free thermal devices. The thermal louver technology is critical in regulating the spacecraft’s temperature without drawing power away from its scientific payloads.

Mars

- Lockheed Martin celebrated 40 years since the first successful Mars landing with its Viking spacecraft, the first U.S. spacecraft to land on another planet. Viking 1 and 2 were the most complex interplanetary missions of their time. In partnership with NASA and the Langley Research Center, Lockheed Martin designed, built, and tested the two landers at its facility near Denver.
- NASA selected SNC and Lockheed Martin Space Systems Co. among six companies to design ground prototypes and concepts for deep space habitats on Mars over the next 24 months. The companies will expand commercial development of space in LEO under the Next Space Technologies Exploration Partnerships-2 (NextSTEP-2), a program to produce habitats that could support astronauts working and living outside Earth’s orbit.
Mars 2020

- SNC’s Space Systems Group was awarded multiple contracts by NASA’s JPL to build critical hardware for NASA’s Mars 2020 rover. This is the 13th time the company will be helping to build hardware for a mission to Mars and will design and manufacture the Descent Brake, as well as actuators for the robotic arm and sample caching system.
- NASA selected ULA to launch its Mars 2020 rover on an Atlas V rocket in the summer of 2020. The $2 billion Mars rover is scheduled to land on the planet in 2021 to explore the Martian surface for two years.
- Lockheed Martin was chosen by NASA’s JPL to build the aeroshell and heat shield for the Mars 2020 rover. The aeroshell system will protect the rover during its cruise to Mars and during the dramatic descent to the surface. The aeroshell is very similar to the system the company developed for NASA’s Curiosity rover.

MAVEN

Mars Atmospheric and Volatile EvolutioN (MAVEN) is a prime example of Colorado’s leadership in space exploration with the entire mission and spacecraft being built and launched by Colorado organizations including Lockheed Martin Space Systems Co., CU Boulder’s Laboratory for Atmospheric and Space Physics (LASP), Harris Corporation, and United Launch Alliance (ULA). MAVEN launched in November 2013 and entered Mars’ orbit in September 2014.

Orion

Lockheed Martin Space Systems Co. is the prime contractor building the Orion Multi-Purpose Crew Vehicle, NASA’s first spacecraft designed for long-duration, human-rated deep space exploration. Orion will transport humans to interplanetary destinations beyond LEO, such as the moon, asteroids, and eventually Mars as early as 2023. Project developments in 2016 included:

- Orion moved forward into assembly, integration, and testing to ready the spacecraft for its uncrewed Experimental Mission-1 in 2018 by NASA’s new Space Launch System. Orion completed a series of structural tests including pressurized volume, water landing, docking capability, safety technologies, and logistics management to make future vehicles re-usable for several flights. Lockheed Martin is also developing and testing software in Jefferson County that will be used on Orion’s computers and flight systems during its unmanned lunar voyage.

OSIRIS-REx

NASA’s OSIRIS-REx mission will travel to asteroid Bennu, study it in detail, and return a sample to Earth—a first for NASA. Lockheed Martin Space Systems Co. designed and built NASA’s OSIRIS-REx spacecraft and is also providing mission operations. The seven-year, 4.4-billion-mile mission successfully launched aboard a ULA Atlas V in September 2016. A team of CU Boulder scientists will lead the radio science investigation for the mission, which will study and return a sample of a carbonaceous asteroid to Earth for detailed analyses in 2023 that could determine the origin of the solar system.

Space-based Missions

- Ball Aerospace was selected by NASA to study a new space telescope that will be launched in mid-2020. The company will develop a concept study for the Wide Field Infrared Survey Telescope (WFIRST), which will have a view 100 times bigger than that of NASA’s Hubble Space Telescope.
- ULA partnered with Nevada-based Bigelow Aerospace to develop and deploy experimental, inflatable space habitats that could be ready for launch as soon as 2020. Bigelow Aerospace, along with ULA, plans to build one or two 12,000-square-foot habitats in LEO.
- Lockheed Martin Space Systems Co. partnered with research teams on three new interplanetary missions. The first project will orbit Venus, the second will descend through Venus’ atmosphere, and the third will travel and study a Trojan-class asteroid that floats near Jupiter. The three projects are among five competing for NASA’s next round of Discovery mission program funding.
- Denver-based York Space Systems signed a $60 million launch agreement with Tucson-based Vector Space Systems. The agreement covers six launches between 2019 and 2022, with the option to extend to include 14 more missions. York Space Systems is establishing a satellite factory in Centennial designed to produce small satellite bodies weekly and have the final satellites assembled in about a month.
AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

• High-tech hardware designed and built at CU Boulder’s BioServe Space Technologies for biomedical experiments was successfully launched aboard the commercial SpaceX Dragon capsule to the ISS. The hardware will support experiments ranging from the mitigation of bone loss in space to the effects of low gravity on stem cell-derived heart cells.

Colorado’s aerospace companies are transforming the future of space with next generation launch systems.

• ULA’s next-generation Vulcan Centaur rocket, set to launch in 2019, will help transform the future of space launch, making it more affordable, accessible, and commercialized. The Vulcan Centaur will have an American engine and eventually an Advanced Cryogenic Evolved Stage (ACES) upper stage, giving it more capability than any other rocket on the market.

• ULA received a $46.6 million USAF contract to develop prototypes of its Vulcan Centaur rocket with two Blue Origin BE-4 engines, the primary path for the new launch vehicle, as well as propulsion for ULA’s ACES upper stage. Aerojet Rocketdyne also received USAF funding to develop its AR-1 engine, which also could power the Vulcan Centaur booster.

• In 2016, ULA successfully launched 12 missions aboard its Delta IV and Atlas V rockets, including a resupply mission to the ISS and missions to support military communications, GPS, and the National Reconnaissance Office.

Satellite Programs

• Lockheed Martin Space Systems Co. secured a contract with Japan-based SKY Perfect JSAT Corp. to build a commercial communications satellite. The JCSAT-17 satellite will include a flexible processor to adjust the satellite’s position to focus on an area of high need.

• ULA launched the U.S. Navy’s fifth Mobile User Objective System (MUOS-5) satellite, built by Lockheed Martin Space Systems Co., to improve data and voice communications for the military. Launched aboard ULA’s Atlas V rocket, the satellite is the final satellite in the five-satellite constellation that will provide 16 times the network capacity for more than 55,000 military communication terminals worldwide.

• ULA launched the WorldView-4 satellite for Westminster-based DigitalGlobe. WorldView-4 is a companion to its WorldView-3 satellite. The satellite, built by Lockheed Martin, will more than double DigitalGlobe’s coverage of the world’s highest resolution imagery and increase the rate at which it grows its 16-year library of time-lapse, high-resolution imagery. WorldView-4 will orbit Earth every 90 minutes, traveling 17,000 miles per hour and capturing more than 680,000 square kilometers of the Earth’s surface daily.

• NOAA’s next generation Geostationary Operational Environmental Satellite-R (GOES-R) weather satellites launched in November 2016 by ULA. The satellite, designed and built by Lockheed Martin Space Systems Co., will provide accurate, real-time weather forecasts and early warning products to NOAA using an instrument suite designed and built by CU Boulder’s LASP known as the Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS). Lockheed Martin also designed and built the Solar Ultraviolet Imager and the Geostationary Lightning Mapper instruments that will fly aboard each of the four spacecrafts in the GOES-R Series.

• SNC’s Space Systems deployed and completed all in-orbit checkout procedures of the final 11 satellites for the ORBCOMM Generation 2 (OG2) constellation after their December 2015 launch. SNC also provided the solar arrays and drive mechanisms and the satellite dispenser to Southwest Research Institute in support of their eight satellite CYGNSS mission for NASA, which launched in December 2016.

• CU Boulder’s LASP built and operated the Miniature X-ray Solar Spectrometer (MinXSS) CubeSat, which successfully deployed from the ISS. MinXSS will operate for up to 12 months and will study solar flares, active regions, the quiescent sun, and the relationship between solar activity and the Earth’s upper atmosphere.

• India-based Antrix Corp. Ltd. launched two weather satellites developed by Boulder-based PlanetIQ. The company’s microsatellites will use radio occultation to measure global temperature pressure and water vapor in the atmosphere, and electron density in the ionosphere. Antrix plans to launch 10 additional satellites in 2017.

• Lockheed Martin Space Systems Co., Arab Satellite Communications Organization, and King Abdulaziz City for Science and Technology completed the Critical Design Review of its Arabsat 6A and Hellas-Sat-4/SaudiGeoSat-1 satellites. With manufacturing underway, the satellites will move further into the production process to provide advanced telecommunications capabilities, including television, Internet, telephone, and secure communications to the Middle East, Africa, and Europe. The satellites are expected to launch in 2018.
AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

- Englewood-based Surrey Satellite Technology US LLC and Boston, Mass.-based BridgeSat Inc. partnered to develop a free-space optical communications system that will provide secure data downlinks from satellites. Surrey will build the flight laser terminal units that will communicate with BridgeSat’s global ground network, providing transmit data at up to 10 gigabits per second, per link.

- ULA successfully launched a Delta IV rocket carrying the USAF Space Command 6 (AFSPC-6) mission. The AFSPC-6 mission included twin Geosynchronous Space Situational Awareness Program (GSSAP) spacecraft, which collects space situational awareness data for more accurate tracking and characterization of man-made orbiting objects.

Global Aerospace Agreements

- SNC’s Space Systems signed a Memorandum of Understanding with the United Nations (UN) Office for Outer Space Affairs (UNOOSA) to provide affordable opportunities for UN member states to conduct experiments in space. Under the agreement, SNC will dedicate at least one Dream Chaser mission that will host payloads to test microgravity science and space equipment for member countries.

- DigitalGlobe and Saudi Arabia-based TAQNIA and King Abdulaziz City for Science and Technology created a joint venture to develop and operate at least six small optical Earth observation satellites. The satellites, capable of detecting objects of less than one meter in diameter, will launch in 2018 and 2019.

- DigitalGlobe partnered with PSMA Australia to map the locations and characterize the physical attributes of more than 15 million structures across the continent of Australia. The mapping will have applications for insurance risk modelling, urban planning and services delivery, business intelligence, and policy development.

Spaceport Colorado

Colorado is actively working to establish horizontal launch capabilities in the state. In 2016, Front Range Airport continued the application process for certification from the FAA to operate as a horizontal-launch spaceport facility. The subsequent designation for Spaceport Colorado, which may be granted in 2017, fulfills a 2011 declaration by Gov. John Hickenlooper of Colorado’s intent to become a spaceport state. These efforts will increase Colorado’s competitiveness in the aerospace industry and support new opportunities in the future growth of commercial space research and transportation. Plans for Spaceport Colorado include the development of an aerospace and technology park to support a broad range of activities and commercial opportunities, including research and development, testing and evaluation, manufacturing, crew training, scientific research, commercial space and aerospace education, suborbital flight, and point-to-point travel. Spaceport Colorado has an abundance of surrounding land and convenient access to Denver International Airport and the state’s sizeable aerospace industry, research universities, and talented aerospace workforce.

Research and Education Announcements

The nine-county region’s robust educational system and research centers help prepare the future aerospace workforce with vital skills through innovation, mentorship, and professional experience.

- Lockheed Martin Space Systems Co. committed $3 million over four years to the University of Colorado Boulder (CU Boulder) to establish academic curriculum focused on technologies for communications and radar systems. The funding will be used for engineering course work in radio frequency technologies, which are used in military and civilian systems ranging from Global Positioning Systems (GPS) to mobile phones. CU Boulder established the Lockheed Martin Radio Frequency Space Systems Research Center, which will aim to increase engineering expertise and support in-demand skills in the aerospace industry.

- CU Boulder launched its new Space Minor program. The program, a component of CU Boulder’s Grand Challenge: Our Space. Our Future, will allow undergraduate students regardless of major to obtain a minor that complements their major degree with a set of five space-related courses.

- Lockheed Martin and CU Boulder launched the inaugural Mentor Lunch during National Engineers Week to inspire and motivate future engineers and celebrate the contributions of engineering professionals. The event featured speed mentoring and tours of various engineering facilities on campus for high school and college students from across the nation.

- A Colorado State University (CSU)-based research team won the top prize in NASA’s DEVELOP program for their satellite imagery monitoring cheatgrass burned from the Arapaho fire in Wyoming.
AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

DEVELOP is a training and development project sponsored by NASA’s Earth Science Applied Sciences Program where interns work on Earth science research projects.

- A hypervelocity dust accelerator for studying micrometeorite impacts opened at CU Boulder’s Institute for Modeling Plasma, Atmospheres, and Cosmic Dust (IMPACT). The accelerator tags each particle’s mass, speed, and charge used for research activities and calibrates dust instruments for space applications.

- The University Corporation for Atmospheric Research (UCAR) was awarded a three-year, $2.8 million cooperative agreement with the National Science Foundation (NSF) to oversee the EarthCube Science Support Office. EarthCube provides over 2,500 contributors with a common cyberinfrastructure to collect, access, analyze, and share all forms of geosciences data and related resources.

- CU Boulder and Fort Lewis College were two of six colleges to receive part of a $24 million NSF imaging science grant. The schools will launch the Science and Technology Center on Real-Time Functional Imaging center (STROBE), which will be headquartered at CU Boulder. The center is designed to tackle major scientific challenges that have the potential to transform imaging science and technology through integrated advanced imaging methods using electrons, X-rays, and super-resolution microscopy.

The nine-county region is home to major science, technology, engineering, and mathematics (STEM) initiatives in aerospace including:

- **Colorado STEM Education Roadmap**, developed by the Colorado Education Initiative, collaborates with key aerospace industry stakeholders to position Colorado as the most innovative state for growing a talent pipeline through STEM education and experiences.

- **Wings Aerospace Academy** is an online, tuition-free charter school for sixth through eighth grade students. Launched in the fall of 2015, the Academy provides aerospace experiences via the Elevate Academy with hands-on, aerospace-based STEM curricula provided by Wings Over the Rockies.

- The **Center for STEM Learning** at CU Boulder partners with and features dozens of STEM programs around the country and within CU Boulder to improve STEM education and serve as a resource for such efforts. In addition, CU Boulder and the University of Massachusetts Amherst are partnering to create a national network of about 200 campus STEM education centers.

- The **Colorado Space Grant Consortium** (CSGC) is a recipient of the National Space Grant and Fellowship Program to increase student and faculty engagement in STEM at community colleges and technical schools. The CSGC provides Colorado students access to space through innovative courses, real-world, hands-on telescope and satellite programs, and interactive outreach programs.

- The Colorado Space Business Roundtable’s **Colorado Aerospace Internship Initiative** is a two-week immersive program designed to expose students to a “day in the life” of an employee at various aerospace organizations.

- The Boulder-based **Space Science Institute** produces pioneering projects including exhibits, digital learning experiences, and workshops designed to engage scientists in education reform.

**Industry Infrastructure Support**

The nine-county region’s organizations and professional associations are dedicated to advancing the thriving aerospace industry.

- The Colorado Space Coalition (CSC), a group of industry stakeholders, works to promote Colorado as a leader in the aerospace industry. The Coalition—including aerospace companies, military leaders, academic groups, and economic development organizations—promotes the state’s significant aerospace assets nationally and advances legislation vital to industry growth and success.

- The Colorado Space Business Roundtable (CSBR) is an independent, nonprofit organization promoting the growth of space and space-related industry in Colorado, with particular focus on small space businesses. CSBR members include a broad cross-section of the Colorado space community including industry, government, and academia that support the space industry with services, advocacy, and procurement. The CSBR leads annual business development road trips throughout the state of Colorado to help connect major space contractors, business leaders, economic development professionals, and STEM advocates with small business owners, college students, and entrepreneurs.

- BioServe Space Technologies is a NASA-funded Center in CU Boulder’s Department of Aerospace Engineering Sciences that focuses on space life science research and engineering. BioServe’s current role in the field of microgravity life science research on the ISS is unmatched. For nearly 30 years, BioServe has designed, built, and flew over 70 different research payloads on over 40 space flight
missions and has a full suite of space flight certified hardware available for use by its customers and partners. BioServe receives approximately $2.5 million per year in research grants and contracts.

- **ADAPT**, the Alliance for the Development of Additive Processing Technologies, is a Colorado consortium focused on helping member manufacturers become global leaders in metal additive manufacturing. ADAPT members have greater opportunities to realize the full potential of additive manufacturing, respond quickly to market demands, and compete more effectively. Launched in December of 2015 as an industry-academic-government consortium, this collaborative effort addresses data-driven challenges in additive metals manufacturing.

- The **CU Boulder AeroSpace Ventures (ASV) initiative** creates a collaborative environment in which CU Boulder’s aerospace engineering and earth and space science faculty, students, and industrial researchers work together to solve complex problems that lead to new discoveries and innovations. Through this initiative, CU Boulder combines aerospace vehicle innovations and science discoveries for local and global measurements to advance solutions in climate, weather, and space environment.

- **EWI’s new site in Loveland**, part of the Colorado FourFront network for industry, serves aerospace customers directly in Colorado with advanced nondestructive examination and quality measurement technology. This capability is backed by EWI’s national network of centers headquartered in Columbus, OH, with the company matching its expertise to the needs of manufacturers to serve as a valuable extension of clients’ innovation and research and development teams.

- The **Colorado Chapter for Citizens for Space Exploration** comprises private citizens, small business owners, students, teachers, space and non-space business representatives, and county and municipal officials. The Chapter actively promotes awareness of the benefits of America’s Human Space Exploration Program and support for NASA.

### Cross-Cluster Convergence

Collaboration across the state’s industries including aerospace, software, energy, and bioscience has fueled innovation, discoveries, and advancements.

- The **National Solar Observatory (NSO)** relocated its headquarters from Tucson, Ariz. to Boulder. The move was motivated by the NSO’s latest undertaking—the Daniel K. Inouye Solar Telescope—which is the largest telescope in the world and will revolutionize the future of solar physics. The NSO plans to hire up to 70 scientists, engineers, and staff with an annual payroll of about $20 million.

- **Lockheed Martin Space Systems Co.** released new software to help speed relief to victims of natural disasters across the globe. The software, called HelpNowMap.com, helps provide clear data to residents, first-responders, and aid agencies on the ground after floods, earthquakes, hurricanes, and other natural disasters. The program uses satellite imagery from DigitalGlobe as the base layer for a heat map of human need and infrastructure damage.

- **DigitalGlobe** partnered with Amazon Web Services, CosmiQ Works, and NVIDIA to launch an open-data initiative to improve image analysis tools. SpaceNet will be an online, publically available repository of over 60 million satellite imagery and labeled training data to advance the development of machine learning and deep learning algorithms.

- **Centennial-based Allosource** collaborated with NASA and the JPL to conduct microbial research that could help improve medical care for astronauts in space. The ongoing project studies the effects of zero gravity on antibiotic resistant genes in microorganisms taken from the ISS and will help scientists and medical staff to more efficiently prescribe antibiotics on the ISS. Allosource also continues to provide advanced microbial research in tissue processing on various Mars missions.
Private Aerospace Workforce Profile

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

The nine-county region’s aerospace industry employs 20,020 people and includes a large pool of talented, well-educated, and highly skilled workers. The aerospace cluster has a larger share of employees (75.4 percent) that are between the ages of 35 and 64 years old, compared with the age distribution across all industries in the region (60.1 percent).

The aerospace workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest aerospace occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.
Wages

Wages in the aerospace cluster are among the highest across all industry clusters. The 2015 average annual salary for an aerospace worker in the nine-county region was $133,840, compared with the national average of $107,450, 25 percent more than the national average. Total nine-county payroll in the aerospace cluster exceeded $2.6 billion in 2015.

Metro Denver and Northern Colorado Aerospace Occupation & Salary Profile, 2016

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<tr>
<td>4. Software developers, systems software</td>
<td>10,829</td>
<td>184</td>
<td>1,038</td>
<td>$108,739</td>
<td>$68,046</td>
<td>$86,965</td>
<td>$128,679</td>
<td>$154,997</td>
</tr>
<tr>
<td>5. Biological technicians</td>
<td>2,465</td>
<td>20</td>
<td>1</td>
<td>$43,878</td>
<td>$29,106</td>
<td>$34,426</td>
<td>$56,637</td>
<td>$69,687</td>
</tr>
<tr>
<td>6. Software developers, applications</td>
<td>19,949</td>
<td>339</td>
<td>921</td>
<td>$103,454</td>
<td>$65,735</td>
<td>$81,356</td>
<td>$122,826</td>
<td>$148,422</td>
</tr>
<tr>
<td>7. Atmospheric &amp; space scientists</td>
<td>1,460</td>
<td>12</td>
<td>47</td>
<td>$93,238</td>
<td>$61,100</td>
<td>$74,769</td>
<td>$115,857</td>
<td>$140,114</td>
</tr>
<tr>
<td>8. Electronics engineers, except computer</td>
<td>4,938</td>
<td>123</td>
<td>441</td>
<td>$101,396</td>
<td>$64,980</td>
<td>$77,300</td>
<td>$122,914</td>
<td>$150,057</td>
</tr>
<tr>
<td>9. Industrial engineers</td>
<td>2,768</td>
<td>69</td>
<td>4</td>
<td>$90,696</td>
<td>$57,010</td>
<td>$72,137</td>
<td>$113,205</td>
<td>$135,370</td>
</tr>
<tr>
<td>10. Natural sciences managers</td>
<td>1,252</td>
<td>104</td>
<td>3,068</td>
<td>$126,982</td>
<td>$87,944</td>
<td>$105,550</td>
<td>$157,165</td>
<td>$259,747</td>
</tr>
</tbody>
</table>

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.

Education & Training

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest aerospace occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via [http://highered.colorado.gov](http://highered.colorado.gov).

- Colorado School of Mines
  [www.mines.edu](http://www.mines.edu)
- Front Range Community College
  [www.frontrange.edu](http://www.frontrange.edu)
- University of Colorado: Boulder, Denver
  [www.cu.edu](http://www.cu.edu)
- Colorado State University
  [www.colostate.edu](http://www.colostate.edu)
- Metropolitan State University of Denver
  [www.msudenver.edu](http://www.msudenver.edu)
- University of Denver
  [www.du.edu](http://www.du.edu)
- Colorado State University Global Campus
  [www.colostate.edu](http://www.colostate.edu)
- Regis University
  [www.regis.edu](http://www.regis.edu)
- University of Northern Colorado
  [www.unco.edu](http://www.unco.edu)
Key Reasons for Aerospace Companies to Locate in the Nine-County Region

The region is a top aerospace location offering:

1. The ability to recruit and retain technical and scientific employees and entrepreneurial talent
   - Colorado has one of the nation's most educated workforces, ranking second among the 50 states for percentage of residents (39.2 percent) with a bachelor's degree or higher. (U.S. Census Bureau, 2015 American Community Survey)
   - Colorado ranked ninth for the number of science, engineering, and health graduate students per 1,000 individuals ages 25 to 34 years old in 2013. (National Science Foundation, 2015)
   - Colorado ranked fifth for the number of scientists and engineers as a share of all occupations in 2014. (National Science Foundation, 2015)
   - The first U.S. Department of Commerce United States Patent and Trademark Office west of the Mississippi opened in Denver in 2014 due to the state's educated workforce, innovative ecosystem, and entrepreneurial culture. (U.S. Patent and Trademark Office, 2016)
   - The Denver-Aurora-Broomfield metropolitan area ranked among the top 10 for economic development and job growth in the “Leading Locations for 2016” list. Areas recognized in the study exhibited economic strength and capacity to support business prosperity. (Area Development, 2016)
   - Metro Denver ranked as the fourth-best metro area for science, technology, engineering, and mathematics (STEM) professionals in 2016. Metro Denver ranked seventh for the projected number of STEM jobs needed by 2020. (WalletHub, 2016)
   - Denver ranked among the top 10 "Best Cities for Young Professionals” in 2016. Denver’s healthy job growth rate and highly educated population contributed to its notable rank. (Forbes, 2016)
   - Boulder ranked sixth among the “Best Cities for New College Grads” in 2016. The city's growing tech hub, student and young professional population, and amenities contributed to its notable rank. (Zumper, 2016)
   - Metro Denver ranked as the fourth-best metro area for young entrepreneurs in 2016. The metro area received accolades for its highly educated population and high rate of small business loans. (NerdWallet, 2016)
   - Boulder and Fort Collins ranked among the top five most-educated metro areas in the nation in 2016. (ValuePenguin.com, 2016)

2. Proximity to vendors and customers
   - Colorado ranked third nationwide in National Aeronautics and Space Administration (NASA) prime contract awards totaling nearly $1.8 billion in 2015, or 14 percent of the nation’s total. The University of Colorado (sixth) and Colorado State University (39th) ranked among the top 100 public educational institutions for NASA research awards in 2015. (NASA, 2016)
   - The nine-county region’s aerospace cluster is anchored by eight large prime contractors: Ball Aerospace, The Boeing Company, Harris Corporation, Lockheed Martin, Northrop Grumman, Raytheon, Sierra Nevada Corporation, and United Launch Alliance.
   - Colorado is a host to major military operations including Buckley AFB, Peterson AFB, Schriever AFB, and Cheyenne Mountain Air Force Station. In addition, the U.S. Air Force Academy is located just outside of Colorado Springs.
   - Cheyenne Mountain Complex serves as NORAD and USNORTHCOM's Alternate Command Center and as a training site for crew qualification.
   - Colorado has 16 Procurement Technical Assistance Centers (PTAC) located throughout the state to assist Colorado businesses with prime contractors and federal, state, and local governments at nominal or no cost. In 2015, PTAC's 2,800 active businesses received $8.8 billion and generated 6,260 jobs.

3. Business organizations and public policy programs designed to encourage industry growth
   - Maj. Gen. Jay Lindell was appointed in 2013 by Gov. Hickenlooper as Colorado’s Aerospace and Defense Industry Champion, to oversee implementation of the state’s aerospace strategic plan and assist aerospace businesses, defense installations, and research institutions.
   - Aerospace Day at the Colorado Capitol occurs annually to recognize the industry’s importance to the state’s economic growth. Formed in 2015, the state’s bipartisan Aerospace and Defense Caucus further supports the continued expansion of aerospace and defense in Colorado.
AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

- The Advanced Industries Accelerator (AIA) Programs promote growth and sustainability in Colorado’s advanced industries, including advanced manufacturing, aerospace, bioscience, electronics, energy and natural resources, infrastructure engineering, and technology and information. Since 2013, the AIA program has granted over $35 million to nearly 230 organizations. These industries account for nearly 30 percent of the state’s wage earnings, nearly 30 percent of the total sales revenue across all industries, and nearly 35 percent of the state’s total exports. (The Colorado Office of Economic Development and International Trade, 2016)
- Personal property used in an orbital space facility, a space propulsion system, satellite, or space station is exempt from sales and use taxes. The exemption encourages capital investment in aerospace manufacturing suppliers. (Exemption clarified in Colorado House Bill 14-1178)
- To further pave the way for Spaceport Colorado, legislation passed in 2012 will help expand the state’s aerospace economy. Senate Bill 35 (2012) limited the liability for public and private entities holding a Federal Aviation Administration license for spaceflight activities. The legislation is an important first step in initiating commercial spaceflight activities in the state.

4. Proximity to colleges/universities
- Two academic institutions in Colorado offer nationally ranked aerospace programs or degrees:
  - The University of Colorado Boulder’s (CU Boulder) aerospace engineering sciences graduate program ranked among the top four programs in the nation by the National Research Council and eighth by U.S. News & World Report in 2016. (National Research Council, 2010; U.S. News & World Report, 2016)
  - The U.S. Air Force Academy in Colorado Springs ranked first in the nation for an undergraduate aerospace engineering program where a doctoral degree is not offered. (U.S. News & World Report, 2016)
  - The U.S. Air Force Academy ranked fifth among the “Top 21 STEM Colleges of 2016.” (Forbes, 2016)
- CU Boulder’s Laboratory for Atmospheric and Space Physics is the only university-based institution in the world to have designed and built space instruments for NASA that have been launched to all eight planets and Pluto.
- CU Boulder is home to over a dozen aerospace-related units on campus and attracts over $100 million in annual aerospace-related research expenditures.
- CU Boulder is the only university outside of the Naval Postgraduate School to have two astronaut alumni on its faculty. Eighteen NASA astronauts are CU Boulder affiliates (graduates, postdocs, and faculty). (University of Colorado, 2016)
- The University of Colorado ranked fourth among U.S. universities in the number of astronaut alumni, excluding military academies. The University of Colorado is home to 20 astronaut alumni. (University of Colorado, 2016; NASA, 2016)
- Three Metro Denver universities are members of the Universities Space Research Association, with graduate programs in space sciences or engineering: CU Boulder, Colorado School of Mines, and the University of Denver. (Colorado Space Coalition, 2016)

5. Low to moderate costs of doing business
- Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)
- Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)
- Metro Denver office rental rates averaged $29.52 per square foot in the fourth quarter of 2016, making the region’s office market highly competitive with other major markets in the U.S. (CoStar Realty Information, The CoStar Office Report, 4Q 2016)

6. Pro-business and flexible state and local governments
- Metro Denver ranked No. 1 among Forbes’ 2016 “Best Places for Business and Careers” for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (Forbes, 2016)
- Colorado ranked No. 3 in CNBC’s annual “America’s Top States for Business” in 2016. The state earned top-10 rankings in the categories that measure workforce (first), the economy (second),
**AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile**

Technology and innovation (eighth), access to capital (eighth), and business friendliness (ninth). *(CNBC, 2016)*

- Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)
- Colorado ranked among the top five “Best States for Small Business Friendliness” in 2016. Fort Collins received an “A” grade and Denver received an “A-” grade for overall friendliness. *(Thumbtack.com, 2016; Ewing Marion Kauffman Foundation, 2016)*

### Aerospace Industry Cluster Definition

<table>
<thead>
<tr>
<th>NAICS Code*</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>331512 (P)</td>
<td>Steel investment foundries</td>
<td>3324-9901</td>
<td>Aerospace investment castings, ferrous mfg.</td>
</tr>
<tr>
<td>331524 (P)</td>
<td>Aluminum foundries (except die-casting)</td>
<td>3365-0201</td>
<td>Aerospace castings, aluminum mfg.</td>
</tr>
<tr>
<td>331529 (P)</td>
<td>Other nonferrous metal foundries (except die-casting)</td>
<td>3369-9901</td>
<td>Aerospace castings, nonferrous: except aluminum mfg.</td>
</tr>
<tr>
<td>332111 (P)</td>
<td>Iron &amp; steel forging</td>
<td>3462-05</td>
<td>Missile &amp; ordnance forings mfg.</td>
</tr>
<tr>
<td>332112 (P)</td>
<td>Nonferrous Forging</td>
<td>3463-02</td>
<td>Nonferrous missile &amp; ordnance forings mfg.</td>
</tr>
<tr>
<td>332313 (P)</td>
<td>Plate work mfg.</td>
<td>3443-1104</td>
<td>Space simulation chambers, metal plate mfg.</td>
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<tr>
<td>332813 (P)</td>
<td>Electroplating, plating, polishing, anodizing &amp; coloring</td>
<td>3471-0204</td>
<td>Decontaminating &amp; cleaning of missile or satellite parts mfg.</td>
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<tr>
<td>332993 (P)</td>
<td>Ammunition (except small arms) mfg.</td>
<td>3483-0101</td>
<td>Arming &amp; fusing devices for missiles mfg.</td>
</tr>
<tr>
<td>332993 (P)</td>
<td>Ammunition (except small arms) mfg.</td>
<td>3483-9910</td>
<td>Missile warheads mfg.</td>
</tr>
<tr>
<td>333314 (P)</td>
<td>Optical instrument &amp; lens mfg.</td>
<td>3827</td>
<td>Optical instruments &amp; lenses</td>
</tr>
<tr>
<td>334220 (P)</td>
<td>Radio &amp; television broadcasting &amp; wireless communications equipment mfg.</td>
<td>3663-9910</td>
<td>Space satellite communications equipment mfg.</td>
</tr>
<tr>
<td>334511 (P)</td>
<td>Search, detection, navigation, guidance, aeronautical, &amp; nautical system &amp; instrument mfg.</td>
<td>3812</td>
<td>Search, detection, navigation, guidance</td>
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<tr>
<td>336414 (P)</td>
<td>Guided missile &amp; space vehicle mfg.</td>
<td>3761</td>
<td>Guided missiles &amp; space vehicles</td>
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<tr>
<td>336415 (P)</td>
<td>Guided missile &amp; space vehicle propulsion unit &amp; propulsion unit parts mfg.</td>
<td>3764</td>
<td>Space propulsion units &amp; parts</td>
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<tr>
<td>336419 (P)</td>
<td>Other guided missile &amp; space vehicle parts &amp; aux. equipment mfg.</td>
<td>3769</td>
<td>Space vehicle equipment NEC</td>
</tr>
<tr>
<td>339113 (P)</td>
<td>Surgical appliance &amp; supplies mfg.</td>
<td>3842-0113</td>
<td>Space suits mfg.</td>
</tr>
<tr>
<td>423860 (P)</td>
<td>Transportation equipment &amp; supplies (except motor vehicle) merchant wholesalers</td>
<td>5088-0300</td>
<td>Aircraft &amp; space vehicle supplies &amp; parts - wholesale trade</td>
</tr>
<tr>
<td>423860 (P)</td>
<td>Transportation equipment &amp; supplies (except motor vehicle) merchant wholesalers</td>
<td>5088-0305</td>
<td>Guided missiles &amp; space vehicles – wholesale trade</td>
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<tr>
<td>423860 (P)</td>
<td>Transportation equipment &amp; supplies (except motor vehicle) merchant wholesalers</td>
<td>5088-0307</td>
<td>Space propulsion units &amp; parts – wholesale trade</td>
</tr>
<tr>
<td>517919 (P)</td>
<td>All other telecommunications</td>
<td>4899-9902</td>
<td>Missile tracking by telemetry or photography</td>
</tr>
<tr>
<td>541712 (P)</td>
<td>Research and development in the physical, engineering, and life sciences (except biotechnology)</td>
<td>3761</td>
<td>Guided missiles and space vehicles</td>
</tr>
<tr>
<td>927110</td>
<td>Space research and technology</td>
<td>9661</td>
<td>Space research and technology</td>
</tr>
<tr>
<td>927110</td>
<td>Space research and technology</td>
<td>4789-9902</td>
<td>Space flight operations, except government</td>
</tr>
</tbody>
</table>

*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.
Note: NEC indicates "not elsewhere classified."

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AEROSPACE: Metro Denver and Northern Colorado Industry Cluster Profile

Aerospace Industry Cluster Relationships

Technologies
- GIS
- GPS
- Nanotechnology
- Photonics
- Remote Sensing

Support Industries
- Aviation
- Computer Storage
- Geospatial
- Government
- Manufacturing
- Software
- Telecommunications

Client Industries
- Aviation
- Geospatial
- Security/Defense
- Telecommunications

Infrastructure
- BioServe Space Technologies
- Colorado Center for Astrodynamics
- CO Photonics Industry Association
- CO Space Business Roundtable
- CO Space Coalition
- CO Space Education Initiative
- CO Space Grant Consortium
- CU-Aerospace Engineering
- CSU-Dept. of Atmospheric Science
- GIS of the Rockies
- NCAR, NOAA, NIST
- National Defense Industrial Assoc.
- CU Boulder RECUV
- Rocky Mountain Technology Alliance
- Space Foundation
- Spaceport CO & Aeronautical Authority
- Space Science Institute

For additional information, contact us:

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email: info@metrodenver.org
www.metrodenver.org

COLORADO SPACE COALITION
For more information on Colorado’s aerospace industry:
303.620.8133
e-mail: info@spacecolorado.org
www.spacecolorado.org

Industry Overview

Colorado’s airport system is a vital and significant contributor to the state’s economy. The state’s robust system of 74 public-use airports supports 265,000 jobs, $12.6 billion in payroll, and generates $36.7 billion in economic output annually. The airports enable economic growth, promote significant development and tourism activities, facilitate commerce and investment, and help to maintain the state’s outstanding quality of life. The state’s largest airport, Denver International Airport (DEN), provides connectivity between the nine-county Metro Denver and Northern Colorado region¹ and serves as one of the busiest airline hubs in the world. The aviation cluster includes companies that manufacture aircraft and provide air transportation services. More specifically, the cluster includes airlines, airports, aircraft manufacturing and technology companies, and support services.

Aviation Economic Profile

The aviation cluster consists of 42, six-digit North American Industry Classification System (NAICS) codes including aircraft manufacturing, passenger and freight air transportation, airport operations, and air traffic control.

With direct employment of 18,470 aviation workers, the nine-county region ranked 11th out of the 50 largest metro areas in 2016. The region ranked 14th for aviation employment concentration.² Roughly 82 percent of Colorado’s aviation cluster employees work in the region.

Aviation Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th></th>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>18,470</td>
<td>1,065,780</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>630</td>
<td>41,150</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>4.6%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>22.4%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>4.1%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>0.8%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>


¹ The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.

² Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest metropolitan statistical areas (MSAs). Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest MSAs.
Aviation Employment

The nine-county region’s aviation employment (18,470 workers) rose 4.6 percent in 2016, compared with the previous year’s level, adding nearly 810 new jobs during the same period. National employment levels increased 1.8 percent over-the-year. The region employs 1.7 percent of the nation’s aviation workforce. Between 2011 and 2016, the region’s aviation employment rose 22.4 percent, compared with 5 percent at the national level. Aviation companies employed 0.8 percent of the region’s total employment base, compared with a 0.6 percent employment concentration nationwide.

About 630 aviation companies operated in the nine-county region in 2016. Nearly 81 percent of the region’s aviation companies employed fewer than 10 people, while 1.3 percent employed 250 or more.
AVIATION: Metro Denver and Northern Colorado Industry Cluster Profile

Nine-County Region Airport Information

The nine-county region’s commercial, reliever, and general aviation airports are major economic catalysts, providing residents and businesses connectivity to worldwide markets and destinations. The state’s largest airport—Denver International Airport (DEN)—generates more than $26 billion for the region annually. Combined, the nine-county region’s airports contribute more than $28 billion to the region’s economy annually, according to the Colorado Department of Transportation’s (CDOT) Division of Aeronautics.

Denver International Airport (DEN)

DEN is a state-of-the-art facility owned and operated by the City and County of Denver. Occupying 53 square miles and located approximately 24 miles northeast of downtown Denver, DEN is the primary airport serving the nine-county region and the state of Colorado. Approximately 35,000 people work at the airport, of which about 1,100 people are employed by the City and County of Denver.

The first, major, new airport to be built in the U.S. in 20 years, DEN has grown from serving 31 million passengers in 1995 to a record 54 million in 2015, marking the second-consecutive year of record-setting traffic in the airport’s history. The airport expects to top 58 million passengers in 2016, setting yet another passenger traffic record. Overall passenger traffic at DEN increased by approximately 8 percent in 2016. November 2016 was the busiest November on record for the airport, with over 4.6 million passengers traveling through DEN. Passenger traffic between January and November 2016 reached a record 53.4 million passengers, which was 8.1 percent higher than the same period of 2015.

DEN provides nonstop service to more than 185 destinations worldwide, including 20 international destinations in eight countries. Over the past several years, the addition of new, nonstop service to international destinations has driven increases in international passenger traffic. Between 2011 and 2015, international passenger traffic increased 27.9 percent from over 1.7 million passengers to nearly 2.2 million passengers. In November 2016, international passenger traffic increased 5 percent year-to-date compared to the same period in 2015. Additionally, international traffic accounted for approximately 4 percent of the airport’s total passenger traffic. The expansion of nonstop flights to international destinations at DEN will continue to support global connectivity, shared innovation, and trade.

Located near the geographic center of the United States, DEN is the only major hub airport within a 500-mile radius. As such, DEN serves as the gateway into Colorado and the Rocky Mountain West and has direct flights to 12 destinations in Colorado, including popular ski resorts, vacation, and business destinations. DEN is the third-largest domestic origination and destination hub in the nation. Additionally, DEN has service to 21 Federally-subsidized Essential Air Service (EAS) routes across the Western and Midwest U.S., making DEN the only air service option for these rural markets. DEN is also a major hub for United, Southwest, and Frontier Airlines.

DEN is also a leading air cargo center and serves as a key distribution hub. Nine cargo airlines and nine major and national carriers currently provide cargo service at DEN, handling over 494.5 million pounds of cargo as of November 2016. With 24-hour operations, the airfield and a 39-acre cargo ramp make freight handling efficient, with no curfews. DEN is home to several world-class cargo companies and support facilities, including FedEx, UPS, Southern Air, DHL, Alpine Air Express, and United Airlines cargo. The U.S. Postal Service facility is also located nearby, providing a wide array of competitive shipping and receiving options. More than 50 freight forwarders and customs brokers operate within 20 miles of DEN.

DEN serves its ever-expanding travel market with six runways, three concourses, 107 gates, and 42 regional aircraft positions. DEN is one of the few major U.S. airports with room to expand its current facilities to accommodate future growth and has capacity for six additional runways, another terminal, and two additional concourses. In 2016, DEN received the prestigious Balchen/Post award for excellence in maintaining operations during challenging winter conditions. The award criteria includes snow and ice control plans, equipment readiness, and overall safety awareness. DEN was named the winner in the category of large commercial airports with more than 200,000 operations annually.

DEN is a global environmental leader and was the first airport in the nation to receive ISO 14001 Environmental Management System certification in 2004. DEN also received the international Airport Carbon Accreditation for measuring and reducing carbon emissions in 2015. Additionally, DEN is a Gold Member of the Colorado Department of Public Health and Environment’s Environmental Leadership Program. The airport continually works to reduce its carbon footprint through a variety of energy-efficient technologies. DEN currently recycles or reuses 21 different types of materials, including approximately 75 percent of collected aircraft deicing fluids. Since 2008, DEN has been committed to investing in on-site renewable energy
and job creation.

These airports support the state and regional economies and support growth, economic development, and hybrid electric vehicles. DEN is undergoing several energy conservation upgrades including replacing older lighting with newer, more efficient lighting and upgrading its heating and air conditioning systems. These upgrades include equipment replacement, decommissioning, and integrating new control technology that will track performance and improve overall system efficiency. DEN's escalators in Jeppesen Terminal and the concourses are equipped with energy-saving motor controllers, resulting in an annual savings of 1.7 million kWh of electricity. The airport continues to install more efficient motors, variable frequency drives, and efficient compressors as appropriate; these systems are currently saving over 6.8 million kWh of electricity annually.

The Federal Aviation Administration (FAA) recognized DEN with a 2016 Regional Administrator Aviation Partnership Award for the airport’s partnership and work with the federal agency’s NextGen and Unmanned Aircraft Systems (UAS) programs. DEN has been at the forefront of developing, testing, and implementing NextGen flight procedures since 2010, and was the first commercial airport to design a truly comprehensive plan of Area Navigation (RNAV) from the beginning that allows aircraft to fly more predictable and smoother approaches into Denver that reduce fuel consumption and residential noise. The award also recognized DEN for its commitment to the FAA’s UAS program, which seeks to safely integrate remotely piloted aircraft into the nation’s airspace system. In 2016, DEN partnered with the FAA to evaluate emerging technology that could one day help airports detect UAS that could be hazardous to aircraft.

Reliever Airports

Three reliever airports—those designated by the FAA to relieve traffic at commercial airports and general aviation airports, and provide other aviation services—are strategically located throughout the nine-county region. These airports support the state and regional economies and support growth, economic development, and job creation.

- **Centennial Airport** (APA) is the premier reliever and business airport in the state to connect people, places and product. Supporting 23 business parks and 6,000-plus businesses in the south metro area, the airport provides all services necessary to compete in the global economy. Located on 1,400 acres, APA is home to four, award-winning fixed-based operators providing all concierge services, a fully staffed 24/7 FAA Air Traffic Control Tower, and on-demand U.S. Customs clearances. APA has a top ranked caterer, a 10,000-foot CAT 1 ILS runway, gateway service to Ronald Reagan Washington National Airport, comprehensive security, and some of the most competitive fuel prices in the country. Services such as air ambulance, law enforcement, charter, fractional, flight schools, and full 24/7 aircraft and powerplant maintenance are based at the airport. APA generates more than $1.3 billion for the region annually, the highest among the state’s general aviation airports.

- **Front Range Airport** (FTG), located six miles southeast of DEN, is one of the largest general aviation airports in the U.S. with 3,200 acres of land. FTG is the region’s only reliever airport without major residential areas nearby and no noise or over-flight impacts, and is convenient to DEN and the entire Metro Denver area with room for significant growth and development. Combined, the land mass of DEN and FTG provide a unique airport complex unlike any other location in the nation. FTG has 1,000 acres for aviation and aerospace development and is adjacent to the 6,500-acre Western Transport business park planned for development to support airport-related commercial and business activities. The airport has the nation’s tallest general aviation tower, which controls two 8,000-foot/CAT 1 ILS full-precision runways and associated taxiway and ramp system. CDOT’s Division of Aeronautics offices, outstanding fixed-based operator and concierge services, exceptional restaurant and full service catering services, aircraft maintenance, flight training, and aircraft hangaring and storage are all available at FTG, supporting military, law enforcement, medical, corporate, and private aircraft operations. Spaceport Colorado will create an aerospace technology park on the airport campus for research and commercial development and the FAA is expected to issue a spaceport operator license in 2017. FTG has an annual economic impact of more than $75 million, supporting 489 jobs with an annual payroll of $32 million.

- **Rocky Mountain Metropolitan Airport** (BJC), located between downtown Denver and Boulder, is the most convenient reliever airport to downtown Denver, and the fourth-busiest airport in Colorado. Averaging more than 140,000 operations each year, BJC has three runways, including a 9,000-foot CAT 1 ILS runway, and offers a user-fee U.S. Customs Office open 24 hours a day. BJC is an FAA Part
AVIATION: Metro Denver and Northern Colorado Industry Cluster Profile

139 Certified Airport with regional air service and large, on-demand aircraft charter. BJC is home to more than 40 aviation companies and flight departments, including the U.S. headquarters of Pilatus Business Aircraft, the U.S. Forest Service tanker base, and the National Center for Atmospheric Research. Located on 1,700 acres, BJC is adjacent to the Interlocken Business Park, the Verve Innovation Park, and the Westmoor Technology Park. A new, state-of-the-art FAA control tower opened in 2012. The airport generates more than $460 million in annual economic impact to the region. In 2016, BJC completed the rehabilitation of its parallel runway, and other various airport improvements. BJC was the first general aviation airport in Colorado to complete a comprehensive sustainability program, which was recognized by Colorado Gov. John Hickenlooper’s office.

General Aviation Airports

Colorado’s general aviation airports support economic vitality and facilitate commerce and air travel needs across the state. Five general aviation airports are located in the nine-county region:

- Boulder Municipal Airport
- Erie Municipal Airport
- Greeley-Weld County Airport
- Northern Colorado Regional Airport
- Vance Brand Municipal Airport

Several projects in the region’s general aviation airports were either underway or received funding in 2016.

- The Greeley-Weld County Airport will expand and remodel its administrative offices. The offices will include a larger board meeting room that will be available to aviation organizations and community groups.
- The Northern Colorado Regional Airport, CDOT Division of Aeronautics, and the FAA are working to implement an innovative remote air traffic control tower project. The project will evaluate and certify a solution for providing air traffic control services for airports at a fraction of the cost. Technology will be used to eliminate the need for costly physical tower facilities, saving millions of dollars.
- Three general aviation airports received state funding from CDOT’s Division of Aeronautics to improve safety and infrastructure at the airports. Vance Brand Municipal Airport received $14,079 to help make $281,590 worth of improvements for pavement rehabilitation and maintenance and Erie Municipal Airport received $23,330 for a $466,670 project to construct a building to house snow-removal equipment. Greeley-Weld County Airport received $250,000 from the state and $5.86 million from the FAA for a $6 million project to repair and improve the airport’s runway.

Metro Denver’s airports receive significant support from the region, especially from CDOT’s Division of Aeronautics and the Metro Denver Aviation Coalition (MDAC). Established in 1991, CDOT’s Division of Aeronautics supports Colorado’s general aviation and regional commercial aviation community through aviation fuel tax revenues, a discretionary aviation grant program, and long-range system planning in partnership with Colorado’s general aviation airports. MDAC is an industry affiliate of the Metro Denver Economic Development Corporation that serves as a private-sector advocate dedicated to the continued growth and development of the region’s aviation industry, including the long-term growth and vision of DEN and Metro Denver’s three reliever and five general aviation airports.

Major Aviation Companies

- Air Methods Corp. [www.airmethods.com](http://www.airmethods.com)
- Air Serv Corp. [www.airservcorp.com](http://www.airservcorp.com)
- American Airlines, Inc. [www.americanairlines.com](http://www.americanairlines.com)
- Delta Air Lines, Inc. [www.delta.com](http://www.delta.com)
- DHL [www.dhl.com](http://www.dhl.com)
- FedEx [www.fedex.com](http://www.fedex.com)
- FlightSafety International Inc. [www.flightsafety.com](http://www.flightsafety.com)
- Heli-One Colorado [www.heli-one.ca](http://www.heli-one.ca)
- Jeppesen [www.jeppesen.com](http://www.jeppesen.com)
- Pilatus Aircraft [www.pilatus-aircraft.com](http://www.pilatus-aircraft.com)
- Signature Flight Support [www.signatureflight.com](http://www.signatureflight.com)
- Simplicity Ground Services [www.simplicityground.com](http://www.simplicityground.com)
- Southwest Airlines [www.southwest.com](http://www.southwest.com)
- Swissport [www.swissport.com](http://www.swissport.com)
Major Aviation Companies Cont’d

- Frontier Airlines
  www.flyfrontier.com
- Great Lakes Aviation
  www.greatlakesav.com
- United Airlines
  www.united.com
- United Parcel Service Inc.
  www.ups.com

2016 Industry Highlights

Denver International Airport Project Updates

Several projects designed to strengthen and grow the economic impact of Denver International Airport (DEN) were either underway or completed in 2016:

- DEN and the Regional Transportation District celebrated the opening of the 23-mile, $1.4 billion University of Colorado A Line, which transports travelers from Denver Union Station to the airport. The train carries passengers to DEN in 37 minutes from Union Station and is expected to transport 18,600 people on the average weekday.
- The new Westin hotel celebrated its one-year anniversary since opening in late 2015, attracting more than 131,000 guests. The hotel is expected to generate $43 million in revenues in 2016. The hotel has received several top hospitality awards since opening and was named as one of the top five airport hotels that are “worth missing your flight for.”
- DEN received a $6 million Federal Aviation Administration (FAA) grant to improve two taxiway areas for commercial airlines. About $2.1 million will go toward replacement of 130 concrete panels on Taxiway EC and $3.9 million will go towards replacing 225 of the 20-by-20-foot panels on the concourse taxiway area.
- A new four-story, 1,821-stall parking garage on the southeast corner of Jeppesen Terminal opened. The $45 million parking garage brings the airport’s total garage spaces to 16,689 and also includes over 15 level-one electric vehicle charging stations.
- DEN was selected as one of the first large airports to implement a new technology called Mobile Passport Control (MPC), the first authorized app to expedite international travelers’ arrival to the U.S. The MPC app allows U.S. citizens and Canadian visitors to submit their passport information and customs declarations form via smartphone or tablet prior to inspection by U.S. Customs and Border Protection.
- DEN completed its second phase of construction to repair 10 bridge structures along Peña Boulevard. The project will repair damaged and deteriorated concrete, including the removal and replacement of concrete bridge curbs and bridge railings.
- DEN contracted with CH2M to provide design and construction administration services for several gate apron rehabilitation and drainage improvements. The three-year project includes pavement evaluations, recommendations, and phased for the program; replacing deteriorating apron pavement, mitigating apron drainage issues and ponding, and preventing water infiltration into the concourse basements; and, conducting utility and infrastructure work.
- DEN installed nearly 10,000 new electrical plug-in points for passengers to charge personal devices throughout the airport. The $4.7 million capital improvement project includes 2,424 power hubs, which provide power options in almost every public seating area on the concourses.
- DEN hosted the Aviation Security Innovation Summit in partnership with the Transportation Security Administration (TSA) in 2016. More than 120 people representing top experts in technology, aviation, security, and other industries converged to identify innovative tools and ideas for developing a new type of security screening experience at DEN that could be replicated at other airports. Ideas generated at the Summit will help inform plans for DEN’s new transformational passenger screening checkpoints under development.

Key Company Announcements

Several airlines and aviation-related companies expanded in 2016:

- United Airlines began renovating the 400,000-square-foot building for its new pilot training facility in Stapleton. The $40 million facility will have 32 simulators and will add simulators for the Boeing 737, Boeing 787, and Airbus 350. When construction is completed in 2017, the facility will add about 200 new jobs.
Several domestic and international airlines began service in DEN and added new nonstop destinations in 2016. Southwest Airlines added 600 new jobs for its Denver operations, part of a 7,000-person company-wide expansion in 2016. New hires included customer service agents, ramp agents, cargo agents, pilots, tech workers, and off-site customer representatives.

Virgin America opened a customer contact center in Aurora and will hire 100 employees. The company also plans to hire 40 employees to support its operations at DEN, including ticketers, baggage handlers, and customer service agents.

Frontier Airlines plans to hire 150 cabin crewmembers and will add at least 200 flight attendant and pilot jobs. The airline is retiring A319 planes, which need three flight attendants, and replacing them with A320s and A321s, which need four or five attendants. The airline will grow from 63 planes in 2016 to 120 planes by 2021.

Southwest Airlines added 600 new jobs for its Denver operations, part of a 7,000-person company-wide expansion in 2016. New hires included customer service agents, ramp agents, cargo agents, pilots, tech workers, and off-site customer representatives.

Pilatus Business Aircraft Ltd. broke ground on a new $22 million, 118,000-square-foot facility that will replace and expand its operations in unincorporated Jefferson County. The company’s new facility at Rocky Mountain Metropolitan Airport’s Verve Innovation Park is slated for completion in 2018 and will provide aircraft completion support for the Pilatus PC-12 and the PC-24 aircraft. The project will nearly double employment and will add more than $3 million in capital investment to Jefferson County.

Travelport Worldwide Limited plans to consolidate the company’s three existing U.S. technology hubs in Denver, Atlanta, and Kansas City into two centers of excellence in Metro Denver and Atlanta. The consolidation will enhance and optimize the company’s operational and technological efficiency. Travelport operates a travel commerce platform that connects the world’s leading travel providers with online and offline travel agencies and other travel buyers.

A partnership inked between Frontier Airlines, Great Lakes Airlines, and Silver Airways is expected to boost Frontier’s pool of pilots and create opportunities for Metropolitan State University of Denver (MSUD) students. The agreement implements defined career paths for pilots that have gained some experience at small airlines. The partnership pairs well with an agreement between MSUD and one of the regional carriers that provides guaranteed job interviews to graduates and seniors in the program.

Silicon Valley startup Boom Technology Inc. chose Centennial Airport to relocate and develop a supersonic airplane that can travel between London and New York in as little as 3.4 hours. Boom’s proposed designs would employ carbon fiber composites, advanced propulsion systems, and proven airframe materials to bring lower cost and affordability to the supersonic flight market.

Denver-based startup XTI Aircraft Company has taken several steps toward flying its first vertical takeoff airplane prototype. The company raised $1 million in an equity crowdfunding initiative for its TriFan 600 airplane development plan. The TriFan 600 is a six-seat aircraft that will utilize three ducted fans to vertically takeoff, transition to a 400 mph cruising speed, and fly up to 1,600 miles. The company also signed an agreement with Fort Collins-based Scion Aviation and Scion UAS for prototype development, and Honeywell International will supply engines for the prototype.

Airline Service Additions
Several domestic and international airlines began service in DEN and added new nonstop destinations in 2016.

DEN celebrated the launch of nonstop service from Denver to Munich, Germany on Lufthansa Airlines. The flight increases capacity between Denver and Europe by 15 percent and provides access to one of the most popular cities in Europe. The flight will shift from operating five days a week to daily in March 2017 and represents the first time the 236-seat Airbus A330-300 aircraft has been scheduled for regular service at DEN. In May 2017, the flight will use 297-seat Airbus A340-600 aircraft. The additional flights are a result of increased ridership by nearly 50 percent in mid-2016.

Southwest Airlines will launch nonstop service between Denver and Belize City between March 11 and April 22, 2017. The flight will be offered once a week on Saturday, and in June 2017 will be offered twice a week on Saturday and Sunday.

PenAir, a new airline to Denver, took over routes from Great Lakes Airlines to Dodge City and Liberal, Kansas offering 12 routes per week and will begin service to the Nebraska cities of Kearney, North Platte, and Scottsbluff. PenAir won a bidding process to receive federal subsidies to serve the cities as Great Lakes Airlines faced pilot shortages and reduced capacity.

Icelandair will add two nonstop flights per week between Denver and Reykjavik, Iceland in the summer of 2017. The airline will offer its “stopover buddy” program, which connects Icelandair travelers with an airline employee to help navigate the city. The increased service is the first time in DEN’s history that a carrier has operated more than one daily flight to the same trans-Atlantic destination.

Two airlines began service between DEN and Monterrey, Mexico. Volaris Airlines inaugurated the first year-round nonstop flight in December 2016 and Aeroméxico will also launch weekend nonstop service between the two cities from December to January each year. The route will solidify business and
tourism between the two cities where passenger traffic has nearly doubled since 2009. Monterrey is Mexico’s third-largest city with 4.4 million residents.

- Virgin America, a new carrier at DEN, launched a new daily direct flight from DEN to San Francisco. Denver has become the most requested destination by Virgin’s corporate clients.
- Air Canada began new, nonstop service from DEN to Montreal, Canada in June, improving service to what was Denver’s largest Canadian market and fourth-largest international market without nonstop service. The daily year-round flights will serve nearly 35,000 passengers annually.
- Air Canada will launch new service between DEN and Vancouver, Canada beginning in May 2017. Flights will operate twice per day through September 2017, and will operate once daily throughout the remainder of the year. Vancouver ranks as Denver’s second-largest market in Canada, behind only Toronto. Nearly 200 people per day travel between the two cities, and the market has grown by 7 percent over the past year.
- Sun Country Airlines returned to Denver with nonstop daily service between DEN and Minneapolis/St. Paul, Minn. Sun Country will be the sixth airline offering service between the cities.
- Low cost carrier, Allegiant Air, began service from DEN to Montrose, Colo. The addition of another affordable seasonal flight to Montrose will give tourists and travelers improved access to recreational opportunities and create stronger regional connections in Colorado.

**Service Milestones**

Several airlines at DEN celebrated notable service milestones in 2016:

- Southwest Airlines celebrated 10 years of service at DEN and commands 30 percent of market share at the airport. The airline currently employs 3,000 workers in Denver and plans to hire additional workers.
- JetBlue Airways has served DEN for 15 years, transporting more than 3.4 million passengers and providing more than 28,000 nonstop flights. JetBlue places special emphasis on customer service and has topped the J.D. Power North American Satisfaction Study for 12 years.
- Lufthansa German Airlines celebrated its 15th year at DEN, providing over 11,500 nonstop flights and serving more than 3.2 million passengers. Lufthansa’s flights serve as a key gateway to Europe through Frankfurt, Germany. More than 120 people travel between the cities daily.

**Cross-Cluster Convergence**

Collaboration across the state’s industries including healthcare, energy, and aviation has fueled innovation, discoveries, and advancements.

- The Center of Excellence for Advanced Technology Aerial Firefighting (CoE) was established by the Colorado Department of Public Safety in 2015 to research, test, and evaluate existing and new technologies that support sustainable, effective, and efficient aerial firefighting techniques. Areas of project focus include: night aerial firefighting operations, effective utilization of drone technology, satellite messenger evaluation and deployment, air-to-ground data links, and advancing mapping techniques using geospatial technologies.
- Englewood-based Flight For Life Colorado and CHC will launch a new critical care helicopter in 2017 to transport and care for small children. Supplied by Englewood-based Air Methods Corp., the Airbus H130 T2 helicopter will have more interior space for an incubator and will be staffed by teams trained in neonates and children. The Airbus will transport patients within a 120-mile radius to all of CHC’s facilities in the region.
- Alaska Airlines operated the first-ever commercial flight using Englewood-based Gevo Inc.’s renewable alcohol-to-jet (ATJ) fuel. ATJ biofuel was approved for use by the American Society for Testing and Materials International in March 2016 and is the first aviation biofuel to be certified and approved since 2011.
- Gevo reached a deal with Deutsche Lufthansa AG to supply the airline with up to 8 million gallons of ATJ fuel per year. The five-year deal would supply the airline with about 40 million gallons of fuel.

**Spaceport Colorado**

Colorado is actively working to establish horizontal launch capabilities in the state. In 2016, Front Range Airport continued the application process for certification from the FAA to operate as a horizontal-launch spaceport facility. The subsequent designation for Spaceport Colorado, which may be granted in 2017, fulfills a 2011 declaration by Gov. John Hickenlooper of Colorado’s intent to become a spaceport state. These efforts
will increase Colorado’s competitiveness in the aerospace industry and support new opportunities in the future growth of commercial space research and transportation. Plans for Spaceport Colorado include the development of an aerospace and technology park to support a broad range of activities and commercial opportunities, including research and development, testing and evaluation, manufacturing, crew training, scientific research, commercial space and aerospace education, suborbital flight, and point-to-point travel. Spaceport Colorado has an abundance of surrounding land and convenient access to DEN and the state’s sizeable aerospace industry, research universities, and talented aerospace workforce.

Unmanned Aircraft Systems (UAS)

The nine-county region is a leader in UAS research and development. In addition to the wealth of academic expertise, Colorado also has a vibrant base of commercial and military UAS activities and receives strong support from its aerospace industry. The variety of airspace, environmental conditions, and terrain provide an ideal geographic location for federal, state, and private UAS research and operations, and the region is actively working to further expand its UAS assembly, launch, and operational test areas. With UAS representing a growing portion of the nation’s military budget, and commercial UAS operations set to expand rapidly, the U.S. Congress is encouraging the integration of UAS into the National Airspace System (NAS), which presents Colorado job growth and economic impact opportunities. The region’s UAS assets and key project announcements in 2016 included:

UAS Assets

- The Research and Engineering Center for Unmanned Vehicles (RECUV) at the University of Colorado Boulder (CU Boulder) is a university, government, and industry partnership dedicated to developing and integrating unmanned vehicle systems. RECUV engineers new mobile sensing systems, stimulates strategic discussions among leaders, increases public awareness of UAS, and educates and trains the next generation of engineers. RECUV is a pioneer in the nomadic use of unmanned aircraft and deploys systems in full compliance with FAA regulations. RECUV has more than 28 FAA Certificates of Authorization (COAs), exceeding any other U.S. university. RECUV is also home to the Indoor Flying Robot Lab inside the new RECUV Aerorobotics Lab. The RECUV Robot Sensor Network is comprised of a team of iRobot Create robots and Smart Quadrotor Unmanned Autonomous Demonstrator aerial robots equipped with onboard sensors, computation, and wireless networking. RECUV's mobile Ground Control Station is a command, control, and communications center housed inside a customized 15-passenger van and provides direct UAS command and control. The Unmanned Vehicle Systems Integration Lab is located in CU Boulder’s College of Engineering and Applied Science’s Discovery Learning Center, which includes computing facilities, electronics work stations, and test equipment-enabled hardware/software integration. The Unmanned Systems Fabrication Lab, located in the Engineering Center, provides software design tools, machine, and power tools for unmanned vehicle design and construction.
- The University of Denver’s Unmanned Systems Research Institute (DU²SRI) promotes knowledge, education, research, and development in unmanned systems, and is pushing forward the frontiers of unmanned systems to develop the next generation of fully autonomous UAS. The DU²SRI infrastructure includes five unmanned ground vehicles, one all-terrain mobile robot, more than 17 (electric and non-electric) unmanned helicopters and quadrotors, FAA-approved simulators, electronics design and fabrication capabilities, and complete UAS design and testing.
- The U.S. Geological Survey’s (USGS) National Unmanned Aircraft Systems Project Office, located in Denver, leads and coordinates USGS efforts to promote and develop UAS technology for civil and domestic applications. These efforts will directly benefit the U.S. Department of the Interior and USGS missions, including access to an increased level of persistent monitoring of earth surface processes (e.g. forest health conditions, monitoring wildfires, earthquake zones, and invasive species) in previously difficult to access areas.
- Metro Denver’s UAS industry benefits from close proximity to high altitude test sites which afford access to mountainous terrain, agriculture, valleys, and rivers. These include the Chaffee County UAS test area, and an 8,000-square-mile air space in the San Luis Valley where testing can be conducted to heights of up to 15,000 feet.
- UAS Colorado is a non-profit business league, committed to promoting and improving the aerospace industry in Colorado, particularly supporting the safe integration and use of UAS throughout the state for the benefit of the public. The group provides organizational structure and support for UAS professionals, advocates for public policy that supports UAS industry development in Colorado, promotes the safe, professional operation of UAS sites in Colorado, and conducts public awareness
and public relations campaigns to help the general public understand the use and importance of UAS in Colorado.

- The Rocky Mountain Chapter of Association for Unmanned Vehicle Systems International (AUVSI) provides leadership to promote the growth of UAS across the Rocky Mountain Region through advocacy, education, and networking. The Chapter is also dedicated to promoting the safe and legal operation of unmanned vehicles regardless of the medium within which they operate. The Chapter and UAS Colorado host the Annual Rocky Mountain Unmanned Symposium, a two-day event intended to bring together industry, government, educational institutions, and industry professionals to provide seminars, panel discussions, drone demonstrations, networking events, and industry vendor exhibits.

**Key Project Announcements**

- Broomfield-based Mountain Aviation received FAA approval to fly UAS. The company is the first FAA-certified airline authorized to conduct commercial UAS operations and plans to offer UAS services for aerial mapping, agricultural support, industrial inspections, aerial video, search and rescue, energy system inspections, and forestry and wildlife monitoring.
- Fort Collins-based Scion UAS partnered with Adsys Controls as a supplier for gimbaled EO/IR payloads for their helicopter systems. The companies will integrate the Arrow 600 EO/IR Gimbal onto the SA-200 Weasel autonomous helicopter system. The Arrow 600 is a precision stabilized six-inch gimbal that provides high image quality, pointing precision, and video processing features that are normally only found in larger and more costly gimbals. On-board, high definition video processing provides multi-target tracking, digital video stabilization, and video encoding.

**Aviation Workforce Profile**

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.
AVIATION: Metro Denver and Northern Colorado Industry Cluster Profile

The nine-county region’s aviation industry employs 18,470 people and includes a large pool of talented, well-educated, and highly skilled workers. The aviation cluster has a larger share of employees (44.1 percent) that are between the ages of 45 and 64 years old, compared with the age distribution across all industries in the region (37.7 percent).

The aviation workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest aviation occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages

The 2015 average annual salary for aviation employees in the nine-county region was $60,520, compared with the national average of $70,130. Total nine-county payroll in the aviation cluster reached nearly $1.1 billion in 2015.

### Metro Denver and Northern Colorado Aviation Occupation & Salary Profile, 2016

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
<td>$97,749</td>
<td>$126,953</td>
</tr>
<tr>
<td>2. Civil engineers</td>
<td>6,658</td>
<td>166</td>
<td>432</td>
<td>$79,090</td>
<td>$51,540</td>
<td>$63,488</td>
<td>$102,053</td>
<td>$132,166</td>
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<tr>
<td>3. Flight attendants</td>
<td>3,056</td>
<td>241</td>
<td>0</td>
<td>$44,441</td>
<td>$28,208</td>
<td>$39,686</td>
<td>$60,621</td>
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<tr>
<td>4. Airline pilots, copilots, &amp; flight engineers</td>
<td>326</td>
<td>234</td>
<td>80</td>
<td>$165,661</td>
<td>$90,730</td>
<td>$132,828</td>
<td>$206,834</td>
<td>$281,334</td>
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<tr>
<td>5. Information &amp; record clerks, all other</td>
<td>6,812</td>
<td>743</td>
<td>0</td>
<td>$40,391</td>
<td>$27,893</td>
<td>$33,188</td>
<td>$49,073</td>
<td>$60,621</td>
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<tr>
<td>6. Painters, construction &amp; maintenance</td>
<td>5,460</td>
<td>710</td>
<td>6</td>
<td>$34,475</td>
<td>$25,417</td>
<td>$30,182</td>
<td>$42,551</td>
<td></td>
</tr>
<tr>
<td>7. Mechanical engineers</td>
<td>5,533</td>
<td>138</td>
<td>721</td>
<td>$85,096</td>
<td>$56,118</td>
<td>$112,174</td>
<td>$141,503</td>
<td></td>
</tr>
<tr>
<td>8. Computer occupations, all other</td>
<td>7,623</td>
<td>130</td>
<td>1,353</td>
<td>$92,053</td>
<td>$52,876</td>
<td>$71,741</td>
<td>$129,193</td>
<td></td>
</tr>
<tr>
<td>9. General &amp; operations managers</td>
<td>31,830</td>
<td>2,642</td>
<td>6,292</td>
<td>$112,133</td>
<td>$50,365</td>
<td>$73,238</td>
<td>$174,412</td>
<td>$254,484</td>
</tr>
<tr>
<td>10. Secretaries &amp; administrative assistants, except legal, medical, &amp; executive</td>
<td>45,568</td>
<td>4,967</td>
<td>45</td>
<td>$37,664</td>
<td>$24,083</td>
<td>$29,685</td>
<td>$45,347</td>
<td>$53,942</td>
</tr>
</tbody>
</table>

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works! QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.
AVIATION: Metro Denver and Northern Colorado Industry Cluster Profile

Education & Training

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest aviation occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via http://highered.colorado.gov.

- Colorado State University
  www.colostate.edu
- Metropolitan State University of Denver
  www.msudenver.edu
- University of Denver
  www.du.edu
- Colorado State University Global Campus
  www.colostate.edu
- Redstone College
  www.redstone.edu
- University of Northern Colorado
  www.unco.edu
- Colorado School of Mines
  www.mines.edu
- Regis University
  www.regis.edu
- Front Range Community College
  www.frontrange.edu
- University of Colorado: Boulder, Denver
  www.cu.edu

Key Reasons for Aviation Companies to Locate in the Nine-County Region

The region is a top aviation location offering:

1. A prime air transportation location
   - Denver International Airport (DEN) was the sixth-busiest airport in the nation and 19th-busiest worldwide in terms of passenger traffic in 2015. (U.S. Bureau of Transportation Statistics, 2016; Airports Council International 2016; and Denver International Airport, 2016)
   - Metro Denver’s central U.S. location on the 105th meridian at the midpoint between Tokyo and Frankfurt makes it a strategic choice for conducting national and international business. (Metro Denver Economic Development Corporation)
   - Encompassing 53 square miles, DEN is the largest airport site in North America and the second-largest in the world. DEN has the ability to double its facilities to serve 100 million passengers a year, with an additional 9,000 acres available for development. (Denver International Airport, 2016)
   - DEN’s six non-intersecting runways offer a competitive advantage for businesses relying on speed to market, with six additional runways approved to meet future global demand. DEN is home to the longest commercial runway in the nation, one of the reasons it is certified to handle Airbus 380 operations. (Denver International Airport, 2016)
   - DEN ranked as the sixth-most affordable airport in the nation in 2016. The average base airfare declined 58 percent from $582 in 2012 to $242 in 2016. (Cheapflights.com, 2016)
   - DEN had the lowest average domestic airfare among the nation’s seven largest airports in the second quarter of 2016 and the second-lowest in DEN’s history. The average domestic fare at DEN was $309.67 in 2016, a decrease of 8.4 percent from the same period in 2015. (U.S. Bureau of Transportation Statistics, 2016)
   - DEN ranked third among the “100 Best U.S. Airports” and earned the top rank in modernity in 2016. (Travel Pulse, 2016)
   - DEN ranked ninth among the world’s best airports serving more than 50 million passengers a year, the highest of the U.S. airports. DEN also ranked among the top five for the best regional airport in North America (first), the best airport in North America (second), the best domestic airport (second), the world’s best regional airport (third), and the best airport staff in North America (third). (Skytrax, 2016)
   - DEN ranked fourth among national large-hub airports for ease of getting to the terminal in 2016. (Phoenix Marketing International, 2016)
   - Three general purpose Foreign Trade Zones in Metro Denver and Northern Colorado allow manufacturers using imported parts and materials to expedite customs and reduce or eliminate fees
and tariffs. The three zones are located near the former Stapleton Airport, one at the former WorldPort at DEN, and one at the Great Western Industrial Park in Windsor. (City and County of Denver)

2. **Lower overall costs of doing business**
   - Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)
   - Aircraft manufacturers or companies that are involved in the maintenance and repair, completion, or modification of aircraft located in aviation development zones can qualify for a state income tax credit of $1,200 per new full-time employee in tax years between 2006 and 2023. (Colorado Department of Revenue)
   - Colorado provides sales and use tax exemptions for on-demand air carriers and eligible aircraft that on-demand air carriers utilize only for the purpose of final assembly, maintenance, modification, or completion of the aircraft manufacturing process. (Exemption clarified in Colorado House Bill 14-1374)
   - The City and County of Denver supports a business-friendly climate for aviation companies. The city provides sales and use tax exemptions on aviation parts. (The City and County of Denver, 2016)
   - Colorado's fly-away sales tax exemption on planes manufactured in Colorado, a valuable incentive for aircraft manufacturers, applies to aircraft built in Colorado but housed in another state. (State of Colorado, Office of the Governor)
   - Metro Denver ranked No. 1 among Forbes' 2016 “Best Places for Business and Careers” for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (Forbes, 2016)
   - Colorado ranked No. 3 in CNBC's annual "America's Top States for Business" in 2016. The state earned top-10 rankings in the categories that measure workforce (first), the economy (second), technology and innovation (eighth), access to capital (eighth), and business friendliness (ninth). (CNBC, 2016)
   - Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)
   - Metro Denver office rental rates averaged $29.52 per square foot in the fourth quarter of 2016, making the region's office market highly competitive with other major markets in the U.S. (CoStar Realty Information, The CoStar Office Report, 4Q 2016)

3. **Access to aviation-related training programs**
   - The Aviation and Aerospace Science Department at Metropolitan State University of Denver (MSUD) is one of the largest and most advanced collegiate aviation programs in the country. The Robert K. Mock World Indoor Airport, located on campus, is one of the world's premier collegiate aviation and aerospace computer and flight simulation training laboratories. Further, MSUD’s Precision Flight Team has been recognized as one of the top collegiate aviation programs in the United States.
   - Opening in 2017, MSUD's new Aerospace and Engineering Sciences Building will revolutionize aerospace and advanced manufacturing education in Colorado by integrating aviation and aerospace-related programs into a state-of-the-art facility for training workers skilled in advanced aerospace design, manufacturing, and assembly.
   - The Envoy Pilot Pipeline Program at MSUD provides a direct pathway for students to earn flight hours needed to become an Envoy/American Airlines first officer while attending school. Students with a minimum of sophomore status will eventually progress to American Airlines when positions open. (Metropolitan State University of Denver, 2016)
   - The nine-county region offers more than 20 flight training schools at Boulder Municipal Airport, Centennial Airport, Erie Municipal Airport, Northern Colorado Regional Airport, Front Range Airport, and Rocky Mountain Metropolitan Airport. These schools provide pilot training, aviation instruction, and certification programs. (Metropolitan State University of Denver, 2016)
   - Aims Community College and MSUD are among 35 schools in the nation approved under the Federal Aviation Administration’s Air Traffic Collegiate Training Initiative. (Federal Aviation Administration, 2016)
   - Aims Community College offers the only degree-based helicopter program in the state. In partnership with Front Range Helicopters in Loveland—Colorado’s largest helicopter flight training school—students can complete their flight training while earning an Associate of Applied Science degree. (Aims Community College, 2016)
4. An overall better quality of life

- Metro Denver ranked as the third-fittest metropolitan area in the U.S. in 2016. Increased physical activity, low obesity and diabetes rates, and access to recreational opportunities contributed to its high rank. (American College of Sports Medicine, 2016)
- Outdoor recreation is a fundamental component to Colorado’s healthy, active lifestyle and generates a $34.5 billion economic impact annually. The state has the fourth-highest percentage of state land area devoted to national forests and public lands, more than 70 state parks and wilderness areas, and is home to the highest concentration of 13,000 and 14,000-foot peaks in the nation. (Colorado Tourism Office, 2016)
- Denver ranked No. 1 among U.S. News & World Report’s 2016 “Best Places to Live.” Denver’s healthy job market and access to the outdoors contributed to its notable rank. (U.S. News & World Report, 2016)
- Denver ranked among the top 10 best cities for millennials (ages 25-34) out of 227 cities with a population over 100,000 in 2016. (Niche.com, 2016)
- Highlands Ranch ranked sixth in MONEY Magazine’s 2016 “Best Places to Live” list. Centennial (13th) and Broomfield (25th) were also named to the list’s top-25. (MONEY Magazine, 2016)
- Denver ranked fifth among the “2016’s Best Large Cities to Live In.” Denver scored first for livability and third for local economy and taxes. (WalletHub, 2016)
- FasTracks is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.
- Metro Denver’s moderate temperatures, low humidity, and sunshine on almost 70 percent of the days each year provide an ideal climate for residents. (U.S. National Oceanic and Atmospheric Administration, National Climatic Data Center, 2016)

### Aviation Industry Cluster Definition

<table>
<thead>
<tr>
<th>NAICS Code*</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>238320 (P)</td>
<td>Paint &amp; wall covering contractors</td>
<td>1721-0301</td>
<td>Aircraft painting</td>
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<td>Carpet &amp; rug mills</td>
<td>2273-0100</td>
<td>Aircraft &amp; automobile floor coverings</td>
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<td>314110 (P)</td>
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<td>NAICS Description</td>
<td>SIC Code</td>
<td>SIC Description</td>
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<td>(P) Petroleum &amp; petroleum products merchant wholesalers (except bulk stations &amp; terminals)</td>
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<td>926120</td>
<td>(P) Regulation &amp; admin of transportation programs</td>
<td>9621-01</td>
<td>Airports, aviation agencies</td>
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</tbody>
</table>

*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.
Note: NEC indicates "not elsewhere classified."
Aviation Industry Cluster Relationships

**Technologies**
- Flight Simulation
- GPS
- GIS
- Photonics
- Radar
- UAS

**Support Industries**
- Food Service
- Geospatial
- Government
- Hotels
- Maintenance
- Manufacturing
- Rail
- Security
- Trucking
- Warehousing

**Client Industries**
- Aerospace
- Air Ambulance
- Business Travelers
- Cargo/Couriers
- Distribution
- Firefighting
- Government
- Tourism/Consumers
- Warehousing

**Infrastructure**
- CO Airport Operators Assoc.
- CO Aviation Business Assoc.
- CO Civil Air Patrol
- CO Dept. of Transportation – Aeronautics Division
- CO Pilots Assoc.
- Flight Training Schools
- Metro Denver Aviation Coalition
- Metropolitan State University of Denver
- Redstone College of Aviation Tech

For additional information, contact us:

Metro Denver Economic Development Corporation
1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenver.org
www.metrodenver.org

For more information on the region’s aviation cluster:

303.620.8083
email: info@metrodenver.org
www.metrodenver.org/MDAC

Industry Overview

Colorado’s traditional beverage cluster has expanded rapidly in recent years owing to the thriving innovation and entrepreneurial culture in the region, combined with market demand for craft and organic products. Companies in the beverage production cluster manufacture malt beverages, wines, distilled liquors, bottled drinks, and ice products. The beverage production cluster supports business activities in several other industry sectors including agriculture, energy, and bioscience as similar production processes and raw materials are used. Though not specifically included in this cluster, ancillary services such as bottle and can manufacturing are readily available in the nine-county Metro Denver and Northern Colorado region. Facilities include Ball Corporation’s Metal Beverage Packaging Division in Golden, Wild Goose Canning Systems in Boulder, and the O-I glass manufacturing plant in Windsor.

The beverage production cluster in the region is one of the region’s fastest growing clusters. Between 2011 and 2016, employment in the region’s beverage production cluster rose 28.1 percent, compared with 28.8 percent nationally. In 2016, the beverage production industry was the region’s second-fastest growing industry by employment, rising 7.5 percent.

The region has a lengthy history as a leader in beverage production, particularly in America’s craft beer revolution and is often recognized as the “Napa Valley of Beer.” The MolsonCoors Brewery was founded in Golden in 1873 by German brewer Adolph Coors and business partner and investor Jacob Schueler. His amber concoction, brewed with fresh Rocky Mountain water from 44 surrounding natural springs, became a favorite among locals earning its name “Miner’s Banquet.” With more than 450 years of combined brewing heritage, MolsonCoors has become the third-largest single brewer in the world producing brands including Coors Banquet, Coors Light, Miller Light, Blue Moon, Molson, and Leinenkugel. Fort Collins is home to Anheuser-Busch InBev, which opened a brewery in 1988, and runs distribution companies in Colorado. Anheuser-Busch InBev has purchased Breckenridge Brewery, entering the craft beer market in the state.

The region is also home to both large and small breweries, soft drink manufacturers, and numerous wineries, distilleries, and ciders. Celestial Seasonings in Boulder is one of the nation’s largest herbal-tea manufacturers. Denver-based WhiteWave Food’s Horizon brand is the biggest branded milk in the overall U.S. milk market with 5.4 percent share and captures nearly 25 percent of the organic milk market. Major beverage distributors are also located in the region including Pepsi-Cola, Coca-Cola, and 7-Up Bottling Co.

Several trends are shaping the beverage production cluster and driving new product offerings. Evolving consumer tastes and a focus on locally-sourced products continue to change the industry. Large producers have yielded significant market share as consumer preferences shift away from mass-market goods toward specialty beverages. Further, botanicals, floral notes, and savory, sour, and bitter ingredients are driving increasingly popular flavor profiles in beverages. For example, fermented beverages such as kombucha are gaining in popularity in the region. Consumers will continue to opt for a growing variety of craft-style products due to their local flair, quality ingredients, and variety of style offerings, which is supporting increasing growth in the beverage production industry.

The region’s beverage producers utilize locally-sourced ingredients including hops, barley, and yeast. The state’s hop acreage has increased from 125 acres in 2015 to about 200 acres in 2016, which has changed the nature of local, fresh-hopped beers, and celebrations of the style. Denver’s annual Fresh Hop Fest showcases a variety of fresh hopped beers created by breweries from across the nation. Several companies in the region provide an abundant supply of grains, malted barley, and yeast. Fort Collins-based Colorado Malting and Troubadour Maltings deliver malted barley for smaller beer makers and custom-malt some of the barley to suit

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1 The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
specific beers at specific locations. Denver-based Inland Island Yeast Laboratories is the fourth national yeast supplier and has about 300 strains, delivering twice the yeast cells as its competitors.

Craft breweries represent an increasing share of the region’s beverage production industry. According to the Brewers Association, Colorado ranked third in the nation for the number of craft breweries in 2015, with more than 280, including New Belgium Brewing Company, Oskar Blues Brewing, Boulder Beer Company, and many others. Further, Wynkoop Brewery in Denver is widely regarded as the start of the brewery revolution in the city. Colorado is home to about 12 percent of the nation’s craft breweries and the state ranked third in the amount of craft beer produced each year, totaling nearly 1.8 million barrels of craft brew. According to the Leeds School of Business at the University of Colorado, the economic impact of craft beer in Colorado rose 44 percent between 2014 and 2015 to $1.7 billion. Additionally, craft brewers in the region continue to grow their international presence.

The region is home to numerous beverage and craft beer festivals. The national Brewer’s Association, located in Boulder, hosts the annual Great American Beer Festival (GABF) in Denver. The GABF is one of the largest commercial beer competitions and beer festivals in the world. The 35th annual event in 2016 attracted 60,000 attendees and more than 7,200 beers from a record 780 breweries. The event also coincided with an estimated 200 events at Metro Denver bars, breweries, restaurants, and music halls. More than 40 percent of attendees were from outside of Colorado and had an economic impact of an estimated $28.6 million. Colorado brewers won 38 medals at the 2016 GABF, the second highest medal count of the event. Additionally, Colorado Brewers’ Festival in Fort Collins is the largest outdoor brewing festival in Colorado and one of the highest-profile events of its kind in the nation, drawing over 20,000 people. South Denver Beer Fest in Littleton features over 60 local and national breweries offering more than 200 craft beers, wines, ciders, and more.

The craft distillery movement is underway in the region. Nearly 25 craft distilleries offer handcrafted rums, vodkas, whiskeys, gins, and a variety of liquors that boast farm-fresh ingredients and unique bottling methods. Stranahan’s Colorado Whiskey in Denver, the first microdistillery in Colorado, was one of the nation’s early craft whiskey distillers. Leopold Bros. is a family-owned and operated distillery in Denver and mills, mashes, and ferments all the grains in their spirits. The company has the largest traditional floor malting room of any distillery in the nation, where they malt Colorado barley onsite. Downslope Distillery in Centennial currently produces 10 regular products that are shipped to seven states. The company has won dozens of national and international awards for its products.

The region is home to nearly 60 licensed commercial wineries and meaderies. While the state's grape growing is concentrated along the Western Slope, the region's winemakers often purchase grapes from vineyards in the Grand Valley and have grapes delivered to the winery during harvest to be crushed, pressed, and fermented onsite. Further, the region's burgeoning wine industry generates significant economic activity annually for wine-based tourism and extends beyond Metro Denver and Northern Colorado, supporting economies outside the Front Range. According to the Colorado Wine Industry Development Board, local wineries produced more than 148,400 cases of wine in 2015, totaling $29.7 million in sales. Among the state's wine regions, the Front Range produced the largest volume of wine in 2015. In total, local wineries contribute $144 million to the state's economy. The industry sustained an average annual growth of 12 percent over the last 23 years. The wine industry also hosts several events to showcase its products. In June 2016, Broomfield hosted the 12th annual Denver International Wine Competition, the largest professionally judged event in the Rocky Mountain region. The Winter Wine Fest celebrated the region's local wine scene in Denver's River North neighborhood. The curated wine event and festival featured over 15 local wineries.

The region's craft ciders are growing rapidly and expanding their innovative products. About a dozen cider makers operate in Colorado, with the majority operating along the Front Range. Additionally, there is significant growth within the cider community to revive older orchards to supply the flourishing industry. Like craft beer, consumers are attracted to the newer, bolder, and drier products. Several Metro Denver festivals including Lakewood Cider Days and Morrison Ciderfest celebrate the local craft cider culture. In 2016, the Rocky Mountain Cider Association hosted the inaugural Colorado Cider Week in May.

**Beverage Production Economic Profile**

The beverage production industry cluster is defined by 12, six-digit North American Industry Classification System (NAICS) codes including malt beverages, wines, distilled liquors, and bottled drinks ranging from milk, water, and coffee to soft drinks, tea, sports drinks, and fruit juices.
BEVERAGE PRODUCTION:
Metro Denver and Northern Colorado Industry Cluster Profile

The nine-county region ranked second out of the 50 largest metro areas in beverage production employment concentration in 2016, up one position from the prior year. With direct employment of about 9,300 beverage production employees, the region ranked fourth. Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.

Beverage Production Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>9,300</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>210</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>7.5%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>28.1%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>5.1%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>0.4%</td>
</tr>
</tbody>
</table>


Beverage Production Employment

The nine-county region’s beverage production employment (9,300 workers) rose 7.5 percent in 2016, compared with the previous year’s level, adding nearly 650 new jobs during the same period. National employment levels increased 8.3 percent over-the-year. The region employs 2.8 percent of the nation’s beverage production workforce. Between 2011 and 2016, the region’s beverage production employment rose 28.1 percent, compared with 28.8 percent at the national level. Beverage production companies employed 0.4 percent of the region’s total employment base, compared with a 0.2 percent employment concentration nationwide.

About 210 beverage production companies operated in the nine-county region in 2016. Approximately 60 percent of the region’s beverage production companies employed fewer than 10 people, while 4.8 percent employed 250 or more.
BEVERAGE PRODUCTION:
Metro Denver and Northern Colorado Industry Cluster Profile

Major Beverage Production Companies

- Allegro Coffee Company
  [www.allegrocoffee.com](http://www.allegrocoffee.com)
- Anheuser-Busch InBev
  [www.anheuser-busch.com](http://www.anheuser-busch.com)
- Avery Brewing Co.
  [www.averybrewing.com](http://www.averybrewing.com)
- Celestial Seasonings
  [www.celestialseasonings.com](http://www.celestialseasonings.com)
- Coca-Cola Company
  [www.coca-colacompany.com](http://www.coca-colacompany.com)
- Dr. Pepper Snapple Group (7-Up Bottling)
  [www.drpeppersnapplegroup.com](http://www.drpeppersnapplegroup.com)
- Eldorado Springs Water
  [www.eldoradosprings.com](http://www.eldoradosprings.com)
- Fort Collins Brewery
  [www.fortcollinsbrewery.com](http://www.fortcollinsbrewery.com)
- MolsonCoors
  [www.molsoncoors.com](http://www.molsoncoors.com)
- Nestlé Waters North America
  [www.nestle-watersna.com](http://www.nestle-watersna.com)
- New Belgium Brewing Company
  [www.newbelgium.com](http://www.newbelgium.com)
- Niagara Bottling, LLC
  [www.niagarawater.com](http://www.niagarawater.com)
- Noosa Yoghurt
  [www.noosayoghurt.com](http://www.noosayoghurt.com)
- Odell Brewing Co.
  [www.odellbrewing.com](http://www.odellbrewing.com)
- Oskar Blues Brewery
  [www.oskarblues.com](http://www.oskarblues.com)
- Pepsi-Cola
  [www.pepsico.com](http://www.pepsico.com)
BEVERAGE PRODUCTION:
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Major Beverage Production Companies Cont’d

- Great Divide Brewing Company
  www.greatdivide.com
- Left Hand Brewing Co.
  www.lefthandbrewing.com
- Meadow Gold Dairy
  www.meadowgold.com
- Proximo Spirits (Stranahan’s Whiskey)
  www.proximospirits.com
- WhiteWave Foods
  www.whitewave.com

2016 Industry Highlights

Merger and Acquisition Activity

Beverage production companies in the nine-county region announced several mergers and acquisitions in 2016.

- Broomfield-based Ball Corp. completed its purchase of United Kingdom competitor Rexam for $6.1 billion. The deal makes Ball Corp. the largest can maker in the world and the combined company will have 75 manufacturing facilities and 18,700 workers. The Rexam headquarters in London closed in 2016 and a number of jobs were transferred to Broomfield.
- Denver-based WhiteWave Foods Co. was purchased by Danone SA for $10.4 billion. The deal allows the companies to combine their U.S. activities and will boost the company’s upmarket product line including Horizon Organic milk and Wallaby Organic yogurt.
- Fort Collins-based Summit Hard Cider purchased the Branch Out Cider product line and Community Orchard in Fort Collins. The deal will help Summit Hard Cider continue to expand its product offerings, including its award-winning cider Perennial.
- Anheuser-Busch InBev was given approval by the U.S. Justice Department to purchase SABMiller for $108 billion.
- Molson Coors purchased SABMiller’s 58 percent stake in MillerCoors and Miller brands brewed outside the U.S. The buyout makes MolsonCoors the third-largest brewer in the world.
- Anheuser-Busch InBev acquired Littleton-based Breckenridge Brewery. With this agreement, Breckenridge Brewery is the seventh craft brewery to join The High End, Anheuser-Busch’s business unit of craft and import brands.
- Boulder-based bottling and canning machine manufacturer Wild Goose merged with Washington-based Meheen Manufacturing to expand opportunities for both companies domestically and internationally. Wild Goose, which caters to the craft beer industry, continued its fast-paced growth in 2016, selling its 400th machine and growing to 46 employees.
- C.R. Goodman Inc., a Colorado distributor of craft beers, plans to sell its distribution assets to Breakthru Beverage Group, a New York-based major national wholesale beverage distributor. Based in Aurora, Breakthru Beverage Colorado is formerly known as Beverage Distributors Co.
- Lone Tree-based Key Logistics, a keg provider, acquired Birmingham, Ala.-headquartered Atlas Keg Co. Key Logistics works with breweries to buy and lease kegs. The company will have access to more than 1,000 brewery and cidery customers across the U.S. and the United Kingdom.

Key Company Announcements

Increasing demand for beverage products are prompting companies to grow and expand in the region. Notable beverage production company announcements, expanded facilities, and new locations in 2016 included:

- Bend, Ore.-based 10 Barrel opened its first Colorado location in the River North neighborhood. The company plans to hire 100 local brewery and pub staff.
- Banded Oak Brewing opened in Denver, which will be dedicated to barrel-aged beers. The new space also includes a taproom and a patio.
- Bierstadt Lagerhaus opened in the Bindery on Blake building in the River North neighborhood. The brewery features German-style lager brewed with an 84-year-old brew kettle from Germany and a strict Reinheitsgebot process.
- Bruz Beers opened in unincorporated Adams County in mid-2016. The 4,700-square-foot brewery makes Belgian-style beers and will start bottling small amounts.
- Carboy Winery opened a 10,000-square-foot urban winery in Littleton. The company will source, blend, and age their own wine and sell it by the same method commonly practiced by crafted brews, through a tap system and glass growler.
BEVERAGE PRODUCTION:
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- Denver Beer Co. plans to open a 4,350-square-foot taproom in Olde Town Arvada in early 2017. The location will allow the company to recreate the atmosphere it developed as a start-up brewery, rotating new beers and experimenting with new flavors.
- Denver’s first kombucha taproom plans to relocate from the River North neighborhood to Edgewater. The company plans to open an expanded taproom near Sloan’s Lake.
- Freedonia Brewing opened a brewery and taproom in downtown Fort Collins. The 4,760-square-foot space will include a beer garden and plans to brew German-style lagers using a historic, 110-year-old, all-copper brew system shipped from Germany.
- Golden is home to a new gluten-free brewery called Holidaily Brewing Co. The company opened the 3,000-square-foot facility at 801 Brickyard Circle.
- Fort Collins is now home to 21 craft brewers with the grand opening of Intersect Brewery. The new brewery has a 130-seat patio and a 2,200-square-foot taproom.
- Liquid Mechanics Brewing Co. will expand its operations by 1,500 square feet in Lafayette. The expansion will include a new tasting room and additional brewery space. The additional brewery space also includes a canning line from Colorado’s Integrated Packing Solutions.
- MolsonCoors Blue Moon Brewing Co. opened a brewery and a tasting room in the River North neighborhood. The brewery features a two-barrel pilot system.
- New Terrain Brewing opened in Golden, which features a taproom, fireplace, and two beer garden areas. The owners plan to locally source cans for their operations from Ball Corp.
- River North Brewery opened its second Metro Denver location in Adams County. The 9,000-square-foot space will include a brewhouse with a 15-barrel system and fermentation capacity of 4,000 to 5,000 barrels a year, and a taproom.
- Rocker Spirits opened a new distillery and taproom in downtown Littleton. The company produces craft vodka, rum, and whiskey, which it has been self-distributing to local stores and restaurants.
- The building that formerly housed the Times-Call in downtown Longmont was redeveloped into a cidery and a distillery. St. Vrain Cidery opened a 2,300-square-foot site with a patio and Abbot & Wallace distillery opened a 4,500-square-foot site.
- Verboten Brewing expanded to a larger space in downtown Loveland to accommodate a new brewery and a taproom. The additional space also accommodates its growing Verboten Brewing Barrel Project, which has tripled in volume.
- Woods Boss Brewing Co. is expected to open in Denver’s Five Points neighborhood in the spring of 2017. The facility will be a 15-barrel brew house and the company expects to invest $550,000 to outfit and open the brewery. The system will have five fermenters, a bright tank, and five serving tanks.
- The World of Beer opened a 3,800-square-foot tavern in Boulder, which will focus on local and global craft beers. The space will include more than 500 bottles and 50 daily rotating taps—along with a stainless steel infusion tower for infusing beer with fruit, coffee, and herbs to create new craft beer experiences.
- Skyline Park opened a pop-up beer garden from mid-August to mid-September, a collaborative project between the Downtown Denver Partnership and the Downtown Denver Business Improvement District. The 40,000-square-foot garden seated up to 350 people and offered a dozen Colorado-crafted beers on tap, mixed drinks, and wine.

Product Development and Market Expansions
The region’s beverage production companies developed several new products and new product offerings in 2016:

- Anheuser-Busch InBev plans to bring Mexican-brewed Estrella Jalisco to the Colorado market and nine other states. The beer has been brewed for 106 years in the Jalisco region of Mexico along the pacific coast. Belgium-based Anheuser-Busch is parent to Corona, among other brands.
- Denver-based WhiteWave Foods is adding banana milk to its product offerings. The new drink was developed at WhiteWave Foods’ new Louisville research and development facility completed in 2015 and will be initially sold in stores in Colorado, Indiana, Michigan, and Ohio.

Academic and Education Announcements
The region’s robust educational system and research centers help prepare the future beverage production workforce with vital skills through leadership, mentorship, and professional experience.

- The Department of Chemistry and Biochemistry at the University of Northern Colorado offers a Brewing Laboratory Science program. The Program prepares students for work in the quality control
BEVERAGE PRODUCTION:
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and quality-assurance sector of beer brewing and offers an undergraduate certificate, a minor in Brewing Laboratory Science, and a laboratory program in a seven barrel microbrewery on campus.

- Colorado State University (CSU) offers a Bachelor of Science in Fermentation Science and Technology. The major launched in 2013 and educates students in the science and art of fermenting beverages and foods. Students will be prepared for employment in the food and beverage industry including product development, processing, quality assurance and control, packaging and distribution, and plant management.

- CSU’s College of Business Beverage Business Institute (BBI) delivers education, training, and research that focuses on business operations, production, and distribution in all beverage-related industries. The Certificate in Beverage Business Management offers a unique opportunity to study business practices specific to the many facets of working with beverage. With specialized curricula, industry facilitators, customized tours, and face-to-face networking, the BBI tailors to the needs of professionals in the beer, distribution, soda, wine, spirits, coffee, and water industries, as well as entrepreneurs, consultants, and professionals whose work tangents these areas.

- Metropolitan State University of Denver offers a Bachelor of Science in Brewery or Brewpub Operations, and a Brewing Minor/Certificate. The programs integrate training facilities within the Tivoli Brewing Company to provide students with access to a 28,000 annual barrel capacity brewing, bottling, and distribution center. The degree options blend the art and science of brewing beer with the hospitality knowledge and operational skills desired by the beer and brewing industry.

- Regis University offers a Certificate in Applied Craft Brewing at its north Denver campus. The part-time program includes nine months of coursework and a three-month brewery internship. Students who complete the program also will become certified beer judges through the national Beer Judge Certification Program.

Cross-Cluster Convergence

Collaboration across the region’s industries including beverage production, aviation, and logistics has fueled innovation, discoveries, and advancements.

- The world’s first beer delivery using a self-driving truck was made in Colorado. Anheuser-Busch InBev delivered 2,000 cases of beer from its Fort Collins brewery to a destination in Colorado Springs. This milestone marked the first time in history that a self-driving vehicle shipped commercial cargo, making it a landmark achievement for self-driving technology.

- For the third year in a row, the annual “Beer Flights” beer garden opened at Denver International Airport in coordination with the Great American Beer Festival. The beer garden showcased 10 Colorado breweries for travelers to sip and sample, showcasing the state’s outstanding microbreweries.

Industry Infrastructure Support

The region’s organizations and professional associations are dedicated to advancing the vibrant beverage production industry.

- Boulder is home to the Brewers Association, a trade group dedicated to more than 3,600 small and independent brewers, focused on the promotion of craft beer and homebrewing. The Brewers Association also represents 46,000 members of the American Homebrewers Association (AHA), a not-for-profit organization dedicated to promoting the homebrewers community. The AHA hosts the world’s largest international beer competition recognizing outstanding homebrewed beer, mead, and cider.

- The Colorado Brewers Guild (CBG) is a trade association representing the majority of the state’s craft breweries and brewpubs. The Guild promotes the quality and diversity of the growing Colorado craft brewing industry and advocates to work with the state legislature on behalf of Colorado’s craft brewing community. The CBG delivers special events intended to feature and promote the world-class products of its members.

- Colorado Startup Brews (formerly Bootstrapped Brews), now in its third year, is the annual members’ conference of the Colorado Startup Brews Association. The conference and networking event connects local startups with homebrewed beer, with proceeds benefiting the Dear Jack Foundation.

- The Rocky Mountain Cider Association (RMCA) is an organization of commercial producers of (hard) cider and perry in the Rocky Mountain region including Colorado, Montana, Wyoming, Utah, Arizona, and New Mexico. The organization promotes the understanding and appreciation of quality cider to
help producers and suppliers network and work together for common goals, and to coordinate events to develop the craft cider industry in the region.

- The Colorado Distillers Guild promotes the quality and diversity of the state’s growing craft distilled spirits industry. The Guild was created to advocate, promote, and grow the common interests of licensed craft distilleries in the state.
- The Colorado Association for Viticulture and Enology (CAVE) is a trade not-for-profit that encourages and supports enology and viticulture in Colorado. CAVE—one of two organizations that supports Colorado wine—promotes the interests of Colorado grape growers and wineries in legislative and political matters, provides a forum for the exchange of ideas, and disseminates information pertaining to optimum winemaking and agriculture practices for vineyards in the area. CAVE seeks to establish contacts and relationships with other associations, both regional and statewide, to further development and growth of the industry.
- The Colorado Wine Industry Development Board aims to increase the quality of wine in the state and serves as the major consumer-facing entity. The Board, appointed by Colorado’s Governor, encourages and promotes viticultural and enological research, and is tasked with marketing and developing public relations materials that promote Colorado’s wine industry.

**Beverage Production Workforce Profile**

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

The nine-county region’s beverage production industry employs 9,300 people and includes a large pool of talented, well-educated, and highly skilled workers. The beverage production cluster has a larger share of employees (54.5 percent) that are between the ages of 25 and 44 years and older, compared with the age distribution of all industries across the nine-county region (45.2 percent).
The beverage production workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest beverage production occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

**Wages**

The 2015 average annual salary for beverage production employees in the nine-county region was $59,880, compared with the national average of $53,930. Total nine-county payroll in the beverage production cluster exceeded $518 million in 2015.

**Metro Denver and Northern Colorado Beverage Production Occupation & Salary Profile, 2016**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Packaging &amp; filling machine operators &amp; tenders</td>
<td>4,046</td>
<td>154</td>
<td>0</td>
<td>$32,909</td>
<td>$19,614</td>
<td>$22,416</td>
<td>$40,191</td>
<td>$57,375</td>
</tr>
<tr>
<td>2. Separating, filtering, clarifying, precipitating, &amp; still machine setters, operators, &amp; tenders</td>
<td>1,200</td>
<td>46</td>
<td>0</td>
<td>$43,191</td>
<td>$22,844</td>
<td>$28,094</td>
<td>$56,857</td>
<td>$67,409</td>
</tr>
<tr>
<td>3. Sales representatives, wholesale &amp; mfg., except technical &amp; scientific products</td>
<td>24,019</td>
<td>2,306</td>
<td>75</td>
<td>$70,993</td>
<td>$27,952</td>
<td>$41,103</td>
<td>$82,934</td>
<td>$130,224</td>
</tr>
<tr>
<td>4. Retail salespersons</td>
<td>60,551</td>
<td>5,813</td>
<td>5</td>
<td>$27,793</td>
<td>$18,070</td>
<td>$19,316</td>
<td>$30,086</td>
<td>$45,428</td>
</tr>
<tr>
<td>5. Industrial truck &amp; tractor operators</td>
<td>6,159</td>
<td>487</td>
<td>0</td>
<td>$34,264</td>
<td>$22,684</td>
<td>$27,100</td>
<td>$56,857</td>
<td>$67,409</td>
</tr>
<tr>
<td>6. Industrial machinery mechanics</td>
<td>3,851</td>
<td>116</td>
<td>0</td>
<td>$56,165</td>
<td>$30,463</td>
<td>$40,645</td>
<td>$67,930</td>
<td>$82,659</td>
</tr>
<tr>
<td>7. Laborers &amp; freight, stock, &amp; material movers, hand</td>
<td>25,528</td>
<td>2,017</td>
<td>0</td>
<td>$28,439</td>
<td>$18,964</td>
<td>$21,450</td>
<td>$33,121</td>
<td>$41,180</td>
</tr>
<tr>
<td>8. Farmworkers &amp; laborers, crop, nursery, &amp; greenhouse</td>
<td>5,696</td>
<td>17</td>
<td>0</td>
<td>$23,619</td>
<td>$17,850</td>
<td>$18,947</td>
<td>$33,121</td>
<td>$41,180</td>
</tr>
<tr>
<td>9. Heavy &amp; tractor-trailer truck drivers</td>
<td>21,278</td>
<td>1,681</td>
<td>0</td>
<td>$45,404</td>
<td>$31,223</td>
<td>$36,734</td>
<td>$53,129</td>
<td>$63,480</td>
</tr>
<tr>
<td>10. Driver/sales workers</td>
<td>5,742</td>
<td>454</td>
<td>5</td>
<td>$27,138</td>
<td>$17,607</td>
<td>$18,532</td>
<td>$31,383</td>
<td>$47,100</td>
</tr>
</tbody>
</table>

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works! QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.

**Education & Training**

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical
BEVERAGE PRODUCTION:
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schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest software occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via [http://highered.colorado.gov](http://highered.colorado.gov).

- Colorado State University
  [www.colostate.edu](http://www.colostate.edu)
- Metropolitan State University of Denver
  [www.msudenver.edu](http://www.msudenver.edu)
- University of Denver
  [www.du.edu](http://www.du.edu)
- Colorado State University Global Campus
  [www.colostate.edu](http://www.colostate.edu)
- Regis University
  [www.regis.edu](http://www.regis.edu)
- University of Northern Colorado
  [www.unco.edu](http://www.unco.edu)
- Front Range Community College
  [www.frontrange.edu](http://www.frontrange.edu)
- University of Colorado: Boulder, Denver
  [www.cu.edu](http://www.cu.edu)
- University of Phoenix-Colorado
  [www.phoenix.edu](http://www.phoenix.edu)

**Key Reasons for Beverage Production Companies to Locate in the Nine-County Region**

The region is a top beverage production location offering:

1. **Established infrastructure and burgeoning consumer base**
   - Denver ranked as the seventh-best city for beer lovers in 2016. (Redfin, 2016; Beer Institute, 2016)
   - Denver ranked second among “America’s Best Beer Destinations” in 2016. (Travelocity, 2016; Brewers Association, 2016)
   - Denver ranked second for the number of beer and wine retailers, breweries, and wineries among the nation’s largest cities. (Infogroup, 2016)
   - Colorado ranked among the top 10 states for the number of craft distilleries in the nation, representing 4.9 percent of the nation’s total craft distilleries. (American Distilling Institute, 2016)
   - Colorado ranked third nationally in total craft breweries (284), breweries per capita (7.3 per 100,000 legal-age residents), and total barrels of craft beer produced annually (1.8 million). (Brewers Association, 2016)
   - Metro Denver is home to 10 percent of the largest U.S. craft breweries. (Brewers Association, 2016)
   - Five Metro Denver microbreweries were ranked among the nation’s largest by beer sales volume in 2015. New Belgium ranked fourth, followed by Oskar Blues Brewery (21st), Odell Brewing Co. (32nd), Left Hand Brewing Co. (39th), and Breckenridge Brewery (47th). (Brewers Association, 2016)
   - Greeley-based WeldWerks Brewing Co. was named the nation’s best new brewery in 2016. (USA Today, 2016)
   - Colorado’s grape growing regions range in elevation from 4,000 to 7,000 feet and are among the highest vineyards in the world. (Colorado Department of Agriculture, 2016)
   - Nearly 2,000 tons of wine grapes totaling more than $3 million are harvested annually. The state is home to 130 wineries, with nearly 44 percent located in the nine-county region. (Colorado Wine Industry Development Board, 2016)
   - Colorado is the crossroads of major Interstate highways (I-25, I-70, and I-76), and has numerous state and federal highways that serve a critical function in supporting interstate commerce. Colorado’s highways provide direct access to the east and west coasts, the Midwest, and the international borders of Canada and Mexico. (Colorado Office of Economic Development and International Trade, 2016)
   - Denver International Airport was the sixth-busiest airport in the nation and 19th-busiest worldwide in terms of passenger traffic in 2015. (U.S. Bureau of Transportation Statistics, 2016; Airports Council International 2016; and Denver International Airport, 2016)

2. **An overall better quality of life**
   - Colorado has the lowest adult obesity rate in the nation (20.2 percent) and is the only state with an obesity rate below 21 percent. (Trust for America’s Health, 2016; Robert Wood Johnson Foundation, 2016)
   - Colorado ranked as the most physically active state in the nation with over 82 percent of adults participating in physical activity in the past month. (The Henry J. Kaiser Family Foundation, 2016)
   - Denver ranked No. 1 among U.S. News & World Report’s 2016 “Best Places to Live.” Denver’s healthy job market and access to the outdoors contributed to its notable rank. (U.S. News & World Report, 2016)
BEVERAGE PRODUCTION:
Metro Denver and Northern Colorado Industry Cluster Profile

- FasTracks is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.
- Metro Denver’s moderate temperatures, low humidity, and sunshine on almost 70 percent of the days each year provide an ideal climate for residents. (U. S. National Oceanic and Atmospheric Administration, National Climatic Data Center, 2016)

3. **Low to moderate costs of doing business and a competitive tax structure**
- Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)
- Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)
- Colorado has the fifth-lowest beer excise tax and the fourth-lowest distilled spirit tax in the nation. (The Tax Foundation, 2016)
- *Forbes* ranked Metro Denver first among the “Best Places for Business and Careers” in 2016 for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (*Forbes*, 2016)
- The Denver-Aurora-Broomfield metropolitan area ranked among the top 10 for economic development and job growth in the "Leading Locations for 2016" list. Areas recognized in the study exhibited economic strength and capacity to support business prosperity. (*Area Development*, 2016)
- Denver ranked fifth among the “2016’s Best Large Cities to Live In.” Denver scored first for livability and third for local economy and taxes. (*WalletHub*, 2016)

### Beverage Production Industry Cluster Definition

<table>
<thead>
<tr>
<th>NAICS Code*</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>311411</td>
<td>Frozen fruit, juice, &amp; vegetable mfg.</td>
<td>2037-02</td>
<td>Fruit juices</td>
</tr>
<tr>
<td>311421</td>
<td>Fruit &amp; vegetable canning</td>
<td>2033-0405</td>
<td>Vegetable juices: concentrated, hot pack</td>
</tr>
<tr>
<td>311421</td>
<td>Fruit &amp; vegetable canning</td>
<td>2033-0406</td>
<td>Vegetable juices: fresh</td>
</tr>
<tr>
<td>311421</td>
<td>Fruit &amp; vegetable canning</td>
<td>2033-0407</td>
<td>Vegetable juices: packaged in cans, jars, etc.</td>
</tr>
<tr>
<td>311511</td>
<td>Fluid milk mfg.</td>
<td>2026</td>
<td>Fluid milk</td>
</tr>
<tr>
<td>311514</td>
<td>Dry, condensed, &amp; evaporated dairy product mfg.</td>
<td>2026</td>
<td>Fluid milk</td>
</tr>
<tr>
<td>311920</td>
<td>Coffee &amp; tea mfg.</td>
<td>2095</td>
<td>Roasted coffee</td>
</tr>
<tr>
<td>311920</td>
<td>Coffee &amp; tea mfg.</td>
<td>2099-9917</td>
<td>Tea blending</td>
</tr>
<tr>
<td>311930</td>
<td>Flavoring syrup &amp; concentrate mfg.</td>
<td>2087-02</td>
<td>Beverage bases, concentrates, syrups, powders &amp; mixes</td>
</tr>
<tr>
<td>312111</td>
<td>Soft drink mfg.</td>
<td>2086</td>
<td>Bottled &amp; canned soft drinks</td>
</tr>
<tr>
<td>312112</td>
<td>Bottled water mfg.</td>
<td>2086</td>
<td>Bottled &amp; canned soft drinks</td>
</tr>
<tr>
<td>312113</td>
<td>Ice mfg.</td>
<td>2097</td>
<td>Manufactured ice</td>
</tr>
<tr>
<td>312120</td>
<td>Breweries</td>
<td>2082</td>
<td>Malt beverages</td>
</tr>
<tr>
<td>312130</td>
<td>Wineries</td>
<td>2084</td>
<td>Wines, brandy, &amp; brandy spirits</td>
</tr>
<tr>
<td>312140</td>
<td>Distilleries</td>
<td>2085</td>
<td>Distilled &amp; blended liquors</td>
</tr>
</tbody>
</table>

* *(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.*
BEVERAGE PRODUCTION:
Metro Denver and Northern Colorado Industry Cluster Profile

Beverage Production Industry Cluster Relationships

Technologies
- Digital & Social Media
- Fermentation
- Mobile Computers & Printers
- Pasteurization
- Preservatives
- Process Computerization
- Refrigeration
- RFID
- Robotics
- Water Treatment

Support Industries
- Agriculture
- Bioscience
- Bottling
- Distribution
- Energy
- Manufacturing
- Packaging
- Retail
- Software
- Transportation & Logistics
- Warehousing

Infrastructure
- Brewers Association
- Colorado Beverage Association
- Colorado Brewers Guild
- Colorado Department of Agriculture
- Colorado Distillers Guild
- Colorado Wine Industry Development Board
- Rocky Mountain Cider Association
- Water Resources

Client Industries
- Businesses
- Consumers

For additional information, contact us:

1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenver.org
www.metrodenver.org

Industry Overview

The nine-county Metro Denver and Northern Colorado region\(^1\) is home to a vibrant and growing bioscience hub of research institutions, life science expertise, and more than 670 bioscience-related companies that are developing breakthroughs in life-saving treatments. More than 81 percent of the state’s bioscience firms are located along the Front Range, with the center of the Rocky Mountain region’s life science center located at the Fitzsimons Innovation Campus and the adjacent Anschutz Medical Campus. As one of the largest bioscience developments in the nation, the $5.4 billion project encompasses 578 acres and more than six million square feet of corporate and bioresearch space.

The region’s top-rated research and educational institutions and entrepreneurial infrastructure offers access to a high concentration of top-tier life science talent. Further, the region's supportive business climate and competitive tax structure have facilitated research, development, and manufacturing for bioscience companies. The region’s bioscience cluster is a major contributor to the state’s economy. More than 1,270 medical devices, diagnostics, and pharmaceuticals are in development and approved by companies headquartered in Colorado. In fact, Colorado’s biotechnology and pharmaceutical industry alone adds as much as $14.5 billion to the state’s economy, according to Pharmaceutical Research and Manufacturers of America.

The bioscience cluster is diverse in both size and scope, including companies that research, develop, and distribute products and services ranging from cutting-edge pharmaceuticals, medical devices, and diagnostics to veterinary supplies and chemical testing kits. The bioscience industry contributes to the growth and advancements of other industries including healthcare and wellness, energy, information technology, and agriculture in the region. Further, digital health is a congruent sector with substantial growth and national recognition. Many bioscience organizations, including the Colorado BioScience Association, are integrating healthcare innovation and technologies into their business strategies.

The bioscience cluster is divided into two subclusters, each of which specializes in distinct aspects of the biosciences: (1) medical devices and diagnostics and (2) pharmaceuticals and biotechnology. With nearly 15,870 bioscience workers in more than 670 companies, the bioscience cluster offers numerous opportunities in both academic and clinical discovery and contributes to the region’s overall economic productivity. A related subcluster, although not specifically included in this report, is agricultural biotechnology. The agricultural biotechnology subcluster includes companies that utilize distinct elements of conventional breeding, biochemistry, molecular genetics, and plant physiology to improve the health of humans and animals. This subcluster employs nearly 1,260 workers in 110 companies in the region and grew an average of 7 percent per year between 2011 and 2016, compared with a 0.7 percent increase nationwide.

The nine-county region is home to numerous public and private bioscience research and innovation assets, including:

- The Anschutz Medical Campus of the University of Colorado Denver (CU Denver)
- The Division of Biomedical Informatics & Personalized Medicine at CU Denver
- The Barbara Davis Center for Diabetes
- The BioFrontiers Institute at the University of Colorado Boulder (CU Boulder)
- The Centers for Disease Control and Prevention’s National Center for Emerging and Zoonotic Infectious Diseases Division of Vector-Borne Diseases in Fort Collins
- The Charles C. Gates Center for Regenerative Medicine
- The Colorado Clinical and Translational Sciences Institute
- Colorado State University’s (CSU) Institute for Biologic Translational Therapies
- CSU's Seed Laboratory and Animal Reproduction and Biotechnology Laboratory

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\(^1\) The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
The Linda Crnic Institute for Down Syndrome
The Marion Downs Center
National Jewish Health
The Rocky Mountain Lions Eye Institute
The Webb-Waring Center

Medical Devices and Diagnostics Economic Profile

The medical devices and diagnostics subcluster includes companies that engineer, research, design, and manufacture medical equipment. The medical devices and diagnostics subcluster consists of eight, six-digit North American Industry Classification System (NAICS) codes.

The nine-county region ranked 11th out of the 50 largest metro areas for medical devices and diagnostics employment concentration in 2016. With direct employment in the medical devices and diagnostics subcluster of about 11,160 employees, the region ranked eighth. Nearly 82 percent of Colorado’s medical devices and diagnostics employees work in the nine-county region.

Medical Devices and Diagnostics Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>11,160</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>340</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>1.7%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>10.8%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>2.1%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>0.5%</td>
</tr>
</tbody>
</table>


Footnote: Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.
Medical Devices and Diagnostics Employment

The nine-county region’s medical devices and diagnostics subcluster employment (11,160 workers) rose 1.7 percent in 2016, compared with the previous year’s level, adding 190 new jobs during the same period. National employment levels increased 0.9 percent over-the-year. The region employs 2.5 percent of the nation’s medical devices and diagnostics workforce. Between 2011 and 2016, the region’s medical devices and diagnostics employment rose 10.8 percent, compared with 1.8 percent at the national level. Medical devices and diagnostics companies employed 0.5 percent of the region’s total employment base, compared with a 0.3 percent employment concentration nationwide.

About 340 medical devices and diagnostics companies operated in the nine-county region in 2016. Approximately 71 percent of the region’s medical devices and diagnostics companies employed fewer than 10 workers, while 2.3 percent employed 250 or more.
BIOSCIENCE: Metro Denver and Northern Colorado Industry Cluster Profile

Major Medical Devices and Diagnostics Companies

- AlloSource  
  www.allosource.org
- Bodesix  
  www.bodesix.com
- CareFusion  
  www.carefusion.com
- Cochlear Americas  
  www.cochlear.com/us
- DePuy Synthes  
  www.depuy.com
- GE Healthcare  
  www3.gehealthcare.com
- Hach Company  
  www.hach.com
- JustRight Surgical, LLC  
  www.justrightsurgical.com
- LivaNova PLC  
  www.livanova.com
- Medtronic PLC  
  www.medtronic.com
- nSpire Health, Inc.  
  www.nspirehealth.com
- Particle Measuring Systems  
  www.pmeasuring.com
- Rocky Mountain Orthodontics  
  www.rmortho.com
- Sharklet Technologies, Inc.  
  www.sharklet.com
- SomaLogic, Inc.  
  www.somalogic.com
- Sparton Medical Systems  
  www.sparton.com
- Spectranetics  
  www.spectranetics.com
- Surefire Medical Inc.  
  www.surefiremedical.com
- Terumo BCT, Inc.  
  www.terumobct.com
- Water Pik, Inc.  
  www.waterpik.com
- Zimmer BioMet  
  www.zimmerbiomet.com

Pharmaceuticals and Biotechnology Economic Profile

Pharmaceutical companies manufacture, research, and develop pharmaceutical drugs. Biotechnology companies utilize cellular and molecular biology and medicinal chemistry to develop and commercialize therapeutic medicines. The pharmaceuticals and biotechnology subcluster consists of four, six-digit North American Industry Classification System (NAICS) codes.

With direct employment in the pharmaceuticals and biotechnology subcluster of about 4,700 workers, the nine-county region ranked 17th out of the 50 largest metro areas in 2016. The region ranked 28th for pharmaceuticals and biotechnology employment concentration. About 94 percent of Colorado’s pharmaceuticals and biotechnology employees work in the nine-county region.

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3 Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest metropolitan statistical areas (MSAs). Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest MSAs.
**Pharmaceuticals and Biotechnology Employment and Company Profile, 2016**

<table>
<thead>
<tr>
<th></th>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>4,700</td>
<td>453,070</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>330</td>
<td>20,000</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>3.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>-2.5%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>-0.5%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>0.2%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>


**Pharmaceuticals and Biotechnology Employment**

The nine-county region’s pharmaceuticals and biotechnology subcluster employment (4,700 workers) rose 3.2 percent in 2016, compared with the previous year’s level, adding more than 140 new jobs during the same period. National employment levels increased 1.5 percent over-the-year. Between 2011 and 2016, the region’s pharmaceuticals and biotechnology employment decreased 2.5 percent, compared with a 5.4 percent increase at the national level. The local decline was primarily due to the closure of the Amgen facility in Boulder County, resulting in the loss of 1,000 employees between 2009 through 2015. Pharmaceuticals and biotechnology companies employed 0.2 percent of the region’s total employment base, compared with a 0.3 percent employment concentration nationwide.

About 330 pharmaceuticals and biotechnology companies operated in the nine-county region in 2016. More than 80 percent of the region’s pharmaceuticals and biotechnology companies employed fewer than 10 people, while 0.6 percent employed 250 or more.
BIOSCIENCE: Metro Denver and Northern Colorado Industry Cluster Profile

Major Pharmaceuticals and Biotechnology Companies

- Agilent Technologies
  www.agilent.com
- Array BioPharma Inc.
  www.arraybiopharma.com
- AstraZeneca
  www.astrazeneca.com
- Clovis Oncology
  www.clovisoncology.com
- Corden Pharma Colorado Inc.
  www.cordenpharma.com
- Heska Corporation
  www.heska.com
- Pfizer Inc.
  www.pfizer.com
- Sandoz, Inc.
  www.sandoz.com
- Silvergate Pharmaceuticals
  www.silvergatepharma.com
- Spectrum Pharmaceuticals
  www.spprx.com
- TOLMAR, Inc.
  www.tolmar.com

Sources: Market Analysis Profile, 2016; Development Research Partners.
2016 Industry Highlights

Bioscience Research and Innovation Assets

The $5.4 billion, 578-acre Fitzsimons campus is the keystone of the region’s bioscience cluster, which includes the adjacent Anschutz Medical Campus and the Fitzsimons Innovation Campus. The project is one of the world’s newest bioscience developments that combine education, research, innovation, and patient care facilities. More than six million square feet of corporate and bioresearch facility space are being developed for companies and firms focusing on the science and technology sectors at the campus. Denver International Airport (DEN) and the Regional Transportation District celebrated the opening of the 23-mile, $1.4 billion University of Colorado A Line in 2016, which connects DEN and downtown Denver. The R Line, opening in 2017, will connect the Anschutz Medical Campus to the A Line.

Located just 20 minutes from DEN and downtown Denver, the 184-acre Fitzsimons Innovation Campus offers an unrivaled range of opportunity from pre-built laboratories to furnished office space or build-to-suit space to life sciences research and development companies of all sizes, from small start-ups to established industry leaders. Further, the Bioscience Park Center features turnkey facilities for research, business development, and product commercialization. The Bioscience 1 and 2 buildings at the Anschutz Medical Campus include incubator and accelerator space, the University of Colorado’s bioengineering program, and commercial space for established bioscience firms.

The Anschutz Medical Campus is the largest academic health center from Chicago to the West Coast. The site, which currently employs more than 21,000, has a $5.4 billion annual economic impact to the state, and receives more than $400 million in sponsored research awards annually. The Campus is home to top-ranked hospitals and facilities including the University of Colorado Hospital; Children’s Hospital Colorado; University Physicians, Inc.; the Schools of Medicine, Nursing, Dental Medicine, Pharmacy, and Public Health; and several other centers for healthcare, biomedical research, and life sciences.

Located adjacent to the Anschutz Medical Campus is the U.S. Department of Veterans Affairs (VA) Eastern Colorado Healthcare System hospital and facilities. Construction began in 2011 on the new VA Hospital that will replace the existing facility in Denver and is slated for completion in early 2018. The Anschutz Medical Campus is also home to the Charles C. Gates Center for Regenerative Medicine and Stem Cell Biology, which is Colorado’s central hub for stem cell and regenerative medicine research. In 2015, the Gates Biomanufacturing Facility opened to serve academic, clinical, and commercial investigators to translate laboratory discoveries into clinical-grade protein and cell-based products for investigational use in humans.

Northern Colorado supports the region’s bioscience hub through the efforts of Colorado State University (CSU), the University of Colorado Health (UCHealth), the Innosphere, the Research Innovation Center (RIC), and public and private enterprises. UCHealth has increased its capacity for clinical trials for national and local bioscience companies and has developed its own innovation capacity for surgical techniques and advancements in cancer treatment for animals. A partner to the RIC, Fort Collins-based Innosphere is an incubator formed to accelerate the success of high-impact scientific and technology companies, and to promote the development of a regional, entrepreneurial ecosystem in Colorado. Innosphere has satellite locations in Denver, Fort Collins, and Boulder to better serve entrepreneurs. Since 2009, Innosphere graduated over 50 companies, raised $220 million in capital, and created more than 1,400 jobs in Colorado. Notable Northern Colorado bioscience assets and project developments in 2016 included:

- The Northern Colorado Bioscience Cluster (NoCoBio) formed through a partnership with the City of Fort Collins, CSU, CSU Ventures, UCHealth, the Colorado BioScience Association, and Innosphere to help advance bioscience in the region. NoCoBio brings together the region’s scientists, physicians, leading innovators, and executive advisors who are working together inside world-class research and business incubator environments in order to maximize the impact on Northern Colorado resources.
- CSU’s Flint Animal Cancer Center is an internationally recognized leader in clinical veterinary oncology and cancer research and is a flagship program for CSU’s College of Veterinary Medicine and Biomedical Sciences through its translational research. In 2016, the Center opened an expanded and improved cancer unit. The $1.75 million renovated Lucy Oncology Clinic in the James L. Voss Veterinary Teaching Hospital consolidated patient examination and treatment, improved efficiencies, and upgraded various technologies.
- CSU will build the $65 million, 100-square-foot Institute for Biologic Translational Therapies in Fort Collins. The facility will provide the College of Veterinary Medicine and Biomedical Sciences with clinical and research laboratories, a technology-rich surgical center, and a 200-seat auditorium. The project will support the creation of advanced regenerative therapies for both humans and animals,
with applications being tested in veterinary patients as a precursor to the development of human treatments. The project is slated for completion in 2019.

- Fort Collins is home to the Centers for Disease Control and Prevention’s National Center for Emerging and Zoonotic Infectious Diseases Division of Vector-Borne Diseases. The Division is a national and international leader in researching, preventing, and controlling viruses and bacteria, spread by vectors such as mosquitoes, ticks, and fleas.

**Key Company Announcements**

The region’s rich intellectual talent and educational resources, supportive bioscience infrastructure, and business-friendly environment provide an ideal location for bioscience companies to grow and expand. Key company announcements in 2016 included:

- Boulder-based Accera announced plans to double its size as the company expands to European markets and completes clinical trials of AC-1204 that could be the first new Alzheimer’s treatment marketed in 13 years. The 22-employee company has raised more than $130 million in debt and equity financing since 2009.
- Agilent Technologies broke ground on a new 130,000-square-foot production facility on 20 acres in Weld County. The facility will enable the company to more than double its commercial manufacturing capacity for nucleic acid active pharmaceutical ingredients. The company plans to hire 150 to 200 people at the new facility.
- AstraZeneca began renovating the former Amgen facility in Boulder to ready the site for production of its experimental bladder cancer drug, durvalumab. The company will add about 250 full-time employees to the facility as the renovation is underway during the next year.
- AstraZeneca purchased a 696,000-square-foot biotech manufacturing plant on 228 acres in Longmont. The company plans to renovate the space to support its Boulder drug manufacturing property. The new site will provide its global biologics research and development arm with flexible biological manufacturing capacity to quickly bring new innovative treatments to patients.
- Avista Pharma, a contract testing, development, and manufacturing organization, plans to expand its Longmont facility. The company will invest $1.79 million in building improvements and $1 million in equipment.
- ChromaDex, a California-based company, plans to open a location in Longmont to expand its research and development team. The company develops and brands natural ingredients and products within the dietary supplement, food, beverage, or cosmetic market. It plans to add one or two new hires to its Boulder employees that will be relocating, but plans to add an additional 30 to 40 jobs within five to seven years.
- Strategic partners, Broomfield-based Corgenix Medical Corporation and Maryland-based Zalgen labs, opened an advanced product development center in the Fitzsimmons Bioscience Park Center. The new development site will serve as Zalgen’s primary site for its work on viral hemorrhagic fever diagnostics, technology it received via transfer from Corgenix.
- Westminster-based Flagship Biosciences increased its operational footprint by approximately 30 percent over the last year, and doubled its staff. The company also acquired new laboratory equipment to meet increasing demand for its specialty tissue image analysis solutions in the immune-oncology market.
- Loveland-based Hach Co. broke ground on a multimillion-dollar research and development facility on its existing campus. The 86,000-square-foot building will give the company room to expand as well as access to advanced equipment and development resources. Hach employs an estimated 800 associates in Northern Colorado.
- Viveve Medical Inc. plans to relocate its headquarters from California to Arapahoe County in early 2017. The company, which manufactures non-surgical devices for vaginal conditions, will create 130 jobs with the relocation.
- Zimmer Biomet Spine Inc. plans to relocate and expand its Westminster operations into a 104,000-square-foot building at the Westmoor Technology Park. The expansion will provide 207 high-paying jobs with an average salary of $79,000.

**Agricultural Biotechnology Announcements**

Northern Colorado is a leading region for agricultural biotechnology advancements.

- Boulder-based AeroGrow International Inc. deepened its partnership with Scotts Miracle-Gro Co. AeroGrow will work with Scotts to grow its direct-to-consumer business segment and develop...
large-scale gardening and consumer lighting products. Scotts has invested several million dollars in AeroGrow over the past few years.

- Agrium Inc., a global leader in agricultural products and services, will consolidate 400 employees from several sites in Loveland into two buildings at a new, 30-acre project on the west side of Interstate 25. The company plans to add 300 new employees once the buildings are completed.

- Fort Collins-based BayoTech Inc. raised $1.5 million to develop a smaller and more cost-effective system for manufacturing nitrogen fertilizer. The new system is also expected to decrease transportation costs by decentralizing production and bringing local facilities closer to end-users. The system can be shipped in three 40-foot shipping containers and can produce up to 50 tons of urea, or nitrogen fertilizer, per day.

- The Cargill Specialty Seeds and Oils Innovation Center, located in Fort Collins, is a center for research and development of next-generation Clear Valley™ canola oils. Scientists at the center focus on the discovery, development, and delivery of high-stability oils with reduced saturates and zero trans fats per serving.

- Fort Collins-based VetDC Inc. was granted conditional approval of a treatment of lymphoma in dogs from the U.S. Food and Drug Administration's (FDA) Center for Veterinary Medicine. The company's Tanovea-CA1 will be available to veterinarians in the spring of 2017, which is administered intravenously every three weeks for up to five doses.

- CSU broke ground on the new Institute for Biologic Translational Therapies. CSU received $20 million to build the Institute in 2016, fulfilling a $65 million matching challenge from lead donors John and Leslie Malone. The Institute will provide regenerative medical therapies for animals and humans, including patient-derived stem cells, to treat musculoskeletal disease and other ailments.

### Innovative Technologies and Regulatory Approvals

Bioscience companies in the region received notable regulatory approvals to advance product development to facilitate commercialization.

- Centennial-based AlloSource will pioneer its research on bioengineered blood vessels, and will be entering clinical trials. AlloSource collaborated with North Carolina-based Humacyte to develop the blood-vessel grafts that will be tested in kidney dialysis patients and will improve current surgical methods involving synthetic implants.

- Golden-based Bio2 Medical Inc. received FDA approval to market and distribute its Angel Catheter® that protects trauma patients from blood clots entering their lungs. The company is readying to expand production and hire staff to its sales team, corporate operations, and production crew. The company raised $3 million in venture debt financing to fund domestic sales.

- Boulder-based Array BioPharma partnered with Japanese pharmaceutical firm Asahi Kasei Pharma Corp. to move its pain inhibiting drug TrKA to clinical trials. The partnership gives Array $12 million in upfront funding for Asahi Kasei’s right to develop and commercialize the drug in Asia. Array will receive up to $64 million in additional payments as well as royalties on sales once the drug meets certain developmental milestones.

- Array BioPharma received positive results from Phase III clinical trials of its melanoma treatment drug binimetinib. Based on the results, Array submitted a new drug application with the FDA and raised $115 million by selling new stock. Phase III trials testing the effectiveness of binimetinib in combination with other drugs in Array’s portfolio are ongoing.

- The FDA granted clearance to Boulder-based Flashback Technologies to market the first medical device containing its Compensatory Reserve Index (CRI) algorithm. CRI is a breakthrough technology that provides real-time, noninvasive measurement of a patient’s ability to tolerate changes in intravascular volume. It is the first algorithm to be classified by the FDA as an adjunctive cardiovascular status indicator.

- CHD Bioscience Inc. is anticipating FDA approval and subsequent commercialization of its first product, VERIOX®. VERIOX® is a novel antimicrobial agent used in coatings that CHD envisions could be used with implants, bandages, and dressings to prevent and treat infections. CHD anticipates expansion once Veriox is approved and comes to market.

- The FDA granted accelerated approval for Boulder-based Clovis Oncology’s genetically targeted ovarian cancer treatment drug Rubraca. The oral therapy treats women with advanced ovarian cancer who have received two or more prior chemotherapies and whose tumors have a BRCA gene mutation.

- CoorsTek Medical won federal approval for a ceramic hip replacement implant that will give providers a domestically manufactured alternative to currently imported implant technologies. CoorsTek’s CeraSurf®-p implants have been used successfully in South America since 2011 and in Europe since...
BIOSCIENCE: Metro Denver and Northern Colorado Industry Cluster Profile

2012. Production is initially planned for CoorsTek’s facilities in Golden, with expansion anticipated for the next several years.

- Fort Collins-based biopharmaceutical company St. Renatus received FDA approval for its first product, Kovanaze™. Kovanaze™ is a dental anesthetic that is administered nasally, circumventing the use of a needle for dental procedures.

- JustRight Surgical received FDA clearance for its pediatric vessel-sealing device that allows safer cauterization of vessels in teens, children, infants, and neonates while using significantly less energy. The Louisville-based company notes electrosurgical devices were approved 15 years ago, but the clearance will allow the company to market the device specifically for pediatric surgery.

- Parker-based VibraLung, Inc. began marketing its Vibralung® Acoustical Percussor to home care providers and patients. Vibralung’s technology treats respiratory conditions associated with cystic fibrosis, chronic obstructive pulmonary disease, bronchitis, asthma, pneumonia, and neuromuscular disease, among others. Vibralung utilizes soundwaves to promote bronchial drainage, airway clearance, and improve expectoration.

- Aytu BioScience Inc., located in Englewood, announced it will launch sales of NATESTOTM. NATESTOTM is the only FDA-approved testosterone replacement therapy delivered in a nasal spray. Aytu won a bid for exclusive rights to sell the product in the United States. The company has grown from about 25 employees to 70.

- Boulder-based ASD’s spectrum analysis technology has been used in efforts to understand and control the spread of Zika virus. Australian researchers have used ASD’s equipment to measure the presence of the bacteria Wolbachia in the mosquito population, a microbe that significantly reduces the likelihood the mosquito will carry the Zika virus. To control the virus, groups of infected mosquitoes are released into the wild with the hope the bacterial infection will spread in the population.

- Louisville-based AntriaBio Inc. partnered with South Korea-based pH Pharma Co. to manufacture and sell its diabetes drug, AB101, in eight Southeast Asian countries. The joint agreement will allow the company to use AntriaBio’s proprietary microsphere platform for various therapeutic opportunities.

- Broomfield-based Colibri Heart Valve LLC formed a joint venture with China-based Venus Medtech Inc. The joint venture will develop a pre-packaged, ready-for-use transcatheter heart valve system and will be funded to conduct clinical and regulatory development work in both China and Europe.

- Englewood-based Mighty Oak Medical’s 3D printed FIREFLY® Pedicle Screw Navigation Guides received a second FDA clearance. The clearance extends compatibility to essentially all currently cleared pedicle screw systems.

- Greenwood Village-based Silvergate Pharmaceuticals Inc. received FDA approval for its Qbrelis™ (Lisinopril) Oral Solution, the first and only FDA-approved Lisinopril oral solution. Qbrelis™ treats hypertension in adults and children, symptomatic heart failure, and asymptomatic left ventricular dysfunction.

Industry Infrastructure Support

The region’s organizations and professional associations are dedicated to advancing the vibrant bioscience industry.

- The Colorado BioScience Association (CBSA) serves as the hub of Colorado’s thriving bioscience sector by connecting innovators to funding, infrastructure, research, and talent. From promising young corporations and institutions, CBSA provides opportunities for networking, education, and professional development. CBSA grows the bioscience workforce and leads business expansion policies to advance the industry in the state. In 2016, CBSA held its inaugural Colorado Life Science Innovation Forum in 2016, which convened Colorado’s researchers, scholars, policymakers, healthcare professionals, and companies to educate and connect.

- The Colorado Office of Economic Development and International Trade (OEDIT) awarded its fourth round of grants for the Advanced Industries Accelerator Programs in 2016. The programs support key industries in Colorado, including bioscience and medical device manufacturers, by providing up to $150,000 for Proof-of-Concept grants, up to $250,000 for Early-Stage Capital grants, and $15,000 matching grants for businesses looking to export to global markets. Since 2006, Colorado has awarded more than 330 life science-related grants and provided $45.9 million in matching grant funding to bioscience ventures, generating $530 million in follow-on grants and additional investments for these companies. The program created 56 new life science companies and 597 new, direct jobs.

- Formed in 2009 through the Bioscience Discovery Evaluation Grant Program, the Colorado Institute for Drug, Device and Diagnostic Development (CID4) accelerates life science discoveries and bridges the gap between research and successful product developments. CID4 serves universities, bioscience companies, academic groups, and professional associations by providing seed funding, active
management, investor connections, and strategic consulting. As of 2016, CID4 invested more than $2 million in nine portfolio companies.

- Founded in 2014, the Blackstone Entrepreneurs Network is designed to help entrepreneurs find resources and thrive in Colorado. The network has a variety of business advisors in fields for entrepreneurship, technology, biotechnology, and health technology industries.

- The Colorado Venture Capital Authority (VCA) was established in 2004 to provide seed and early-stage capital investments in Colorado companies with the potential for rapidly scaling their businesses. The managing partner, High Country Venture, reviews funding deals and makes investments in selected businesses by using debt, equity, or debt with a conversion option into equity. VCA also established Colorado Fund I and II, each with approximately $25 million.

- The University of Colorado’s BioFrontiers Institute established the Olke C. Uhlenbeck Endowed Graduate Fund to support first-year graduate students pursuing doctoral degrees. The endowment was made possible by a $1 million gift from John F. Milligan and Kathryn Bradford-Milligan. The BioFrontiers Institute was chosen specifically because of the IQ Biology program which exposes students to applied aspects of biological sciences such as writing computer code and applied math.

- The Knoebel Center for the Study of Aging at the University of Denver celebrated its grand opening in 2016. The Center focuses on ways to increase the healthy years of life in an aging population and supports complementary research and scholarship on aging and aging-related conditions in a variety of science, technology, engineering, and mathematics disciplines.

- Colorado PERA launched The Colorado Mile High Fund in 2012, a $50 million co-investment program designed to invest in a diversified, high-quality portfolio of companies with a nexus to Colorado. With an established bioscience industry, strong growth opportunities, a dedicated research community, and an active private equity market, the nine-county region is poised for investment.

- The Denver Office of Economic Development offers the Denver Capital Matrix, a resource directory of over 400 funding sources for small business and entrepreneurs including traditional bank lending, venture capital firms, private equity firms, angel investors, mezzanine sources, and others that have funded Colorado businesses.

- The Boettcher Foundation’s Webb-Waring Biomedical Research Awards provides biomedical research funding for early career investigators at Colorado’s research institutions. Recipients of the awards receive research grants of $235,000, covering up to three years of biomedical research. The grants help Boettcher Investigators become competitive for major awards from federal agencies and private sources.

**Cross-Cluster Convergence**

The region’s bioscience companies are developing breakthrough therapies to support the state’s aging population and growing millennial population. For example, Boulder-based Accera opened two trial sites in the state to research Alzheimer’s disease. Additionally, more than 130 digital health companies are appealing to health and wellness goals for millennials. Boulder-based SomaLogic is developing a wellness chip to enable early detection of diseases and health conditions to monitor well-being. The synergy between bioscience, healthcare, and software supports the nine-county region as a national leader in expanding digital health. Other digital health companies including Prima-Temp, RxREVU, Welltok, iTriage, RxAssurance, and Cerescan are developing advanced technologies to improve health.

- Metro Denver is an emerging digital health community. Founded in July 2012 by the Denver South Economic Development Partnership and Innovation Pavilion, Prime Health is a growing statewide community of 1,600+ health care executives, physicians, technologists, academics, entrepreneurs, and investors dedicated to improving health and lowering healthcare costs through the commercialization of digital health technologies. Prime Health is a resource ecosystem for Digital Health—the convergence of the digital and genetics revolutions with bioscience, healthcare and wellness, and information technology-software. Colorado is home to more than 130 digital health companies.

- StartUp Health Colorado launched to create a health innovation hub in the Rocky Mountain region. The organization partnered with Children’s Hospital Colorado, UCHealth, and the University of Colorado to streamline the pathways for health entrepreneurs to innovate and grow.

- Plans were announced for Catalyst HTI, a health-tech industry integration project slated to open in 2018 in Denver’s River North neighborhood. The project will integrate building space for startups, Fortune 500 companies, and healthcare providers in one location, enabling startups with resources to grow and exposing providers and larger companies to emerging technologies and human capital. The concept will be the first of its kind and has already received support from Terumo BCT, the University of Colorado Anschutz Medical Campus, and the American Diabetes Association.
Collaboration across the region’s industries including aerospace and bioscience has fueled innovation, discoveries, and advancements.

- Centennial-based AlloSource announced a collaboration with NASA and the Jet Propulsion Laboratory (JPL) to study the effects of zero gravity on antibiotic resistant genes in microorganisms from the International Space Station (ISS). The research will help NASA and JPL identify microbes in the ISS and prescribe antibiotics more effectively. AlloSource is one of the largest providers of skin, bone, and soft tissue allografts for use in surgery and other medical procedures.

**Venture Capital and Funding Awards**

Several bioscience companies received significant venture capital and funding awards to advance new technologies and support product development.

- Boulder-based Array BioPharma initiated a $115 million stock sale to fund research and development. The funding will also be used for clinical trials for its proprietary candidates, to build and scale commercial capability, and for general corporate purposes.
- SomaLogic Inc., based in Boulder, received a $60.5 million investment from New York-based Visium Healthcare Partners to advance the company’s diagnostic products. SomaLogic’s technologies identify disease-indicating biomarkers on proteins that revolutionize how diseases are diagnosed and treated. SomaLogic’s technologies are used in clinics and research laboratories, including the U.S. Department of Agriculture’s National Center for Toxicological Research.
- Boulder-based PanTheryx acquired $53 million of private-equity investment to fund the global launch of DiaResQ®, a product used to treat acute infectious diarrhea in children. PanTheryx will add 15 to 20 new workers, invest in new product research and development, and expand the marketing and distribution of DiaResQ®.
- Biodesix, a Boulder-based diagnostic test maker, raised $29 million in 2016 toward the development of its VeriStrat and GeneStrat blood tests for use with immunotherapies in the treatment of cancer. The tests will help identify which patients would best benefit from various cancer drugs and treatments. The company also entered into an international collaboration agreement with China-based Biyong Technology Company Ltd. to commercialize a version of its blood test in China.
- Louisville-based JustRight Surgical raised $11.2 million to increase sales and marketing efforts for its precisely designed surgical devices in the U.S. and Europe. The company’s devices help reduce scarring and the length of hospital stays.
- Westminster-based Cerapedics completed an $11 million Series D financing round to expand commercialization of its FDA-approved i-FACTOR™ Peptide Enhanced Bone Graft. The product is used in anterior cervical discectomy and fusion (ACDF) procedures in patients with degenerative cervical disc disease. It is the first bone graft to be approved for use in the cervical spine by the FDA.
- Golden-based Bio2 Medical, Inc. raised $10 million in a Series D funding round to initiate commercialization of its Angel® Catheter. Preparations for commercialization include hiring a sales and clinical team, upgrading IT infrastructure, establishing customer service, and building inventory to support its projected sales demand.
- Aurora-based Ocugen Inc. raised $6 million in a round of Series A financing. The funding will be used to advance its research to treat retinitis pigmentosa, macular degeneration, and ocular graft versus host disease.
- Broomfield-based Colorado Therapeutics closed on $4.3 million of angel funding to complete FDA approval of its first product, Xenograft. The company added manufacturing and production staff to support its product development.
- BackJoy Orthotics LLC, a Boulder-based company that makes posture improving products and apparel, raised $2.3 million in an equity-funding round. The latest funding follows an $8.7 million investment from Sandbridge Capital in 2014 that will help the company ramp up its footwear and apparel product lines.
- Boulder-based startup Prima-Temp completed its third round of funding in three years, raising $1.64 million. The funding will be used on the manufacture, marketing, and sales of its Priya™ sensor technology that helps women track their fertility.
- CardioNXT secured an additional $1.5 million in equity funding to expand its products that enable a better understanding of complex cardiac arrhythmias including atrial fibrillation, and deliver targeted therapy to affected areas within the heart. CardioNXT expects regulatory approval for its products in targeted markets in 2017.
- Louisville-based medical device startup Eximis Surgical closed on a $995,000 seed round of funding toward the development of a specimen removal device in laparoscopic surgeries such as
hysterectomies and tumors. The startup has plans to join Innosphere as it grows and works toward product commercialization.

**Mergers and Acquisitions**

Several mergers and acquisitions in the region’s bioscience cluster drove company growth and expanded product offerings in 2016.

- Canada-based Agrium and Potash Corp. plan to merge to create one of the largest crop-nutrient companies in the world with nearly 20,000 employees. The $27 billion deal will allow the combined company to produce fertilizers and sell them directly to farmers through a network of retail stores. Agrium has facilities in Loveland, Greeley, and Denver and employs several hundred people in Colorado.
- Germany-based Sartorius acquired Broomfield-based startup ViroCyt in a $16 million deal. The company will maintain its leadership and branding as it develops instrumentation used to quantify virus particles. The acquisition will help the company reach new markets and find new applications for its product.
- New Jersey-based Zoetis, a developer of animal-health products with a location in Longmont, was acquired by Bulgarian pharmaceutical company Huvepharma in a deal valued at $40 million. The acquisition will facilitate Huvepharma’s continued growth in the United States.
- Zimmer Biomet Holdings Inc., whose spine division is headquartered in Broomfield, acquired LDR Holding Corp. for $1 billion. The deal will increase Zimmer’s share of the spinal device market, complementing its primary business of manufacturing replacement hips, knees, and other reconstructive and orthopedic devices.
- Tecomet Inc., a global contract manufacturer, purchased Boulder-based Mountainside Medical, a medical device components and surgical devices manufacturer. Mountainside Medical employs just over 100 people and no job cuts are planned. Tecomet plans to invest to expand the Boulder business.
- Castle Rock-based Venaxis®, Inc. acquired Boulder-based BiOptix Diagnostics, Inc. in a $2.6 million deal. The merger will allow Venaxis® access to BiOptix’s proprietary technology platform for the detection of molecular interactions.

**Bioscience Grants and Incentive Programs**

The state of Colorado has several financing, tax credits, and incentive programs to support early-stage and growth companies in the bioscience cluster.

- Colorado offers various bioscience tax incentive programs to promote growth including:
  - Biotechnology Sales and Use Tax Refund was created for Colorado taxpayers to refund state sales and use taxes paid on purchases of tangible personal property used directly in biotechnology R&D.
  - Manufacturing Sales & Use Tax Refund Colorado provides an exemption from state sales and use tax paid on the purchases of manufacturing machinery and machine tools and parts.
  - Cleanroom Sales & Use Tax Exemption Colorado provides an exemption from state sales and use tax paid on the purchase of machinery that comprises a cleanroom from July 1, 2007 to July 1, 2017.
  - Advanced Industry Workforce Development provides companies a reimbursement for expenses related to hiring an intern or apprentice.
- The Advanced Industry Investment Income Tax Credit allows investors to receive tax credits for investing in early-stage, advanced industry companies. Investors can claim tax credits worth 25 percent of their investment in the company if they do not own more than 30 percent of the business before the investment was made or 50 percent after, up to a maximum of $50,000 in tax credits.
Bioscience Workforce Profile

Many companies choose locations because of the available workforce. With nearly half of the nine-county region's 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region's adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation's second-most highly educated workforce as measured by the percentage of residents with a bachelor's degree or higher.

The attractiveness of the region draws new residents through in-migration. The region's population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region's labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

Medical Devices and Diagnostics Workforce Profile

Age Distribution

The nine-county region’s medical devices and diagnostics subcluster employs 11,160 people and includes a large pool of talented, well-educated, and highly skilled workers. The medical devices and diagnostics subcluster has a larger share of employees (51.1 percent) that are between the ages of 45 and 64 years old, compared with the age distribution of all industries across the nine-county region (37.7 percent).

The medical devices and diagnostics workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest medical devices and diagnostics occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the
number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages

The 2015 average annual salary for medical devices and diagnostics subcluster workers in the nine-county region was $75,400, compared with $84,970 nationwide. Total payroll in the region’s medical devices and diagnostics subcluster exceeded $827 million in 2015, an increase of 3.6 percent over-the-year.

### Metro Denver & Northern Colorado Medical Devices & Diagnostics Occupation & Salary Profile, 2016

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</tr>
</thead>
<tbody>
<tr>
<td>1. Electrical &amp; electronic equipment assemblers</td>
<td>2,925</td>
<td>111</td>
<td>4</td>
<td>$32,230</td>
<td>$21,342</td>
<td>$25,005</td>
<td>$42,838</td>
<td>$55,687</td>
</tr>
<tr>
<td>2. Electromechanical equipment assemblers</td>
<td>1,730</td>
<td>66</td>
<td>0</td>
<td>$35,728</td>
<td>$25,481</td>
<td>$31,787</td>
<td>$39,887</td>
<td>$44,393</td>
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<tr>
<td>3. Team assemblers</td>
<td>4,367</td>
<td>166</td>
<td>0</td>
<td>$29,666</td>
<td>$20,562</td>
<td>$23,826</td>
<td>$37,132</td>
<td>$46,729</td>
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<tr>
<td>4. Dental laboratory technicians</td>
<td>527</td>
<td>20</td>
<td>0</td>
<td>$33,484</td>
<td>$25,302</td>
<td>$27,945</td>
<td>$45,586</td>
<td>$55,992</td>
</tr>
<tr>
<td>5. Industrial engineers</td>
<td>2,768</td>
<td>69</td>
<td>4</td>
<td>$90,696</td>
<td>$57,010</td>
<td>$72,137</td>
<td>$113,205</td>
<td>$135,370</td>
</tr>
<tr>
<td>6. Mechanical engineers</td>
<td>5,533</td>
<td>138</td>
<td>721</td>
<td>$85,096</td>
<td>$56,118</td>
<td>$68,661</td>
<td>$112,174</td>
<td>$141,503</td>
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<tr>
<td>7. Electronics engineers, except computer</td>
<td>4,938</td>
<td>123</td>
<td>441</td>
<td>$101,396</td>
<td>$64,980</td>
<td>$77,300</td>
<td>$122,914</td>
<td>$150,057</td>
</tr>
<tr>
<td>8. Inspectors, testers, sorters, samplers, &amp; weighers</td>
<td>3,658</td>
<td>139</td>
<td>0</td>
<td>$40,160</td>
<td>$23,170</td>
<td>$31,213</td>
<td>$53,235</td>
<td>$67,867</td>
</tr>
<tr>
<td>9. First-line supervisors of production &amp; operating workers</td>
<td>4,956</td>
<td>188</td>
<td>1</td>
<td>$58,811</td>
<td>$36,795</td>
<td>$46,494</td>
<td>$73,886</td>
<td>$93,787</td>
</tr>
<tr>
<td>10. General &amp; operations managers</td>
<td>31,830</td>
<td>2,642</td>
<td>6,292</td>
<td>$112,133</td>
<td>$50,365</td>
<td>$73,238</td>
<td>$174,412</td>
<td>$254,484</td>
</tr>
</tbody>
</table>

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.

### Pharmaceuticals and Biotechnology Workforce Profile

#### Age Distribution

The nine-county region’s pharmaceuticals and biotechnology subcluster employs 4,700 people and includes a large pool of talented, well-educated, and highly skilled workers. The pharmaceuticals and biotechnology subcluster has a larger share of employees (56 percent) that are between the ages of 35 and 54 years old, compared with the age distribution of all industries across the nine-county region (43.7 percent).

The pharmaceuticals and biotechnology workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest pharmaceuticals and biotechnology occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of
available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages

Total nine-county payroll in the pharmaceuticals and biotechnology subcluster exceeded $471 million in 2015. The 2015 average annual salary for pharmaceuticals and biotechnology employees in the region was $103,370, compared with the national average of $137,580.

Metro Denver and Northern Colorado Pharmaceuticals and Biotechnology Occupation & Salary Profile, 2016

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<tbody>
<tr>
<td>1. Chemists</td>
<td>1,693</td>
<td>14</td>
<td>266</td>
<td>$75,832</td>
<td>$39,285</td>
<td>$51,230</td>
<td>$105,206</td>
<td>$125,470</td>
</tr>
<tr>
<td>2. Packaging &amp; filling machine operators &amp; tenders</td>
<td>4,046</td>
<td>154</td>
<td>0</td>
<td>$32,909</td>
<td>$19,614</td>
<td>$22,416</td>
<td>$40,191</td>
<td>$57,375</td>
</tr>
<tr>
<td>3. Biological technicians</td>
<td>2,465</td>
<td>20</td>
<td>1</td>
<td>$43,578</td>
<td>$29,106</td>
<td>$34,426</td>
<td>$56,637</td>
<td>$69,687</td>
</tr>
<tr>
<td>4. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
<td>$97,749</td>
<td>$126,953</td>
</tr>
<tr>
<td>5. Chemical equipment operators &amp; tenders</td>
<td>623</td>
<td>6</td>
<td>0</td>
<td>$36,015</td>
<td>$23,492</td>
<td>$29,521</td>
<td>$45,711</td>
<td>$61,625</td>
</tr>
<tr>
<td>6. Natural sciences managers</td>
<td>1,252</td>
<td>104</td>
<td>3,068</td>
<td>$126,982</td>
<td>$87,944</td>
<td>$105,550</td>
<td>$157,165</td>
<td>$259,747</td>
</tr>
<tr>
<td>7. Medical scientists, except epidemiologists</td>
<td>1,165</td>
<td>9</td>
<td>739</td>
<td>$65,568</td>
<td>$39,722</td>
<td>$47,943</td>
<td>$98,932</td>
<td>$148,472</td>
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<tr>
<td>8. Biochemists &amp; biophysicists</td>
<td>477</td>
<td>4</td>
<td>155</td>
<td>$64,538</td>
<td>$38,670</td>
<td>$49,047</td>
<td>$91,769</td>
<td>$127,899</td>
</tr>
<tr>
<td>10. General &amp; operations managers</td>
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Education & Training

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest bioscience occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via http://highered.colorado.gov.

- Colorado School of Mines
  [www.mines.edu](http://www.mines.edu)
- Metropolitan State University of Denver
  [www.msudenver.edu](http://www.msudenver.edu)
- University of Northern Colorado
  [www.unco.edu](http://www.unco.edu)
- Colorado State University
  [www.colostate.edu](http://www.colostate.edu)
- Regis University
  [www.regis.edu](http://www.regis.edu)
- University of Phoenix-Colorado
  [www.phoenix.edu](http://www.phoenix.edu)
- Colorado State University Global Campus
  [www.colostate.edu](http://www.colostate.edu)
- University of Colorado: Anschutz Medical Campus,
  Boulder, Denver
  [www.cu.edu](http://www.cu.edu)
- Front Range Community College
  [www.frontrange.edu](http://www.frontrange.edu)
- University of Denver
  [www.du.edu](http://www.du.edu)
Key Reasons for Bioscience Companies to Locate in the Nine-County Region

The region is an emerging bioscience location offering:

1. **The ability to recruit and retain technical and scientific employees and entrepreneurial talent**
   - Colorado has 10 higher education institutions with bioscience programs. Biological sciences graduate programs at the University of Colorado Boulder (CU Boulder), Colorado State University (CSU), and the University of Colorado Denver ranked within the nation’s top-100 in 2014. ([U.S. News & World Report](https://www.usnews.com), 2014)
   - Colorado ranked ninth for the number of science, engineering, and health graduate students per 1,000 individuals ages 25 to 34 years old in 2013. ([National Science Foundation](https://www.nsf.gov), 2015)
   - Colorado ranked fifth for the number of scientists and engineers as a share of all occupations in 2014. ([National Science Foundation](https://www.nsf.gov), 2015)
   - Colorado ranked second in the 2016 *State Technology and Science Index*. Colorado received top-five rankings in all five categories, and received its highest individual score in human capital investment (first). ([Milken Institute](https://www.milkeninstitute.org), 2016)
   - Colorado ranked among the top 10 states that have a specialized concentration of medical device and equipment jobs and ranked seventh for bioscience-related venture capital distribution dollars per 1 million population. Colorado bioscience companies have received $1 billion in venture capital investments since 2012. ([Battelle Memorial Institute](https://www.battelle.org), 2016)
   - The first U.S. Department of Commerce United States Patent and Trademark Office west of the Mississippi opened in Denver in 2014 due to the state’s educated workforce, innovative ecosystem, and entrepreneurial culture. ([U.S. Patent and Trademark Office](https://www.uspto.gov), 2016)
   - The Denver-Aurora-Broomfield metropolitan area ranked among the top 10 for economic development and job growth in the “Leading Locations for 2016” list. Areas recognized in the study exhibited economic strength and capacity to support business prosperity. ([Area Development](https://www.areadaily.com), 2016)
   - Metro Denver ranked as the fourth-best metro area for science, technology, engineering, and mathematics (STEM) professionals in 2016. Metro Denver ranked seventh for the projected number of STEM jobs needed by 2020. ([WalletHub](https://www.wallethub.com), 2016)
   - Boulder ranked as the third-best place for STEM graduates in 2016. STEM jobs in Boulder represented more than 14 percent of all jobs, earning an annual mean wage of $91,800. ([NerdWallet](https://www.nerdwallet.com), 2016)
   - Boulder and Fort Collins ranked among the top five most-educated metro areas in the nation in 2016. ([ValuePenguin.com](https://www.valuepenguin.com), 2016)
   - Metro Denver ranked as the fourth-best metro area for young entrepreneurs in 2016. The metro area received accolades for its highly educated population and high rate of small business loans. ([NerdWallet](https://www.nerdwallet.com), 2016)
   - Denver ranked third among the top 25 U.S. cities for fostering innovation and entrepreneurial growth. The city ranked among the top five for a healthy quality of life, a well-connected ecosystem, a vibrant cultural foundation, and a highly educated young population. ([U.S. Chamber of Commerce Foundation](https://www.us Chamber.com), 2016)
   - Denver ranked as the nation’s third-easiest city to find a job, with 96 jobs posted for every 1,000 residents. ([Forbes](https://www.forbes.com), 2016)
   - Boulder ranked sixth among the “Best Cities for New College Grads” in 2016. The city’s growing tech hub, student and young professional population, and amenities contributed to its notable rank. ([Zumper](https://www.zumper.com), 2016)

2. **Affordable operating costs**
   - Bioscience companies can recruit affordable, productive employees as the nine-county average wage for bioscience workers is slightly below the national average.
   - Denver ranked as the 13th-best market for life sciences based on employment, employment growth, venture capital funding, and NIH funding in the 2016 *Life Science Outlook*. ([Jones Lang LaSalle](https://www.jll.com), 2016)
   - The nine-county region offers a variety of real estate opportunities for bioscience companies, ranging from fully furnished executive suites to build-to-suit laboratories and office space.

3. **A pro-business environment and competitive tax structure**
   - Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. ([State of Colorado; The Tax Foundation](https://www.colorado.gov))
BIOSCIENCE: Metro Denver and Northern Colorado Industry Cluster Profile

- Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)
- Metro Denver ranked No. 1 among Forbes’ 2016 “Best Places for Business and Careers” for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (Forbes, 2016)
- Colorado ranked among the top five “Best States for Small Business Friendliness” in 2016. Fort Collins received an “A” grade and Denver received an “A−” grade for overall friendliness. (Thumbtack.com, 2016; Ewing Marion Kauffman Foundation, 2016)

4. Access to financial resources to fund research and development
- Colorado offers several public and private sources of business funding including the Certified Capital Companies Program, the Venture Capital Authority, and Colorado Capital Access. (Contact the Colorado Office of Economic Development and International Trade for more information.)
- Since 2006, Colorado has awarded more than 330 life science-related grants and provided $45.9 million in matching grant funding to bioscience ventures, generating $530 million in follow-on grants and additional investments for these companies. (Colorado BioScience Association, 2016)
- The nine-county region has six venture firms currently investing in bioscience: Boulder Ventures, Lightstone Ventures, Morgenthaler Ventures, Stakeholder Ventures, Tango/HCV, and Three Leaf Ventures.
- Colorado ranked third in the nation for Small Business Innovation Research (SBIR) grants per worker. The state received more than 200 grants totaling nearly $82.1 million, or $32.90 in grants per worker compared with the U.S. average of $11.80. (U.S. Small Business Administration, 2016; U.S. Bureau of Labor Statistics, 2016)
- Research expenditures at CSU reached $332 million in fiscal year 2016, the ninth consecutive year that research expenditures topped $300 million. (Colorado State University, 2016)
- The University of Colorado ranked among the nation’s top-25 institutions in total NIH funding reaching $173.5 million in fiscal year 2015. (National Institutes of Health, 2016)

5. Business organizations and public policy programs designed to encourage industry growth
- The Advanced Industries Accelerator (AIA) Programs promote growth and sustainability in Colorado’s advanced industries, including advanced manufacturing, aerospace, bioscience, electronics, energy and natural resources, infrastructure engineering, and technology and information. Since 2013, the AIA program has granted over $35 million to nearly 230 organizations. These industries account for nearly 30 percent of the state’s wage earnings, nearly 30 percent of the total sales revenue across all industries, and nearly 35 percent of the state’s total exports. (The Colorado Office of Economic Development and International Trade, 2016)
- Sales and use tax is exempt for equipment used in R&D of medical devices or clean technology. The exemption refunds up to $50,000 per year in sales and use taxes for companies with less than 35 employees and more than 50 percent employed in Colorado. (Exemption clarified in Colorado House Bill 15-1180)
- Startup Colorado is a regional initiative to increase the breadth and depth of the entrepreneurial ecosystem across Colorado’s Front Range. The initiative focuses on increasing connections among entrepreneurs and mentors, improving access to entrepreneurial education, and building a more vibrant entrepreneurial community. (Startup Colorado, 2016)
- The Colorado Innovation Network is a catalyst for economic prosperity through innovation by partnering with government, business, and civil society to foster collaboration around global ideas, talent, capital, and the entrepreneurial spirit.
### Bioscience Industry Cluster Definition

<table>
<thead>
<tr>
<th>NAICS Code*</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
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<tr>
<td>325413</td>
<td>In-vitro diagnostic substance mfg.</td>
<td>2835</td>
<td>Diagnostic substances</td>
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<td>Pharmaceutical machinery</td>
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<td>3842</td>
<td>Orthopedics, prosthetics, &amp; surgical appl.</td>
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<td>Laboratory apparatus &amp; furniture</td>
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<td>339114</td>
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<td>3843</td>
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<td>Research &amp; development in biotechnology</td>
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<td>Medical research</td>
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<td>Research &amp; development in biotechnology</td>
<td>8731-9902</td>
<td>Medical research (commercial)</td>
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<td>Research &amp; development in biotechnology</td>
<td>8733-01</td>
<td>Noncommercial biological research org.</td>
</tr>
</tbody>
</table>

*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.
Bioscience Industry Cluster Relationships

**Technologies**
- Bioinformatics
- Biopharma
- Genetic Engineering
- Nanotechnology
- Nutraceuticals
- Photonics

**Support Industries**
- Agriculture
- Broadcasting and Telecommunications
- Government
- Hardware
- Manufacturing
- Software

**Client Industries**
- Agriculture
- Consumers
- Energy
- Healthcare

**Infrastructure**
- Anschutz Medical Campus
- Colorado BioScience Association
- Colorado Photonics Industry Association
- Colorado State University
- Fitzsimons Innovation Campus
- National Jewish Health
- Northern Colorado Bioscience Cluster
- Other Research Institutions
- University of Colorado

For additional information, contact us:

Metro Denver Economic Development Corporation
1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenver.org
www.metrodenver.org

Industry Overview

The broadcasting and telecommunications cluster includes companies that help deliver voice, data, and video to end users. This cluster includes landline and wireless telephone communications companies, radio and television communications services, and cable and Internet service providers.

The nine-county Metro Denver and Northern Colorado region\(^1\) is an established, nationally recognized center for the broadcasting and telecommunications industry. With 42,400 broadcasting and telecommunications workers, the region has the fifth-highest employment concentration out of the 50 largest metropolitan areas. The region is also home to some of the world’s largest broadcast and telecommunications companies. These companies are developing next-generation products in the region and all major technologies are represented including cellular, fixed wireless systems, and satellite. Further, new mobile technologies and expanded broadband access have provided increased productivity, and the ability to telework, or work at home. In fact, Colorado has the highest telecommuting rate in the nation. About 6.9 percent of the state’s residents telecommute full-time, outpacing the national average by 2.6 percentage points.

The nine-county region is home to numerous broadcasting and telecommunications assets, including:

- **Data Centers** – The region is an attractive location for high-tech data centers, with low risk of natural disasters and a thriving economy. Centers for both private companies and government entities are located throughout the region.
- **Satellite** - Metro Denver’s unique geographic location in the Mountain time zone makes it possible to have same day, real-time connections around the globe. The region is home to two of the nation’s largest satellite television providers.
- **Subscription TV** - Metro Denver is the birthplace of the cable television industry and is home to a significant concentration of broadcasting and telecommunications companies including Time Warner Cable, Comcast, DISH Network, and others. In fact, Comcast has its second-largest employment presence in Colorado outside of Philadelphia. The Cable Center, located on the University of Denver campus, provides education, training, and research in all aspects of cable telecommunications.
- **Federal Laboratories and Research Centers** – Boulder is home to the Institute for Telecommunication Sciences (ITS), which is the research and engineering laboratory of the National Telecommunications and Information Administration (NTIA). ITS performs basic research in radio science that provides the technical foundation for NTIA’s policy development and spectrum management activities. The National Institute of Standards and Technology’s Communications Technology Laboratory (CTL) in Boulder unites wireless communications efforts and develops instruments, creates protocols, models, and simulation tools to enable a range of emerging wireless technologies.
- **Voice and Data Services** - Metro Denver businesses and households can access numerous providers that offer landline and wireless phone services and high-speed Internet. The region has more than 30 long-distance providers for intraLATA calls, or long distance calls within a local access transport area (LATA). Metro Denver’s extensive fiber optic network allows the flow of voice and data traffic at lower prices.
- **WiFi** - The downtown Denver WiFi Zone was among the first in the nation to provide large-scale, public Internet access. Several locations throughout Denver offer free WiFi, including the 16th Street Mall, Skyline Park, the Denver Performing Arts Complex, and Denver International Airport. Several organizations offer telework consulting services for employers in the region including the Downtown

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\(^1\) The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
Several programs and initiatives to expand broadband across the state are underway. The Colorado Governor’s Office of Information Technology (OIT) and the Colorado Department of Local Affairs are currently developing an enhanced broadband infrastructure database that will include fiber routes, tower locations and capacity, and detailed attributes for the Community Anchor Institutions. The datasets will be used for state, regional, and local broadband planning and analysis efforts. A new initiative was unveiled to bring high-speed Internet to schools across the state called Kids Link Colorado, a partnership between the Colorado Office of the Governor, OIT, and EducationSuperHighway to identify schools where improved broadband access is needed, and strategies to increase access and affordability. During the next year, the partnership will release a connectivity report for the state to recommend strategies to achieve connectivity goals. Further, Colorado has a five-year strategic plan to enable statewide broadband connectivity by partnering with the private sector to assure availability to all Coloradans.

Municipalities across the region have expanded broadband networks and increased speed. Longmont completed construction of its $40.3 million Gigabit City that provided 17 miles of expanded broadband services to more than 37,000 city facilities, businesses, and residents. Every business and resident in Longmont will have access to the affordable, fiber-based gigabit services. As a result, PC Magazine ranked Longmont third among cities with the fastest average upload and download speeds in 2016. Similarly, nearly 100 municipalities across the state have implemented or are exploring the idea of offering their own broadband Internet service including Golden, Centennial, and Lafayette.

According to BroadbandNow.com, more than 82 percent of residents across the nine-county region have access to broadband speeds of 25 megabits per second (Mbps) or faster and 70 percent of residents have access to broadband speeds of 100 Mbps or faster. A number of cities were recognized for providing exemplary digital service and increased connectivity to residents. The "2016 Digital Cities Survey" ranked the City and County of Denver seventh in the more than 250,000 population category, the city of Fort Collins ranked second in the 125,000 to 249,999 population category, and the cities of Boulder, Westminster, and Arvada ranked among the top 10 in the 75,000 to 124,999 population category.

Broadcasting and Telecommunications Economic Profile

The broadcasting and telecommunications industry cluster consists of 16, six-digit North American Industry Classification System (NAICS) codes including radio and television communications equipment, telephone communications, and cable television services.

The nine-county region ranked fifth out of the 50 largest metro areas for broadcasting and telecommunications employment concentration in 2016, up one position from the prior year. With direct employment of about 42,400 broadcasting and telecommunications employees, the region ranked ninth. About 87 percent of Colorado’s broadcasting and telecommunications cluster employees work in the region.

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2 Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.
Broadcasting and Telecommunications Employment

The nine-county region’s broadcasting and telecommunications employment (42,400 workers) increased 0.4 percent in 2016, compared with the previous year’s level. National employment levels decreased 1.8 percent over-the-year. Between 2011 and 2016, the region’s broadcasting and telecommunications employment rose 0.2 percent, compared with a 7.5 percent decline at the national level. Broadcasting and telecommunications companies employed 1.9 percent of the region’s total employment base, compared with 0.7 percent employment concentration nationwide.

Approximately 2,630 broadcasting and telecommunications companies operated in the nine-county region in 2016. About 83 percent of the region’s broadcasting and telecommunications companies employed fewer than 10 people, while 0.7 percent employed 250 or more.
**Broadcasting and Telecommunications:**  
*Metro Denver and Northern Colorado Industry Cluster Profile*

**Major Broadcasting and Telecommunications Companies**

- Alcatel-Lucent  
  [www.alcatel-lucent.com](http://www.alcatel-lucent.com)
- AT&T Inc.  
  [www.att.com](http://www.att.com)
- Avaya Inc.  
  [www.avaya.com](http://www.avaya.com)
- BI Incorporated  
  [www.bi.com](http://www.bi.com)
- Birch Communications  
  [www.birch.com](http://www.birch.com)
- BT Conferencing, Inc.  
  [www.btconferencing.com](http://www.btconferencing.com)
- CenturyLink, Inc.  
  [www.centurylink.com](http://www.centurylink.com)
- Charter Communications Inc.  
  [www.charter.com](http://www.charter.com)
- iHeartMedia, Inc.  
  [www.iheartmedia.com](http://www.iheartmedia.com)
- Integra Telecom, Inc.  
  [www.integratelecom.com](http://www.integratelecom.com)
- Level 3 Communications, Inc.  
  [www.level3.com](http://www.level3.com)
- Liberty Media Corp.  
  [www.libertymedia.com](http://www.libertymedia.com)
- Sprint Corp.  
  [www.sprint.com](http://www.sprint.com)
- Starz  
  [www.starz.com](http://www.starz.com)
- T-Mobile  
  [www.t-mobile.com](http://www.t-mobile.com)
- Verizon  
  [www.verizon.com](http://www.verizon.com)
Major Broadcasting and Telecommunications Companies Cont’d

- Comcast Corp.  
  www.xfinity.com
- DIRECTV, Inc.  
  www.directv.com
- DISH Network  
  www.dish.com
- EchoStar Corp.  
  www.echostar.com
- Google  
  www.google.com
- WildBlue Communications, Inc.  
  www.wildblue.com
- WOW! Internet, Cable & Phone  
  www.wowway.com
- XO Communications, LLC  
  www.xo.com
- Zayo Group  
  www.zayo.com

2016 Industry Highlights

Key Company Announcements

The nine-county region’s diverse and highly educated workforce, innovative and entrepreneurial spirit, and reputation as a tech hub make it an attractive location for broadcasting and telecommunications companies to locate and expand. Notable company announcements in 2016 included:

- Comcast Corp. will open a new call center in Fort Collins in 2017 and plans to hire 600 employees, most of whom are expected to be hired locally. The new center is in addition to existing customer care sites in the southern Metro Denver area, where Comcast employs about 400 people.
- Comcast Corp. leased a 212,000-square-foot office building in the Dry Creek Business Park in Centennial. Comcast will occupy the property in the first quarter of 2017.
- Comcast Corp. expanded its VIPER team in downtown Denver with new offices at 15th and Wynkoop. The company’s Internet software development division will employ more than 200 workers and 110 contract staff.
- Google exercised an option to purchase the land for the second phase of its Boulder campus, which is expected to accommodate another 500 employees. The $150 million project includes a four-acre campus that will provide 330,000 square feet of office space in three four-story buildings with an underground parking lot. The first phase, designed to accommodate up to 1,000 workers, is slated for completion in 2017.
- Charter Communications Inc. plans to lease 306,000 square feet in Village Center Station in Greenwood Village and will add 800 jobs to the area. The new space will be home to the company’s corporate functions, software and product development, and regional operations.
- Liberty Global moved its headquarters from Douglas County to downtown Denver in February. The company leased more than 70,000 square feet in the Triangle Building near Denver Union Station.
- DISH Network plans to add up to 100 new technology jobs with the opening of its new Grand Central offices in downtown Denver. The expansion is part of DISH’s growing line of products and services including the Hopper DVR platform and Sling TV.
- SpotXchange Inc., a firm that provides an online video advertising platform, will move its headquarters from Westminster to Broomfield in May 2017. The company leased 38,730 square feet of space at 8181 Arista Place to accommodate its growing workforce and product offerings.
- Broomfield-based Gogo will expand its Gogo Vision that offers studio-licensed movies and television episodes in seven languages. Gogo utilizes on-board servers that stream content wirelessly to personal electronic devices.
- Rocky Mountain PBS plans to expand and move to north downtown Denver. The project includes a 500-seat performance theater, 80,000 square feet of office space, shared studios, and a Denver Public School expeditionary learning school. The facility is expected to bring 43 new jobs to the organization.
- Denverite, an all-digital news operation, launched in Denver. The news outlet provides a daily digital email newsletter, a website, and a social media stream.

Expanded Broadband and Network Improvements

The nine-county region’s broadcasting and telecommunications companies offered expanded broadband and increased network speeds in 2016.
BROADCASTING AND TELECOMMUNICATIONS:
Metro Denver and Northern Colorado Industry Cluster Profile

• AT&T invested nearly $300 million to upgrade its Denver infrastructure and wireless networks from 2013 to 2015, boosting reliability, coverage, speed, and performance. The company added capacity in the Colorado Convention Center, Coors Field, and Denver International Airport, among others. Across the state, AT&T invested $575 million between 2013 and 2015 including nearly 650 wireless network upgrades, doubled capacity at more than 200 sites, and added distributed antenna systems.
• Canada-based Tucows Inc. will begin construction of a fiber network in Centennial in 2017. The company’s Ting Internet service will bring speeds of an estimated 1,000 megabits per second (Mbps), expanding opportunities for both residents and businesses.
• Comcast Corp. will offer 1 gigabit-per-second Internet service to customers in the Front Range by early 2017. Comcast will deploy the service using existing coaxial cable and fiber optic lines that are already in place in most neighborhoods and homes.
• Fiber-to-the-home connections are becoming standard for new housing developments in the region. The fiber networks replace traditional copper phone wires and coaxial cables for television and broadband. In 2016, CenturyLink Inc. and Comcast Corp. completed fiber-to-home connections in 75,000 new homes built or under construction.
  o Comcast and Oakwood Homes are making fiber-to-the-home standard in a part of northeast Denver’s Green Valley Ranch neighborhood. Construction is expected to begin around the rail stop.
  o Sterling Ranch Development Co. is creating a fiber-optic, network-linked community in Douglas County. Developers plan for each one of the 12,500 homes in the new development to have gigabit-speed Internet connections. Once built, the development will be among a handful of places globally utilizing “smart” infrastructure.
• Cable and satellite TV providers are expanding over-the-top (OTT) streaming services in Colorado and nationally. Dish Network introduced Sling TV and several other companies are launching similar services including AT&T, CenturyLink, Comcast, and Direct TV. OTT allows consumers to stream live cable television channels and video over Internet-connected devices with low-cost subscriptions and no long-term contracts.
• Denver-based WOW! Internet, Cable & Phone raised $40 million in financing to expand its product offerings. The broadband service provider has 2,800 employees and 784,600 customers.
• Prism TV is expanding and is currently available to 500,000 homes in Metro Denver. The service is similar to cable, with hundreds of channels and limited-time deals that require a 12-month contract. It also allows wireless set-top boxes so customers are not limited to keeping the box near a CenturyLink connection in the wall.

Merger and Acquisition Activity

Broadcasting and telecommunications companies in the nine-county region announced several mergers and acquisitions in 2016.

• Charter Communications, Inc. merged with Time Warner Cable Inc. and Bright House Networks in May 2016. The company is the second largest cable operator in the U.S., offering a full range of broadband communications services and serving over 25 million customers in 41 states.
• Golden-based Centerline Solutions, a designer and builder of wireless service antennae towers, acquired Florida-based UCI Construction. Centerline’s acquisition grows the company to over 400 employees nationwide and opens access to the southeastern market. Part of the fast-growing mobile-phone infrastructure industry, Centerline has had triple-digit revenue growth over the past three years.
• Golden-based Digital Roads Inc. was acquired by New Mexico-based Advanced Network Management Inc. (ANM) to expand product offerings and serve its growing client base. ANM will combine the staff at Digital Roads Inc. with its existing Denver office.
• Boulder-based Zayo Group completed its acquisition of Canada-based Allstream in a deal valued at $348 million. Other notable Zayo acquisitions in 2016 included Clearview International for $18.9 million. Over the past two years, the company has acquired more than a dozen companies.
• California-based Lions Gate acquired Douglas County-based Starz in a $4.4 billion deal. The deal will create worldwide growth opportunities for the combined company.
• CenturyLink plans to purchase Broomfield-based Level 3 Communications in a deal worth an estimated $34 billion. The combined company will be the second-largest domestic communications provider serving global enterprise customers and will expand CenturyLink’s network by 200,000 route miles of fiber. Level 3 has a presence in more than 60 countries.
AT&T plans to purchase Time Warner in an $85.4 billion deal. The merger would allow AT&T to control the distribution of both company’s shows, movies, and other content. The deal is expected to require antitrust hearings from the U.S. Justice Department and federal regulators.

Denver-based Liberty Global merged with Netherlands-based Vodafone Group, a company that operates European mobile phone networks. The $3.7 billion deal will allow the joint-venture partners to offer bundles of cable television, broadband, and mobile services to 4.2 million video subscribers and 5.3 million wireless phone subscribers. Liberty Global is the largest multinational cable television and broadband provider worldwide.

Broadcasting and Telecommunications Workforce Profile

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

The nine-county region’s broadcasting and telecommunications industry employs 42,400 people and includes a large pool of talented, well-educated, and highly skilled workers. The broadcasting and telecommunications cluster has a larger share of employees (57.4 percent) that are between the ages of 35 and 54 years and older, compared with the age distribution of all industries across the nine-county region (43.7 percent).
The broadcasting and telecommunications workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest broadcasting and telecommunications occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

**Wages**

The 2015 average annual salary for broadcasting and telecommunications employees in the nine-county region was $99,120, compared with $84,130 nationwide. Total payroll for the broadcasting and telecommunications cluster in the region reached nearly $4.2 billion in 2015.

**Metro Denver and Northern Colorado Broadcasting and Telecommunications Occupation & Salary Profile, 2016**

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<td>$53,573</td>
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<td>$41,879</td>
<td>$51,228</td>
</tr>
<tr>
<td>4. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
<td>$97,749</td>
<td>$126,953</td>
</tr>
<tr>
<td>5. Electronics engineers, except computer</td>
<td>4,938</td>
<td>123</td>
<td>441</td>
<td>$101,396</td>
<td>$64,980</td>
<td>$77,300</td>
<td>$122,914</td>
<td>$150,057</td>
</tr>
<tr>
<td>6. Software developers, applications</td>
<td>19,949</td>
<td>339</td>
<td>921</td>
<td>$103,454</td>
<td>$65,735</td>
<td>$81,356</td>
<td>$122,826</td>
<td>$148,422</td>
</tr>
<tr>
<td>7. Network &amp; computer systems administrators</td>
<td>9,014</td>
<td>153</td>
<td>852</td>
<td>$83,869</td>
<td>$51,933</td>
<td>$65,942</td>
<td>$102,033</td>
<td>$119,858</td>
</tr>
<tr>
<td>8. Telecommunications line installers &amp; repairers</td>
<td>1,353</td>
<td>41</td>
<td>4</td>
<td>$46,735</td>
<td>$28,961</td>
<td>$34,898</td>
<td>$57,806</td>
<td>$67,594</td>
</tr>
<tr>
<td>9. Computer network architects</td>
<td>3,501</td>
<td>60</td>
<td>2,251</td>
<td>$106,010</td>
<td>$66,384</td>
<td>$82,947</td>
<td>$125,442</td>
<td>$150,490</td>
</tr>
<tr>
<td>10. Computer user support specialists</td>
<td>11,439</td>
<td>194</td>
<td>928</td>
<td>$57,610</td>
<td>$34,918</td>
<td>$43,203</td>
<td>$69,054</td>
<td>$87,818</td>
</tr>
</tbody>
</table>

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works! QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.
Education & Training

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest broadcasting and telecommunications occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via [http://highered.colorado.gov](http://highered.colorado.gov).

- Colorado State University  
  [www.colostate.edu](http://www.colostate.edu)
- Front Range Community College  
  [www.frontrange.edu](http://www.frontrange.edu)
- University of Colorado: Boulder, Denver  
  [www.cu.edu](http://www.cu.edu)
- Colorado State University Global Campus  
  [www.colostate.edu](http://www.colostate.edu)
- Metropolitan State University of Denver  
  [www.msudenver.edu](http://www.msudenver.edu)
- University of Denver  
  [www.du.edu](http://www.du.edu)
- Community College of Aurora  
  [www.ccaurora.edu](http://www.ccaurora.edu)
- Regis University  
  [www.regis.edu](http://www.regis.edu)
- University of Northern Colorado  
  [www.unco.edu](http://www.unco.edu)

Key Reasons for Broadcasting and Telecommunications Companies to Locate in the Nine-County Region

The region is a top broadcasting and telecommunications location offering:

1. **A central location and easy global access**
   - Denver International Airport was the sixth-busiest airport in the nation and 19th-busiest worldwide in terms of passenger traffic in 2015. ([U.S. Bureau of Transportation Statistics, 2016](https://www.bts.gov)); [Airports Council International, 2016](https://www.aci-aero.org); [Denver International Airport, 2016](http://www.denverinternationalairport.com)
   - Metro Denver is the largest region in the U.S. to offer one-bounce satellite uplinks to six out of seven continents in one business day due to its unique geographic location in the Mountain time zone. ([Metro Denver Economic Development Corporation](http://www.mdedc.com))
   - Metro Denver’s central U.S. location on the 105th meridian at the midpoint between Tokyo and Frankfurt makes it a strategic choice for conducting national and international business. ([Metro Denver Economic Development Corporation](http://www.mdedc.com))
   - More than 1,000 miles from the nearest coast and outside of Tornado Alley, Metro Denver’s risk of natural disasters is minimal compared with locations in the east, west, and south. ([National Oceanic and Atmospheric Administration, 2016](https://www.noaa.gov); [U.S. Geological Survey, 2016](https://www.usgs.gov))

2. **A large concentration of high-quality technology workers and entrepreneurial talent**
   - Colorado has one of the nation’s most educated workforces, ranking second among the 50 states for percentage of residents (39.2 percent) with a bachelor’s degree or higher. ([U.S. Census Bureau, 2015 American Community Survey](https://www.census.gov))
   - Colorado ranked third in the nation for its technology employment concentration (9 percent) in 2015. The state had the eighth-highest number of tech establishments, ranked ninth for average high-tech wage, and ranked third for the tech industries’ contribution to the state’s economy. Colorado had the 10th-highest wage differential in the nation, with tech workers earning nearly double the average private-sector worker. ([CompTIA, Cyberstates 2016: The Definitive State-by-State Analysis of the U.S. High-Technology Industry, 2016](https://www.comptia.org))
   - Metro Denver ranked ninth among the 40 largest metro areas for startup activity in the 2016 [Kauffman Index: Startup Activity](https://www.kauffman.org), with 360 people out of 100,000 adults becoming entrepreneurs each month. ([Ewing Marion Kauffman Foundation, 2016](https://www.kauffman.org))
   - Metro Denver ranked as the fourth-best metro area for young entrepreneurs in 2016. The metro area received accolades for its highly educated population and high rate of small business loans. ([NerdWallet, 2016](https://www.nerdwallet.com))
   - Boulder ranked sixth among the “Best Cities for New College Grads” in 2016. The city’s growing tech hub, student and young professional population, and amenities contributed to its notable rank. ([Zumper, 2016](https://www.zumper.com))
BROADCASTING AND TELECOMMUNICATIONS:
Metro Denver and Northern Colorado Industry Cluster Profile

- Denver ranked third among the top 25 U.S. cities for fostering innovation and entrepreneurial growth. The city ranked among the top five for a healthy quality of life, a well-connected ecosystem, a vibrant cultural foundation, and a highly educated young population. (U.S. Chamber of Commerce Foundation, 2016)
- Metro Denver ranked as the fourth-best metro area for science, technology, engineering, and mathematics (STEM) professionals in 2016. Metro Denver ranked seventh for the projected number of STEM jobs needed by 2020. (WalletHub, 2016)
- Denver ranked third for attracting the most millennials relocating from another city in 2016. (Mayflower, 2016)
- Metro Denver ranked fifth among the top 15 major metros for college graduates in 2016. Fort Collins ranked fourth among small metro areas. (American Institute for Economic Research, 2016)

3. Low to moderate costs of doing business
- Colorado ranked fifth on Forbes’ 2016 “Best States for Business” list. The state received its highest rankings for labor supply (first overall), economic climate (second overall), growth prospects (third overall), and regulatory environment (ninth overall). (Forbes, 2016)
- Metro Denver ranked No. 1 among Forbes’ 2016 “Best Places for Business and Careers” for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (Forbes, 2016)
- Metro Denver office rental rates averaged $29.52 per square foot in the fourth quarter of 2016, making the region’s office market highly competitive with other major markets in the U.S. (CoStar Realty Information, The CoStar Office Report, 4Q 2016)

4. A pro-business environment and competitive tax structure
- Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)
- The Denver-Aurora-Broomfield metropolitan area ranked among the top 10 for economic development and job growth in the “Leading Locations for 2016” list. Areas recognized in the study exhibited economic strength and capacity to support business prosperity. (Area Development, 2016)
- Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)
- Colorado ranked among the top five “Best States for Small Business Friendliness” in 2016. Fort Collins received an “A” grade and Denver received an “A-” grade for overall friendliness. (Thumbtack.com, 2016; Ewing Marion Kauffman Foundation, 2016)

5. An overall better quality of life
- Denver ranked No. 1 among U.S. News & World Report’s 2016 “Best Places to Live.” Denver’s healthy job market and access to the outdoors contributed to its notable rank. (U.S. News & World Report, 2016)
- Highlands Ranch ranked sixth in MONEY Magazine’s 2016 “Best Places to Live” list. Centennial (13th) and Broomfield (25th) were also named to the list’s top-25. (MONEY Magazine, 2016)
- Metro Denver ranked as the third-fittest metropolitan area in the U.S. in 2016. Increased physical activity, low obesity and diabetes rates, and access to recreational opportunities contributed to its high rank. (American College of Sports Medicine, 2016)
- Outdoor recreation is a fundamental component to Colorado’s healthy, active lifestyle and generates a $34.5 billion economic impact annually. The state has the fourth-highest percentage of state land area devoted to national forests and public lands, more than 70 state parks and wilderness areas, and is home to the highest concentration of 13,000 and 14,000-foot peaks in the nation. (Colorado Tourism Office, 2016)
- Denver ranked fifth among the “2016’s Best Large Cities to Live In.” Denver scored first for livability and third for local economy and taxes. (WalletHub, 2016)
- FasTracks is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.
**Broadcasting and Telecommunications Industry Cluster Definition**

<table>
<thead>
<tr>
<th>NAICS Code*</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>334210</td>
<td>Telephone apparatus mfg.</td>
<td>3661</td>
<td>Telephone &amp; telegraph apparatus</td>
</tr>
<tr>
<td>334220</td>
<td>Radio &amp; television broadcasting &amp; wireless communications equipment mfg.</td>
<td>3663</td>
<td>Radio &amp; tv communications equipment</td>
</tr>
<tr>
<td>334290</td>
<td>Other communications equipment mfg.</td>
<td>3669</td>
<td>Communications equipment, NEC</td>
</tr>
<tr>
<td>335921</td>
<td>Fiber optic cable mfg.</td>
<td>3357</td>
<td>Drawing &amp; insulating of nonferrous wire</td>
</tr>
<tr>
<td>335929</td>
<td>Other communication &amp; energy wire mfg.</td>
<td>3357</td>
<td>Drawing &amp; insulating of nonferrous wire</td>
</tr>
<tr>
<td>515111</td>
<td>Radio networks</td>
<td>4832</td>
<td>Radio broadcasting stations</td>
</tr>
<tr>
<td>515112</td>
<td>Radio stations</td>
<td>4832</td>
<td>Radio broadcasting stations</td>
</tr>
<tr>
<td>515120</td>
<td>Television broadcasting</td>
<td>4833</td>
<td>Television broadcasting stations</td>
</tr>
<tr>
<td>515210</td>
<td>Cable networks &amp; other subscription prog.</td>
<td>4841</td>
<td>Cable &amp; other pay television services</td>
</tr>
<tr>
<td>517110</td>
<td>Wired telecommunications carriers</td>
<td>4813</td>
<td>Telephone communication except radio</td>
</tr>
<tr>
<td>517110</td>
<td>Wired telecommunications carriers</td>
<td>4822</td>
<td>Telegraph &amp; other communications</td>
</tr>
<tr>
<td>517110</td>
<td>Wired telecommunications carriers</td>
<td>4841</td>
<td>Cable &amp; other pay television services</td>
</tr>
<tr>
<td>517110</td>
<td>Wired telecommunications carriers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>517210</td>
<td>Wireless telecommunications carriers (except satellite)</td>
<td>4899</td>
<td>Communication services, NEC</td>
</tr>
<tr>
<td>517210</td>
<td>Wireless telecommunications carriers (except satellite)</td>
<td>7375</td>
<td>Information retrieval services</td>
</tr>
<tr>
<td>517410</td>
<td>Satellite telecommunications</td>
<td>4899</td>
<td>Communication services, NEC</td>
</tr>
<tr>
<td>517911</td>
<td>Telecommunications resellers</td>
<td>4812</td>
<td>Radiotelephone communication</td>
</tr>
<tr>
<td>517911</td>
<td>Telecommunications resellers</td>
<td>4813</td>
<td>Telephone communication except radio</td>
</tr>
<tr>
<td>517919</td>
<td>All other telecommunications</td>
<td>4899</td>
<td>Communication services, NEC</td>
</tr>
<tr>
<td>517919</td>
<td>All other telecommunications</td>
<td>7375</td>
<td>Information retrieval services</td>
</tr>
<tr>
<td>519130</td>
<td>Internet publishing &amp; broadcasting &amp; web search portals</td>
<td>8999-0800</td>
<td>Communication services</td>
</tr>
<tr>
<td>561499</td>
<td>All other business support services</td>
<td>7389-1004</td>
<td>Teleconferencing services</td>
</tr>
</tbody>
</table>

*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.

Note: NEC indicates "not elsewhere classified."
Broadcasting and Telecommunications Industry Cluster Relationships

**Technologies**
- WiFi – Wireless Fidelity
- Fiber Optic Networks
- VoIP – Voice over Internet Protocol
- Nanotechnology
- Internet
- Photonics

**Support Industries**
- Aerospace
- Computer Storage
- Fiber Optics
- Geospatial
- Photonics
- Software

**Infrastructure**
- CO Technology Partners
- One-Bounce Satellite Location
- High-Speed Digital Network
- CO Telecom Association
- CO Photonics Industry Association
- CU-Telecom Systems Lab
- CTA-Colorado Technology Association
- DU Center for Technology Innovation
- Institute for Telecommunication Sciences, NTIA
- NIST Communications Technology Lab

**Client Industries**
- Aerospace
- Aviation
- Bioscience
- Energy
- Financial Services
- Healthcare
- Software
- Consumers
- Businesses

For additional information, contact us:

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**Industry Overview**

Colorado has one of the most diverse energy economies in the nation with access to several natural resources. In fact, Colorado’s energy sector has grown to include fossil fuels, consisting of oil, coal, and natural gas, as well as clean-energy technologies such as wind, solar, biomass, energy efficiency controls and applications, and alternative fuel vehicles and fueling infrastructure. The varied energy mix is attributable to several key assets including significant oil and gas reserves, super-compliant coal, vast solar and wind resources, and high-profile intellectual property. In support of a balanced energy policy, Colorado has advanced a diversity of measures, such as the first voter-led renewable energy standard in the nation and financial incentives for homegrown energy resources.

Colorado is an energy powerhouse and is one of the most energy-rich states in the nation. According to the U.S. Energy Information Administration, Colorado ranked sixth in the nation for natural gas production, seventh for crude oil production, and 11th for coal production. In 2016, Colorado ranked ninth in the nation for total installed solar capacity and 10th for installed wind generation capacity. Additionally, Colorado ranked third in the nation for high-tech employment and its universities and technology hubs elevate the state’s position as a leader in energy technology and sector advancements.

This report evaluates the energy industry in the nine-county Metro Denver and Northern Colorado region in two subclusters: (1) cleantech and (2) fossil fuels. With 52,850 energy workers in approximately 3,230 companies in 2016, the nine-county region continues to position itself as a leader in the energy industry.

Across the state, 70,640 direct energy workers earning $6.9 billion support an additional 204,120 indirect workers earning nearly $8 billion in all industries. In total, the energy industry in Colorado supports 274,760 workers in all industries earning $14.9 billion annually.

**Cluster Definition and Methodology**

The fossil fuels subcluster includes companies involved in the extraction of naturally occurring fuels used to produce energy as well as the generation, transmission, and distribution of energy resources. The cleantech subcluster includes companies developing and delivering products and technologies across solar, wind, biomass, and sustainable transportation sectors that improve operational performance, efficiency, or productivity, while reducing energy costs and energy consumption.

It is often difficult to distinguish how an organization’s operations are divided between fossil fuels and cleantech components. For example, research is a critical component of all energy industries, from oil and gas to solar and wind energy. So that the two subclusters may be analyzed independently, all energy research entities are included in the cleantech subcluster while all energy transmission and distribution activities are included in the fossil fuels subcluster, even though a portion of the energy may be coming from renewable resources.

**Cleantech Economic Profile**

The cleantech subcluster includes companies that produce and conserve energy using wind, solar, biomass, fuel cells, hydroelectric resources, and green transportation technologies. Companies that manufacture renewable energy equipment, storage, and power transformers, and businesses that provide engineering and other support services are also included. The subcluster includes energy research companies that provide laboratory testing, scientific and technical consulting services, and institutional research related to the

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1 The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
environment, natural resources, and energy. The cleantech subcluster consists of 29, six-digit North American Industry Classification System (NAICS) codes.

The nine-county region ranked fourth out of the 50 largest metro areas in cleantech employment concentration in 2015, up one position from the previous year. With direct employment in the cleantech subcluster of 22,390 workers, the region ranked sixth out of the 50 largest metro areas. About 85 percent of Colorado’s cleantech employment was located in the region.

### Cleantech Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>22,390</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>1,610</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>6.0%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>20.4%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>3.8%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>1.0%</td>
</tr>
</tbody>
</table>


### Cleantech Employment

The nine-county region’s cleantech employment (22,390 workers) rose 6 percent in 2016 compared with the previous year’s level, adding 1,270 new jobs during the same period. National employment levels also grew over-the-year, rising 5.7 percent, representing an additional 47,180 jobs. Nearly 3 percent of the nation’s cleantech employment is located in the region. Between 2011 and 2016, the region’s cleantech employment rose 20.4 percent compared with a 17.6 percent increase nationwide. Cleantech companies employed 1 percent of the region’s total employment base, compared with a 0.5 percent employment concentration nationwide.

About 1,610 cleantech companies operated in the nine-county region in 2016, rising 3.7 percent over the prior year. Approximately 83 percent of these companies employed fewer than 10 people, while 0.8 percent employed 250 or more.

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2 Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.
Cleantech Overview

The nine-county region’s research universities, the U.S. Department of Energy’s (DOE) National Renewable Energy Laboratory, and public-private partnerships, like those established through the Colorado Energy Research Collaboratory (Collaboratory) and the Colorado Cleantech Industry Association, provide the foundational research and education needed for new market innovations. These research and educational centers create new opportunities in energy efficiency and renewable energy that allow for cleaner and more efficient use of energy.

The Collaboratory integrates cutting-edge research with industry expertise to accelerate the transfer of energy technologies to the marketplace in the areas of biorefining, solar photovoltaics, wind, and carbon management. Since its launch in 2007, the Collaboratory has shown a 24:1 return on investment using state funding of nearly $8 million to leverage federal and private-sector dollars, and has helped attract several companies to Colorado. The Collaboratory has drawn $96.6 million in outside investment over the last eight years and had an economic impact of $194 million.

The Colorado Cleantech Industry Association (CCIA), an industry association dedicated entirely to cleantech, provides advocacy, capacity building, and education and training to the cleantech sector. CCIA is one of the first, regional cleantech organizations to partner with Advanced Energy Economy, a national trade association representing the advanced energy industry. The Energy Fellows Institute, a CCIA program, is the nation’s first program to educate experienced entrepreneurs and executives in the technology sectors of cleantech.
Colorado’s 30 federal research laboratories and research institutions—one of the highest concentrations of federal funded science and research centers in the nation—support the state’s thriving energy cluster. Employing nearly 8,000 scientists and engineers and generating a more than $2.3 billion annual economic impact to the region, the laboratories collaborate to encourage the exchange of information and ideas, promote technology transfer, and support innovation.

The National Renewable Energy Laboratory (NREL), located in Golden, is the DOE’s only laboratory dedicated to renewable energy and energy efficiency research and development. NREL is home to three national centers including the National Bioenergy Center, the National Center for Photovoltaics, and the National Wind Technology Center. NREL’s $135 million, 182,000-square-foot Energy Systems Integration Facility (ESIF) was named “Laboratory of the Year” by R&D Magazine in 2014, an esteemed award for the most important technological innovations. Since 2002, NREL received more than $4.6 billion in funding. Further, NREL contributed nearly $701 million to Colorado’s economy in fiscal year 2014. NREL collaborates with hundreds of partners across 46 states and 30 countries to commercialize renewable energy and energy efficiency technologies. NREL had nearly 700 active partnerships and established 240 new partnership agreements in 2015. Under these collaborative partnerships, technology is often transferred for commercialization and used in the private sector. NREL has been awarded 40 technology transfer awards since 1997, aided 30 clean-energy startups, issued over 440 U.S. patents, and garnered more than 200 awards and honors for its programs and scientific research. Notable NREL announcements in 2016 included:

- The Institute for Advanced Composites Manufacturing Innovation, NREL, and the state of Colorado repurposed an existing building at NREL’s Wind Research Center into the Wind Blade Component Manufacturing Facility. The $1.6 million facility will serve as a research and development site to help manufacturers build longer, lighter, and stronger wind blades.
- NREL installed its second hydraulic hybrid propulsion system on a passenger shuttle bus, part of its work to comply with federal standards to reduce emissions from its fleets by 2025. The hydraulic hybrid system, manufactured by Loveland-based Lightning Hybrids, improves fuel and braking efficiency. Both buses shuttle more than 500 employees and visitors around NREL’s campus.
- NREL was awarded a $1.4 million DOE grant to lead four projects for the Technology Commercialization Fund. The projects will be used to advance promising renewable energy-related technologies with commercial potential and help strengthen partnerships between national laboratories and private companies.
- NREL partnered with Sandia National Laboratories, Lawrence Berkeley National Laboratory, and SLAC National Accelerator Laboratory to form the Durable Module Materials National Lab Consortium (DuraMat). DuraMat will receive about $30 million over five years from DOE’s SunShot Initiative, which funds projects designed to accelerate the market competitiveness of solar power. DuraMat intends to develop, characterize, and deploy new materials and architectures that will improve the value of photovoltaic (PV) modules for manufacturers, plant developers, financiers, and utilities.

Cleantech Policy and Financing

Colorado’s progressive policy initiatives support the state’s balanced energy economy. Among the state’s notable policies, Colorado is home to the first voter-led renewable energy standard in the nation, achieving 30 percent by 2020. Other policies also make Colorado an attractive cleantech marketplace including the state’s commercial property-assessed clean energy (C-PACE) financing program and progressive community solar initiatives. In addition to policies incentivizing technology deployment, Colorado has several programs that provide grants and tax incentives to cleantech companies that invest in Colorado, such as the Advanced Industries Accelerator Program. The Energy Fellows Institute also trains CEOs from other sectors to lead Colorado’s cleantech companies.

These policies and incentives are helping to attract cleantech venture capital and funding opportunities to the state. Colorado has consistently been a strong performer in cleantech venture capital. According to PricewaterhouseCoopers, Colorado ranked eighth out of 50 states in cleantech venture capital investments in 2016, totaling $20.5 million. According to the i3 Platform, the state ranked fourth in deal volume across major U.S. hubs, accounting for 5.3 percent of total venture capital deal volume to cleantech startups. The number of deals from 2012-2014 was nearly quadruple that of the 2007-2009 period, vaulting Colorado into second place nationally in cleantech venture capital deals per one million people. On a dollars per capita basis, Colorado has outperformed the average of the top 10 states, at about $7 per person.
Cleantech Company Announcements

The nine-county region’s cleantech companies offer advanced technologies and increased innovation to harness new and existing cleantech resources. Notable announcements in 2016 included:

- According to Development Research Partners, more than $5.4 billion in renewable energy projects have been built in eastern Colorado over the last 16 years. The construction and operation of these renewable energy power facilities have had an estimated $2.7 billion economic impact in eastern Colorado. Further, wind and solar support about 4,250 jobs at more than 220 cleantech businesses.
- The University of Colorado Boulder received a $1.8 million grant from the DOE’s Advanced Research Projects Agency-Energy to develop a window coating that could improve buildings’ energy efficiency. The team will utilize liquid crystals to create a transparent, solid film that is thermally insulating, soundproof, and resists water condensation.
- Denver-based Quantum Renewable Energy Inc. unveiled its new “smart box” technology that combines solar, wind, natural gas, and other renewable power sources to create clean, utility-grade electrical power. The technology reduces consumers’ energy costs by anticipating power loads and environmental conditions for renewable energy production.
- According to the Colorado Energy Office, the state is home to 70 energy recycling sites that generate up to 108 megawatts (MW) of power—enough to support 81,000 homes. Recycled energy captures heat that is produced by an industrial process that normally would be vented. The heat is funneled through a turbine to generate electricity for use either on-site, or for sale to a utility to use off-site. Of the total, 10 sites have the capacity to generate up to 56 MW of power.
- Colorado has more than 32,000 customer-sited installed energy systems, with small-scale solar power systems representing the largest share (91.6 percent) of all distributed energy systems, according to the Colorado Energy Office. The Colorado Customer-Sited Energy Study determined most of the systems are concentrated in Metro Denver, but there are solar power systems in nearly every county in the state.
- Boulder-based Cool Energy Inc. raised nearly $1.5 million in new equity funding to support the company’s ThermoHeart Engine™ converting waste heat from industrial facilities into clean electricity.
- Continental Control Systems LLC moved its headquarters and manufacturing operations from Boulder to Longmont. The company doubled its space and will add employees to expand its electric power metering and monitoring equipment manufacturing.
- Xcel Energy will offer two pilot programs that adjust electricity rates higher during peak times or boost rates when customers’ usage surges. Each program requires smart meters for participants to control their energy use and will allow Xcel to improve grid efficiency. The programs will target 10,000 residential customers in 2017, with a goal of 18,000 by 2019.

Solar Energy

The nine-county region is a leading solar market, fueled by decreasing costs, increasing innovation, and access to low-cost capital. Key solar announcements and new project developments in 2016 included:

- Boulder-based Namasté Solar began construction on a 3.5-MW ground-mounted solar array for the city of Loveland. The array will replace the Idylwilde hydroelectric facility, which was damaged during the major floods in 2013.
- Tennessee-based Silicon Ranch Corp. constructed a new 13-MW solar farm for the city of Fort Lupton. The 112-acre solar farm will contribute $20 million in economic impact for the area and will generate enough power to supply about 2,500 households.
- Louisville-based Clean Energy Collective partnered with Xcel Energy to build a community solar facility northeast of Platteville. The 12.5-acre project will include more than 18,000 solar panels, which could power over 450 homes.
- Xcel Energy will add 392 MW of new solar power in the state between 2017 and 2019, including 123 MW of rooftop solar. Xcel will also create a solar power program for low-income customers via rooftop solar power systems, and will create a new 50 MW program for residential and business customers to get up to 100 percent of their energy from renewable sources.
- Solar Alliance Energy expanded its residential, commercial, and industrial solar sales and installations into Colorado, with the opening of an office in Denver.
- Denver was selected to be the site of the 2017 DOE Solar Decathlon competition. The international contest challenges collegiate teams to design, build, and operate solar-powered houses that are cost-effective, energy-efficient, and attractive.
- Xcel Energy will launch two solar power-battery storage tests in Denver as part of the Innovation Clean Technology demonstration project program. The $9.1 million projects, one in Stapleton and the
other at the Panasonic facility in Denver, will test the use of batteries and microgrid power systems to evaluate utilizing batteries to regulate voltage, reduce peak demand, and cut energy costs.

- Boulder-based Wunder Capital received $3.6 million in private equity to expand its large-scale solar projects across the nation and grow its existing workforce. Wunder Capital partners with a network of U.S. installers, developers, and distributors to find and assess solar projects to finance.

- Colorado is among 14 states where SolarCity Corp. will offer a new loan program for homeowners to finance installation of solar panels. The program will allow consumers to purchase solar panels through 10-year or 20-year loans instead of leasing them.

Colorado was the first state in the nation to allow community solar systems on the grid. As of 2016, the state has 27 MW of shared solar across 37 projects. About 75 percent of the state’s electricity customers can access a community solar project. Further, the state’s electric cooperatives have embraced shared solar, accounting for 11 of Colorado’s programs. Notable announcements in 2016 included:

- Xcel Energy, Clean Energy Collective, Community Energy Solar Inc., and Denver-based SunShare will supply 29.5 MW of new community solar power systems across Colorado. The companies will build projects via Xcel’s Solar Rewards Community programs.

- SunShare opened a new 1.5-MW community solar garden in Arvada. The 13-acre Jefferson County Community Solar Garden project includes more than 4,750 solar panels that could power 300 homes over 20 years.

**Wind Energy**

Wind is the predominant renewable resource in Colorado and is the fastest-growing energy resource on the grid. Further, the state is a hub for wind manufacturing activity and has created new opportunities in electricity generation, innovation, and research and development. Notable wind announcements in 2016 included:

- Vestas Wind Systems will add 100 new workers to its Brighton facility. The extension of the federal Production Tax Credit continues to boost demand at the company’s Colorado facilities.


**Biofuels and Bioenergy**

Bioenergy is an increasingly important source of the nine-county region’s renewable energy portfolio and is well positioned for continued growth and development. Notable bioenergy announcements in 2016 included:

- Alaska Airlines operated the first-ever commercial flight using Englewood-based Gevo Inc.’s renewable alcohol-to-jet (ATJ) fuel. ATJ biofuel was approved for use by the American Society for Testing and Materials International in March 2016 and is the first aviation biofuel to be certified and approved since 2011.

- Gevo reached a deal with Deutsche Lufthansa AG to supply the airline with up to 8 million gallons of ATJ fuel per year. The five-year deal would supply the airline with about 40 million gallons of fuel.

- Heartland Biogas LLC and Eaton-based A1 Organics completed a $3.5 million addition to the biogas digester system at the Heartland Biogas Digestion facility near LaSalle. The addition included a new processor that turns solid food waste into slurry that is pumped into a digester that is converted to natural gas.

**Research and Education Announcements**

The nine-county region’s leading research institutions, educational facilities, and cohort-based programs support the region’s dynamic energy industry.

- Aims Community College broke ground on a $23.8 million Applied Technology Education Center to expand program opportunities in energy technology, welding, and industrial and engineering technology, among others. The 72,000-square-foot facility will include instructional labs and classroom space, which is slated for completion in 2017.

- Traxion, a new business accelerator focused on supporting energy startups, opened in Golden in 2016. The company invests seed capital and connects participating companies to experienced business mentors and strategic partners. Traxion hosts a 12-week accelerator program to provide founders of start-up businesses with a comprehensive educational program.
Energy: Metro Denver and Northern Colorado Industry Cluster Profile

- Solar Ready Colorado launched in 2016 as a statewide effort through Solar Energy International (SEI) and industry partners to expand the activities of outreach, recruiting, and training to the state’s solar industry and jobs market. Solar Ready Colorado plans to recruit and train 350 people and participants can receive SEI professional certificates in residential and commercial PV systems, battery-based PV, solar business and technical sales, and renewable energy applications.
- Lincoln Tech unveiled a first-of-its-kind program at its Denver campus to train mechanics to work on compressed natural gas (CNG) vehicles. Students will have the option of adding three one-month courses to its diesel mechanics program.

Green Transportation

Colorado is a leader in low-emission transportation and is committed to adopting alternative fuel vehicles (AFVs) to reduce emissions. The combination of state programs and initiatives with cutting-edge technological development have led to advancements in the market including publicly available charging stations, a diversified fuel mix, and low-cost vehicle models. Sales of AFVs in Colorado have grown at a rapid pace in recent years. As of 2015, Colorado was home to more than 77,700 AFVs, including compressed natural gas, converted compressed natural gas, electric, hybrid electric, plug-in electric, and propane vehicles. Market shares are growing rapidly, particularly for electric and natural gas vehicles. The state has doubled its number of such vehicles per million residents in the last six years, to 12,748 vehicles per million people; meanwhile, the total market has expanded by a compound annual growth rate of 15.9 percent. Between 2014 and 2015, new Colorado electric vehicle (EV) registrations increased 15.2 percent and the total number of EVs in Colorado rose 43.4 percent.

Further, Colorado has passed some of the highest tax credits in the nation for natural gas vehicles, EVs, and propane vehicles. Colorado offers more than 600 alternative fueling stations, including over 360 EV charging stations and nearly 800 charging outlets throughout the state. Key developments in Colorado’s green transportation market in 2016 included:

- Colorado will join with neighboring states Utah and Nevada on development of an electric vehicle charging network along key highway corridors. The corridors will include Interstates 70, 76, and 25 across Colorado; Interstates 70, 80, and 15 across Utah; and Interstates 80 and 15 across Nevada. Overall, the charging network will connect 2,000 miles of highway. An estimated 8,000 electric vehicles are on the road in Colorado, with the state offering a $5,000 tax credit on electric-vehicle purchases. Additionally, Colorado is building charging stations on its own through the Charge Ahead Colorado program.
- China-based Hybrid Kinetic Group Ltd. invested $48 million to obtain 54 percent ownership of Longmont-based UQM Technologies Inc. The partnership will allow UQM to execute its global growth strategy and will provide capital, infrastructure, and access to the China market, the largest EV market in the world.
- UQM Technologies Inc. shipped its initial order for electric drive systems to China-based ITL Efficiency Corporation, which are intended for a test and certification program in 2016. Under the agreement, UQM will make the electric propulsion systems for shuttle buses, delivery trucks, and transit buses through 2017, then shift manufacturing to China.
- UQM Technologies Inc. partnered with Sweden-based Kalmar Motor AB to build its electric motor system for the company’s towbarless airplane tug traction drives. Under the agreement, UQM will supply its PowerPhase HD 200 electric motor system.
- Lightning Hybrids LLC raised $2.3 million in funding to fuel the company’s expansion. The company has received significant orders to accommodate large brand fleet, including an order to retrofit 50 United Parcel Service Inc. trucks with hybrid systems. The company will install its systems on 50 Freightliner MT-55 trucks with gasoline engines in the Chicago area.
Major Cleantech Companies

- Advanced Emissions Solutions, Inc.
  www.advancedemissionsolutions.com
- AECOM
  www.aecom-urs.com
- ARCADIS
  www.arcadis.com
- Ascent Solar Technologies, Inc.
  www.ascentsolar.com
- Chicago Bridge & Iron Company
  www.cbi.com
- Cool Planet Energy Systems
  www.coolplanet.com
- GE Energy
  www.geenergyconnections.com
- Gevo Inc.
  www.gevo.com
- juwi Inc.
  www.juwi.com
- Lightning Hybrids, Inc.
  www.lightninghybrids.com
- Namasté Solar
  www.namastesolar.com
- RavenWindow, LLC
  www.ravenwindow.com
- RES Americas, Inc.
  www.res-americas.com
- RGS Energy
  www.rgsenergy.com
- Senvion USA Corp.
  www.repower.com
- SolarCity
  www.solarcity.com
- Sundrop Fuels, Inc.
  www.sundropfuels.com
- Tetra Tech Inc.
  www.tetratech.com
- UQM Technologies, Inc.
  www.uqm.com
- Vestas
  www.vestas.com
- Woodward
  www.woodward.com

Major Renewable Energy Government and Research Facilities

- CO Department of Natural Resources
  www.cdnr.us
- CO Department of Public Health & Environment
  www.colorado.gov/cdphe
- CO Department of Regulatory Agencies
  www.colorado.gov/dora
- Colorado Energy Office
  www.colorado.gov/energy
- Colorado Energy Research Collaboratory
  www.coloradoenergyresearch.org
- Colorado Energy Research Institute
  www.ceri-mines.org
- JILA
  www.jila.colorado.edu
- National Center for Atmospheric Research
  www.ncar.ucar.edu
- National Institute of Standards & Technology
  www.nist.gov
- National Oceanic & Atmospheric Administration
  www.noaa.gov
- National Renewable Energy Laboratory
  www.nrel.gov
- U.S. Bureau of Reclamation
  www.usbr.gov
- U.S. Dept. of Energy, Golden Field Office
  www.energy.gov/eere
- U.S. Environmental Protection Agency
  www.epa.gov
- U.S. Geological Survey
  www.usgs.gov
- Western Area Power Administration
  www.wapa.gov

Fossil Fuels Economic Profile

The fossil fuels subcluster includes companies that extract naturally occurring mineral liquids, gases, and solids used to produce energy. The fossil fuels subcluster also includes mining machinery manufacturers and companies that provide mining, exploration, and related support services. Companies providing generation, transmission, and distribution of energy resources are also included. The fossil fuels subcluster consists of 29, six-digit North American Industry Classification System (NAICS) codes.
The nine-county region ranked sixth out of the 50 largest metro areas for fossil fuels employment concentration in 2016. With direct employment in the fossil fuels subcluster of about 30,460 workers, the region ranked fifth. As of 2016, 68.7 percent of Colorado’s fossil fuels employees work in the region.

Fossil Fuels Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th></th>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
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<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>30,460</td>
<td>1,652,370</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>1,620</td>
<td>66,800</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>-3.7%</td>
<td>-8.4%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>20.7%</td>
<td>-1.5%</td>
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<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>3.8%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>1.4%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>


Fossil Fuels Employment

The nine-county region’s fossil fuels employment (30,460 workers) declined 3.7 percent in 2016 compared with the previous year’s level. National employment levels declined over-the-year, decreasing 8.4 percent. In response to the decline in oil prices, many of the state’s fossil fuels companies and operators trimmed payrolls and shifted operations to locations outside of Colorado.

About 2 percent of the nation’s fossil fuels employment is located in the nine-county region. Between 2011 and 2016, the region’s fossil fuels employment rose 20.7 percent, compared with a 1.5 percent decline nationwide. Fossil fuels companies employed 1.4 percent of the region’s total employment base, compared with a 1 percent employment concentration nationwide.

About 1,620 fossil fuels companies operated in the nine-county region in 2016. Approximately 73 percent of these companies employed fewer than 10 people, while 1 percent employed 250 or more.

3 Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.
ENERGY: Metro Denver and Northern Colorado Industry Cluster Profile

Fossil Fuels Overview

Colorado offers abundant and diverse natural resources and the state’s major geologic basins contain some of the largest fossil fuel deposits—including oil, natural gas, and crude oil—in the nation. While many fossil fuel companies conduct business operations from the Metro Denver region, the majority of the drilling is concentrated along the Western Slope of the Rocky Mountains and in Weld County. Colorado’s active wells totaled nearly 54,040 as of December 2016, with nearly 43 percent of total active wells located in Weld County.

Colorado’s crude oil production has been rising with the increased use of directional drilling and hydraulic fracturing technologies, and output nearly doubled from 2013 to 2015. In 2015, the state supplied about 3 of every 100 barrels of U.S. crude oil output. Colorado’s Niobrara shale formation—located in northeast Colorado’s rich Denver-Julesburg Basin (DJ Basin) and extending into parts of adjacent Wyoming, Nebraska, and Kansas—has led to substantial economic benefits including job creation, infrastructure development, export possibilities, and technological development. The 7,000-foot-deep geologic layer could hold more than 4 billion barrels of recoverable oil reserves. Based on proved reserves, the Wattenberg field in the DJ Basin is the fourth-largest U.S. oil field.

Sources: Market Analysis Profile, 2016; Development Research Partners.
ENERGY: Metro Denver and Northern Colorado Industry Cluster Profile

Fossil Fuels Company Announcements

Following trends that started in mid-2014, the price of oil declined through 2016 from highs once above $100 a barrel to under $30 a barrel in early 2016. Even though the decline in global oil prices has impacted oil and gas development strategies over the last year, a number of company developments and new projects were announced in 2016:

- BP plc will move the headquarters of its U.S. Lower 48 onshore business from Houston to downtown Denver. The company anticipates the office will open with at least 200 employees in early 2018, with more staff to be added later. The new office will improve access to key producing basins in the region and will create a strategic platform for growth.
- Denver-based Synergy Resource Corp. purchased 33,100 acres of Noble Energy Inc.’s undeveloped oil and gas properties in the DJ Basin. The $505 million deal will help the company be a leading operator in the Wattenberg Field.
- Synergy Resources Corp. plans to expand its Denver headquarters into a larger space at the Denver Energy Center. The relocation will expand the company’s office space from 38,000 square feet to 43,000 square feet.
- Anadarko opened a new Integrated Operations Center in Platteville to monitor and manage operations in the Wattenberg field. The facility serves as a centralized dispatch center to route real-time remote-monitoring communications between the field’s 6,800 wells, 3,700 tank facilities, and an incident management team.
- Aurora-based Wagner Power Systems partnered with Houston-based FlexGen Power Systems to provide a new hybrid power system that will reduce noise, pollution, and wellhead costs in the DJ Basin. The FlexGen Solid State Generator utilizes energy storage, power conversion, and controls to eliminate load transients associated with natural gas, dual fuel, and diesel engines.
- Denver-based Exciter Energy Services Inc. partnered with Houston-based National-Oilwell Varco Inc. to deliver a new generation of drilling rigs. The high-tech drilling rig design features soundwall barriers to hide and shield its noise and lights from nearby homes, and links to existing power grids or liquefied natural gas for near-zero emissions. Five rigs are destined for Colorado in early 2017.
- Denver-based U.S. Energy Corp. will purchase 40 percent interest in Ironhorse Resources LLC’s stake in the DJ Basin. The company will invest nearly $10 million for drilling and completing wells in three core areas, with activity beginning in late 2016.
- Denver-based Extraction Oil & Gas Inc. received state approval for 22 new oil wells at the Triple Creek drilling site in Greeley. The location will be a flagship energy development facility that utilizes some of the best technologies available in the industry.
- Bill Barrett Corp., a Denver-based oil producer, will restart its horizontal drilling operation in the DJ Basin. The company plans to drill a dozen new wells into production by the first quarter of 2017.

Merger and Acquisition Activity

Fossil fuels companies in the nine-county region announced several mergers and acquisitions in 2016.

- Denver-based DCP Midstream Partners LP acquired the assets of a joint venture between Phillips 66 and Spectra Energy Corp. to create the largest natural gas liquids producer and gas processor in the U.S. The $11 billion combined company will be renamed DCP Midstream LP and will help simplify its corporate structure and expand its projects in key U.S. producing basins, including the Denver-Julesburg Basin.
- Denver-based Liberty Oilfield Services Holdings acquired the U.S. assets of Canada-based Sanjel and has been repairing pumps, blenders, and other equipment from the acquisition. The company also secured $191 million from existing investors, which allowed the company to increase its staff.
- Denver-based Crestone Peak Resources acquired Encana Oil & Gas Inc.’s oil and gas assets in the DJ Basin, totaling 51,000 acres. The $900 million deal marked the end of Encana’s oil-focused drilling and production operations in the state.
- ARB Midstream LLC acquired a controlling interest in Platte River Gathering System, a pipeline system that gathers crude oil in the DJ Basin. The Platte River pipeline system is capable of gathering up to 157,000 barrels per day from wells scattered across more than 40 miles of pipelines. The system also includes an unloading facility at the Lucerne Hub and plans for storage tanks that can hold up to 600,000 barrels of oil.
- Denver-based Magellan Petroleum Corp. plans to merge with Houston-based Tellurian Investments Inc. to become a liquefied natural gas (LNG) company. The newly formed company will be able to access more attractive financing to build liquefaction plants to export LNG overseas.
ENERGY: Metro Denver and Northern Colorado Industry Cluster Profile

Technological Advancements
Several companies and organizations have developed technology to eliminate emissions from oil and natural gas sites. Key announcements in 2016 included:

- Colorado State University (CSU) received a $3.5 million DOE grant to design, construct, and operate a test facility to simulate and measure methane emissions. The facility will be operated jointly by CSU and the Colorado School of Mines to simulate steps of the natural gas supply chain including underground pipelines, midstream compression, and wet and dry gas production.
- Johnstown-based Oilfield Clean Energy Solutions Inc. and Platteville-based Redi Services, LLC partnered to demonstrate new emissions-eliminating technology. The Phoenix Pyrolytic Technology® removes hydrocarbon emissions and other waste byproducts at oil and natural gas well sites.

Major Fossil Fuels Companies

- Anadarko Petroleum Corporation [www.anadarko.com](http://www.anadarko.com)
- Antero Resources [www.anteroresources.com](http://www.anteroresources.com)
- Bill Barrett Corp. [www.billbarrettcorp.com](http://www.billbarrettcorp.com)
- Black Hills Corporation [www.blackhills Corp.com](http://www.blackhills Corp.com)
- BP America [www.bp.com](http://www.bp.com)
- Cimarex Energy [www.cimarex.com](http://www.cimarex.com)
- ConocoPhillips Co. [www.conocophillips.com](http://www.conocophillips.com)
- Crossfire LLC [www.crossfire-llc.com](http://www.crossfire-llc.com)
- DCP Midstream [www.dcpmidstream.com](http://www.dcpmidstream.com)
- Encana Corporation [www.encana.com](http://www.encana.com)
- Halcón Resources Corp. [www.halconresources.com](http://www.halconresources.com)
- Halliburton [www.halliburton.com](http://www.halliburton.com)
- InfraSource, Inc. [www.infrasourceus.com](http://www.infrasourceus.com)
- Intermountain Rural Electric Association [www.irea.coop](http://www.irea.coop)
- Kinder Morgan [www.kindermorgan.com](http://www.kindermorgan.com)
- MarkWest Energy Partners, L.P. [www.markwest.com](http://www.markwest.com)
- Noble Energy, Inc. [www.nobleenergyinc.com](http://www.nobleenergyinc.com)
- Northern Pipeline Construction [www.gonpl.com](http://www.gonpl.com)
- PDC Energy, Inc. [www.pdce.com](http://www.pdce.com)
- QEP Resources [www.qepres.com](http://www.qepres.com)
- Schlumberger Ltd. [www.slb.com](http://www.slb.com)
- Shell Exploration and Production [www.shell.com](http://www.shell.com)
- SM Energy Co. [www.sm-energy.com](http://www.sm-energy.com)
- Suncor Energy Inc. [www.suncor.com](http://www.suncor.com)
- Superior Energy Services Co. [www.superienergy.com](http://www.superienergy.com)
- TransMontaigne Inc. [www.transmontaigne.com](http://www.transmontaigne.com)
- Tri-State Generation & Transmission Assoc. [www.tristategt.org](http://www.tristategt.org)
- United Power [www.unitedpower.com](http://www.unitedpower.com)
- Westmoreland Coal Company [www.westmoreland.com](http://www.westmoreland.com)
- Whiting Petroleum Corp. [www.whiting.com](http://www.whiting.com)
- Williams [www.co.williams.com](http://www.co.williams.com)
- Xcel Energy [www.xcelenergy.com](http://www.xcelenergy.com)

Energy Workforce Profile
Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.
The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

[Image of educational attainment chart]

Educational Attainment of Metro Denver and Northern Colorado’s Population Age 25 and Older

Source: U.S. Census Bureau, 2015 American Community Survey.

[Image of labor force projections]

Metro Denver and Northern Colorado’s Labor Force Projections by Age (millions)

Source: Colorado Division of Local Government, State Demography Office.
Cleantech Workforce Profile

Age Distribution
The nine-county region’s cleantech industry employs 22,390 people and includes a large pool of talented, well-educated, and highly skilled workers. The cleantech subcluster has a larger share of employees (67.6 percent) that are between the ages of 35 and 64 years old, compared with the age distribution of all industries across the nine-county region (60.1 percent).

The cleantech workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Cleantech Occupation & Salary Profile below includes the 10 largest cleantech occupations in the nine-county region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages
The 2015 average annual salary for cleantech employees was $79,690 in the nine-county region, compared with the national average of $79,360. The nine-county region’s cleantech payroll reached nearly $1.7 billion in 2015.

### 10 Largest Cleantech Occupations in Metro Denver and Northern Colorado

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</thead>
<tbody>
<tr>
<td>1. Electricians</td>
<td>13,806</td>
<td>306</td>
<td>681</td>
<td>$44,252</td>
<td>$28,432</td>
<td>$34,399</td>
<td>$58,063</td>
<td>$71,180</td>
</tr>
<tr>
<td>2. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
<td>$97,749</td>
<td>$126,953</td>
</tr>
<tr>
<td>3. Engineers</td>
<td>36,107</td>
<td>1,388</td>
<td>3,762</td>
<td>$95,775</td>
<td>$61,173</td>
<td>$75,952</td>
<td>$122,063</td>
<td>$151,215</td>
</tr>
<tr>
<td>4. Plumbers, pipefitters, &amp; steamfitters</td>
<td>6,956</td>
<td>46</td>
<td>56</td>
<td>$46,964</td>
<td>$32,461</td>
<td>$37,700</td>
<td>$60,302</td>
<td>$69,537</td>
</tr>
<tr>
<td>5. Secretaries &amp; administrative assistants, except legal, medical, &amp; executive</td>
<td>45,568</td>
<td>4,967</td>
<td>45</td>
<td>$37,664</td>
<td>$24,083</td>
<td>$29,685</td>
<td>$45,347</td>
<td>$53,942</td>
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<tr>
<td>6. Office clerks, general</td>
<td>33,490</td>
<td>3,650</td>
<td>0</td>
<td>$35,941</td>
<td>$21,277</td>
<td>$27,490</td>
<td>$47,471</td>
<td>$59,800</td>
</tr>
<tr>
<td>7. Physical scientists</td>
<td>9,239</td>
<td>317</td>
<td>1,246</td>
<td>$88,767</td>
<td>$51,504</td>
<td>$66,119</td>
<td>$118,050</td>
<td>$146,502</td>
</tr>
<tr>
<td>8. Heating, air conditioning, &amp; refrigeration mechanics &amp; installers</td>
<td>4,817</td>
<td>75</td>
<td>227</td>
<td>$53,174</td>
<td>$33,661</td>
<td>$42,864</td>
<td>$62,026</td>
<td>$74,199</td>
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<tr>
<td>9. Information &amp; record clerks, all other</td>
<td>6,812</td>
<td>743</td>
<td>0</td>
<td>$40,391</td>
<td>$27,893</td>
<td>$33,188</td>
<td>$48,480</td>
<td>$61,219</td>
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<tr>
<td>10. General &amp; operations managers</td>
<td>31,830</td>
<td>2,642</td>
<td>6,292</td>
<td>$112,133</td>
<td>$50,365</td>
<td>$73,238</td>
<td>$174,412</td>
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</tbody>
</table>

Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.
Fossil Fuels Workforce Profile

Age Distribution

The nine-county region’s fossil fuels industry employs 30,460 people and includes a large pool of talented, well-educated, and highly skilled workers. The fossil fuels subcluster has a larger share of employees (90.4 percent) that are between the ages of 25 and 64 years old, compared with the age distribution across all industries (82.9 percent).

The fossil fuels workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Fossil Fuels Occupation & Salary Profile below includes the 10 largest fossil fuels occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages

Wages in the fossil fuels subcluster are among the highest across all industry clusters. The 2015 average annual salary for a fossil fuels worker in the nine-county region was $111,880, compared with the national average of $101,670. The nine-county region’s fossil fuels payroll exceeded $3.5 billion in 2015.
Education & Training

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest energy occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via http://highered.colorado.gov.

- Colorado School of Mines
  www.mines.edu
- Emily Griffith Technical College
  www.emilygriffith.edu
- Regis University
  www.regis.edu
- Colorado State University
  www.colostate.edu
- Front Range Community College
  www.frontrange.edu
- University of Colorado: Boulder, Denver
  www.cu.edu
- Colorado State University Global Campus
  www.colostate.edu
- Jones International University
  www.jiu.edu
- University of Denver
  www.du.edu
- Ecotech Institute
  www.ecotechinstitute.com
- Metropolitan State University of Denver
  www.msudenver.edu

Key Reasons for Energy Companies to Locate in the Nine-County Region

Colorado is a top-10 fossil fuels location offering access to one of the most energy rich regions in the United States.

- **Coal** - Colorado was the 11th-largest coal-producing state in the nation in 2015 and borders Wyoming, the nation’s largest coal producer. Colorado produced 18.9 million short tons of coal, representing 2.1 percent of the nationwide supply in 2015. (U.S. Department of Energy, Energy Information Administration, 2016)
- **Natural Gas** - Colorado ranked sixth among natural-gas producing states, accounting for 6.2 percent of U.S. natural gas production. Colorado was the leading producer of coalbed methane and has the largest reserves of coalbed methane in the nation, representing nearly 30 percent of the nation’s total production. (U.S. Department of Energy, Energy Information Administration, 2016)
  - The Rockies Express Pipeline (REX) is one of the largest natural gas pipelines ever constructed in the nation, measuring more than 1,700 miles in length. The pipeline extends from northwestern Colorado to eastern Ohio and has 1.8 billion cubic feet per day of long-haul design capacity. REX has recently begun firm service from Appalachian basins to Midwest Markets. (U.S. Department of Energy, Energy Information Administration, 2016; Tallgrass Energy, 2016)
- **Oil** - Colorado ranked as the nation’s seventh-largest oil producer, reaching its highest level on record with 126 million barrels of crude oil in 2015. Colorado ranked sixth in the number of active rotary rigs as of September 2016, and Colorado had the seventh-highest proven oil reserves in the nation totaling 1,451 million barrels in 2014. (U.S. Department of Energy, Energy Information Administration, 2015; Baker Hughes, 2016; Colorado Oil and Gas Conservation Commission, 2016)
  - Colorado is home to the fourth-largest U.S. oil field and 11 of the nation’s 100 largest natural gas fields are located wholly or partly in the state. (U.S. Department of Energy, Energy Information Administration, 2016)
  - Colorado ranked first nationwide in National Science Foundation (NSF) geoscience awards—more than $1.3 billion—or 28 percent of the nation’s total in 2009. The funding represents about $864 per capita in NSF geoscience awards. (National Science Foundation, 2009)

Colorado is a top-10 cleantech location with access to clean energy resources and robust renewable energy generation requirements.

- **Wind** - Colorado ranked as the eighth-largest generator of wind energy in the nation and ranked 10th for total installed wind power capacity as of October 2016. Wind provided more than 14 percent of all
ENERGY: Metro Denver and Northern Colorado Industry Cluster Profile


- **Biomass** - Colorado more than doubled its biomass electricity generation between 2010 and 2015. While biomass accounts for nearly 2 percent of the state’s renewable energy generation, roughly 25 percent of the state’s 24 million acres of forestland have high or moderate potential for future biomass production. (U.S. Department of Energy, Energy Information Administration, 2016)

- **Solar** - Colorado ranked ninth in the nation for total installed solar capacity in 2016, with 574 megawatts and 109,000 solar-powered homes. (Solar Energy Industries Association, 2016)

- **Water** - Hydroelectric power accounted for nearly 19 percent of Colorado’s renewable net electricity generation in 2015, the second-largest share behind wind power. The state has more than 100 existing and potential hydropower facilities. (U.S. Department of Energy, Energy Information Administration, 2016; Colorado Energy Office, 2016)

- Metro Denver ranked 12th in clean technology leadership in 2016 and ranked among the top 10 for green building usage, cleantech investment, and clean energy patents granted. (Clean Edge, Inc., 2016)

- Denver ranked seventh in the nation for development and construction of green buildings in 2016, with 46.6 percent of its office space qualified as green certified. (CBRE Group, Inc., 2016; Maastricht University, 2016)

- Metro Denver had the ninth-most ENERGY STAR® certified buildings in 2015, with 215 certified buildings representing 47 million square feet and saving $52 million annually in energy costs. (U.S. Environmental Protection Agency, 2016)

The region is at the forefront of energy development, with a location that offers:

1. **The ability to recruit and retain senior management and scientific talent**
   - Colorado has one of the nation's most educated workforces, ranking second among the 50 states for percentage of residents (39.2 percent) with a bachelor’s degree or higher. (U.S. Census Bureau, 2015 American Community Survey)
   - Boulder and Fort Collins ranked among the top five most-educated metro areas in the nation in 2016. (ValuePenguin.com, 2016)
   - Colorado ranked ninth in the nation for the number of science, engineering, and health doctorate holders as a percent of the workforce. (National Science Foundation, 2015)
   - Metro Denver ranked as the fourth-best metro area for science, technology, engineering, and mathematics (STEM) professionals in 2016. Metro Denver ranked seventh for the projected number of STEM jobs needed by 2020. (WalletHub, 2016)
   - Boulder ranked as the third-best place for STEM graduates in 2016. STEM jobs in Boulder represented more than 14 percent of all jobs, earning an annual mean wage of $91,800. (NerdWallet, 2016)
   - Colorado ranked among the top 10 states for solar jobs per capita and total solar employment. (The Solar Foundation, 2016)
   - Colorado ranked among the top five states for wind-related employment, accounting for nearly 7 percent of the nation’s total wind-related jobs in 2015. (American Wind Energy Association, 2016)
   - Colorado ranked fifth in the nation for the number of new clean energy jobs created in 2015, with 2,650 new clean energy jobs announced during the year. (Environmental Entrepreneurs, 2016)

2. **Proximity to energy-related higher education programs and research centers**
   - Colorado ranked ninth for the number of science, engineering, and health graduate students per 1,000 individuals ages 25 to 34 years old in 2013. (National Science Foundation, 2015)
   - Colorado School of Mines is one of the few universities in the world to offer programs from baccalaureate through doctorate levels in all key fields related to energy and is the only institution in the world that offers doctoral programs in five of the major earth science disciplines. (Colorado School of Mines, 2016)
   - The Education Corporation of America’s Ecotech Institute in Aurora is the world’s first and only college entirely focused on preparing graduates for careers in cleantech through eight associate degree programs. In 2016, Ecotech Training launched to provide cleantech courses and certifications to individuals across the nation. (Ecotech Institute, 2016)
   - The Colorado State University (CSU) Energy Institute is the central, unifying hub of scholarly excellence in energy-related research, education, and outreach. Headquartered at CSU’s Powerhouse Energy Campus, the Institute aims to increase collaboration with industry and governmental partners to solve energy problems and create new research and educational opportunities. (Colorado State University, 2016)
ENERGY: Metro Denver and Northern Colorado Industry Cluster Profile

- The Solar Technology Acceleration Center (SolarTAC) is the largest test facility for solar technologies in the U.S., occupying 74-acres at the 1,760-acre Aurora Campus for Renewable Energy. (The Solar Technology Acceleration Center, 2016)

3. Access to the research of a broad collection of federal laboratories and private R&D activities
- Key federal offices located in the nine-county region include the National Center for Atmospheric Research; the Office of Surface Mining Reclamation and Enforcement; the U.S. Bureau of Land Management; the U.S. Bureau of Ocean Energy Management, Regulation and Enforcement; the U.S. Bureau of Reclamation; the U.S. Forest Service; the U.S. Department of Energy; the U.S. Environmental Protection Agency; the U.S. Geological Survey; and the Western Area Power Administration.
- Firms with fossil fuel energy R&D programs include Anadarko Petroleum, BP America, Encana, Noble Energy, Shell Exploration & Production, and Suncor Energy.

4. Business organizations and public policy programs designed to encourage industry growth.
- Legislation passed in 2016 expands existing tax credits for alternative fuel vehicle (AFV) purchases. House Bill 1332 (2016) provides between $5,000 and $20,000 for the purchase or conversion of a light-medium or heavy-duty AFV.
- Sales and use tax is exempt for equipment used in R&D of medical devices or clean technology. The exemption refunds up to $50,000 per year in sales and use taxes for companies with less than 35 employees and more than 50 percent employed in Colorado. (Exemption clarified in Colorado House Bill 15-1180)
- The Colorado Energy Coalition (CEC) is a consortium of leaders and stakeholders dedicated to strengthening the business climate in Colorado supporting all sectors of the energy industry. The CEC’s mission is to brand Colorado as the Balanced Energy Capital of the West. (Metro Denver EDC, 2016)
- The Colorado Clean Energy Cluster (CCEC) is an economic development organization dedicated to growing clean energy jobs and aims to expand the clean energy sector through innovative and entrepreneurial projects and initiatives. CCEC’s initiatives include FortZED, the International Cleantech Network, C3E, and Net Zero Water. (The Colorado Clean Energy Cluster, 2016)
- The Advanced Industries Accelerator (AIA) Programs promote growth and sustainability in Colorado’s advanced industries, including advanced manufacturing, aerospace, bioscience, electronics, energy and natural resources, infrastructure engineering, and technology and information. Since 2013, the AIA program has granted over $35 million to nearly 230 organizations. These industries account for nearly 30 percent of the state’s wage earnings, nearly 30 percent of the total sales revenue across all industries, and nearly 35 percent of the state’s total exports. (The Colorado Office of Economic Development and International Trade, 2016)

### Energy Industry Cluster Definition

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### Cleantech

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<td>3612</td>
<td>Power, distribution, &amp; specialty transformers</td>
</tr>
<tr>
<td>335312 (P)</td>
<td>Motor &amp; generator mfg.</td>
<td>3621-03</td>
<td>Control equipment for electric buses &amp; locomotives</td>
</tr>
<tr>
<td>335312 (P)</td>
<td>Motor &amp; generator mfg.</td>
<td>3621-9909</td>
<td>Windmills, electric generating</td>
</tr>
<tr>
<td>335911</td>
<td>Storage battery mfg.</td>
<td>3691</td>
<td>Storage batteries</td>
</tr>
<tr>
<td>335999 (P)</td>
<td>All other misc. electrical equipment &amp; component mfg.</td>
<td>3629-0102</td>
<td>Electrochemical generators (fuel cells)</td>
</tr>
<tr>
<td>336111 (P)</td>
<td>Automobile mfg.</td>
<td>3711-0104</td>
<td>Cars, electric, assembly of</td>
</tr>
<tr>
<td>336390 (P)</td>
<td>Other motor vehicle parts mfg.</td>
<td>3799-0302</td>
<td>Cars, off-highway: electric</td>
</tr>
<tr>
<td>423720 (P)</td>
<td>Plumbing &amp; heating equipment &amp; supplies (hydronics) merchant wholesalers</td>
<td>5074-0208</td>
<td>Heating equipment &amp; panels, solar</td>
</tr>
<tr>
<td>482111 (P)</td>
<td>Line-haul railroads</td>
<td>4011-9901</td>
<td>Electric railroads</td>
</tr>
<tr>
<td>541380 (P)</td>
<td>Testing laboratories</td>
<td>8734-00</td>
<td>Testing laboratories</td>
</tr>
<tr>
<td>541380 (P)</td>
<td>Testing laboratories</td>
<td>8734-9902</td>
<td>Calibration &amp; certification</td>
</tr>
<tr>
<td>541620 (P)</td>
<td>Environmental consulting services</td>
<td>8748-9905</td>
<td>Environmental consultant</td>
</tr>
<tr>
<td>541620 (P)</td>
<td>Environmental consulting services</td>
<td>8999-07</td>
<td>Earth science services</td>
</tr>
<tr>
<td>541620 (P)</td>
<td>Environmental consulting services</td>
<td>8999-09</td>
<td>Scientific consulting</td>
</tr>
<tr>
<td>541690 (P)</td>
<td>Other scientific &amp; technical consulting services</td>
<td>8748-9904</td>
<td>Energy conservation consultant</td>
</tr>
<tr>
<td>541712 (P)</td>
<td>Research &amp; development in the physical, engineering, &amp; life sciences (except biotechnology)</td>
<td>8731-03</td>
<td>Natural resource research</td>
</tr>
<tr>
<td>541712 (P)</td>
<td>Research &amp; development in the physical, engineering, &amp; life sciences (except biotechnology)</td>
<td>8733-9902</td>
<td>Research institute</td>
</tr>
<tr>
<td>924110 (P)</td>
<td>Administration of air &amp; water resource &amp; solid waste management programs</td>
<td>9511-00</td>
<td>Air, water, &amp; solid waste management</td>
</tr>
</tbody>
</table>

*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.
**The NAICS codes are reviewed every five years for potential revisions to reflect new and emerging industries and to allow for industry changes. In 2012, NAICS code 221119 was reclassified into five new industries to distinguish solar (221114), wind (221115), geothermal (221116), biomass (221117), and other electric (221118) power generation. As a result, 221119 was removed from fossil fuels and reclassified into cleantech. Data is limited or not yet available for these five new industries.
Note: NEC indicates "not elsewhere classified."
ENERGY: Metro Denver and Northern Colorado Industry Cluster Profile

Energy Industry Cluster Relationships

Technologies
- Bioconversion
- Biofuels
- Electric Motors
- Ethanol
- Fuel Cells
- Geographic Information Systems
- Nanotechnology
- Photonics
- Photovoltaics

Support Industries
- Agriculture
- Beverage Production
- Bioscience
- Geospatial
- Government
- Software
- Transportation

Energy
- Fossil Fuels
- Cleantech

Infrastructure
- CO Clean Energy Cluster
- CO Cleantech Industry Assoc.
- CO Energy Research Institute
- CO-LABS
- CO Mining Association
- CO Renewable Energy Collaboratory
- CO School of Mines
- CO Petroleum Association
- Conservation and Gas Tech. Institute
- Federal Laboratories-NIST, NCAR
- National Renewable Energy Laboratory
- Solar Thermal Alliance of Colorado

Client Industries
- Defense/Security
- Utilities
- Manufacturing
- Transportation
- Consumers
- Businesses

For additional information, contact us:

Metro Denver Economic Development Corporation
1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenver.org
www.metrodenver.org

COLORADO ENERGY COALITION
1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenver.org
www.metrodenver.org/cec

Industry Overview

The nine-county Metro Denver and Northern Colorado region is a global epicenter for financial services activities, boasting significant capital, an unmatched talent pool, high quality of life, and a central location with easy global access. The region is the largest financial center between Los Angeles and Chicago. Denver is home to a branch of the Federal Reserve Bank and is the location of one of only six U.S. Mints. The Denver Mint is the single largest producer of coins in the world and manufactures all denominations of circulating coins, coin dies, the Denver "D" portion of the annual uncirculated coin sets, and commemorative coins authorized by the U.S. Congress.

The region is one of the few areas outside of the northeast with a substantial financial services industry in three subclusters: (1) banking and finance, (2) investments, and (3) insurance. The banking and finance subcluster is comprised of transaction-oriented companies including commercial banks and credit unions, lenders, credit agencies, and mortgage bankers. The investments subcluster includes companies involved in financial advising, securities and commodities trade, real estate investment trusts (REITS), portfolio management, and financial planning. The insurance subcluster consists of insurance carriers and brokerages.

Financial services is a vital component to the region’s economy and provides a variety of financial products and services to individuals, businesses, and government entities. Additionally, the region’s hotbed of financial services activities help financial services companies expand their competitive edge and capitalize on world-class infrastructure, pro-business environment, and low costs. Financial services companies employed 4.4 percent of the region’s total employment base and nearly 2 percent of all financial services employment in the nation is located in the nine-county region. The financial services industry is one of the region’s largest clusters, with about 98,870 employees working in over 14,080 companies.

Professional Associations

A variety of trade associations and service firms support the region’s diverse financial services industry base.

- The Colorado Bankers Association is a key industry partner (www.coloradobankers.org) representing all Colorado banks and provides government relations, community relations, educational and training services, and bank insurance.

- The Colorado Association of Mortgage Professionals (www.coamp.org) is a nonprofit trade group representing Colorado’s financing professionals specializing in origination of residential and commercial mortgages and offers professional development opportunities and member certification support.

- The Colorado Association of Insurance and Financial Advisors represents the state’s insurance agents, financial advisors, multiline agents, and other advisors, offering more than 50 programs and products to enhance skills and business services (www.naiacolorado.org).

- Established in 2014, the Colorado Investment Services Coalition (CISC) is an advocacy group for Colorado’s large employers in investment management and advisory services. The Coalition’s mission is to develop the talent pipeline for financial services companies expanding in the region, and to provide a public policy voice on issues of common interest. CISC members’ goal is to educate and inform policymakers on industry-related issues at the state and federal level that is conducive to industry growth and job creation in Colorado.

1 The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
Banking and Finance Economic Profile

The banking and finance subcluster consists of 16, six-digit North American Industry Classification System (NAICS) codes including both depository and non-depository institutions such as commercial banks, credit card companies, and mortgage brokers.

With direct employment of 39,150 banking and finance workers, the nine-county region ranked 12th out of the 50 largest metro areas in 2016. The region ranked 14th for banking and finance employment concentration.\(^2\) About 79 percent of Colorado’s banking and finance industry employees work in the region.

### Banking and Finance Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>39,150</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>3,110</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>1.8%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>1.4%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>0.3%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>1.7%</td>
</tr>
</tbody>
</table>


Banking and Finance Employment

The nine-county region’s banking and finance employment (39,150 workers) increased 1.8 percent in 2016, compared with the previous year’s level, adding more than 690 new jobs during the same period. Similarly, national employment levels rose 1.1 percent over-the-year. From 2011 to 2016, the region’s banking and finance employment increased 1.4 percent, compared with 1.6 percent at the national level. About 1.5 percent of the nation’s banking and finance employment is located in the region. Banking and finance companies employed 1.7 percent of the region’s total employment base, compared with a 1.5 percent employment concentration nationwide.

About 3,110 banking and finance companies operated in the nine-county region in 2016. Approximately 74 percent of the region’s banking and finance companies employed fewer than 10 people, while 0.5 percent employed 250 or more.

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\(^2\) Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest metropolitan statistical areas (MSAs). Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest MSAs.
Major Banking and Finance Companies

- ADS Alliance Data Systems  
  [www.alliancedata.com](http://www.alliancedata.com)
- American Financing Corp.  
  [www.americanfinancing.net](http://www.americanfinancing.net)
- Bank of the West  
  [www.bankofthewest.com](http://www.bankofthewest.com)
- BBVA Compass Bank  
  [www.bbvacompass.com](http://www.bbvacompass.com)
- Belco Credit Union  
  [www.belco.org](http://www.belco.org)
- Citywide Banks  
  [www.citywidebanks.com](http://www.citywidebanks.com)
- CoBank  
  [www.cobank.com](http://www.cobank.com)
  [www.chase.com](http://www.chase.com)
- KeyBank  
  [www.key.com](http://www.key.com)
- Nelnet  
  [www.nelnet.com](http://www.nelnet.com)
- Nordstrom Credit  
  [www.nordstrom.com](http://www.nordstrom.com)
- On Deck Capital  
  [www.ondeck.com](http://www.ondeck.com)
- Public Service Credit Union  
  [www.pscu.org](http://www.pscu.org)
- Pulte Mortgage  
  [www.pultemortgage.com](http://www.pultemortgage.com)
Major Banking and Finance Companies Cont’d

- Colorado Business Bank
  www.cobizbank.com
- Colorado Housing and Finance Authority
  www.chfainfo.com
- Colorado State Bank and Trust
  www.csbt.com
- Elavon
  www.elavon.com
- First Data Corporation
  www.firstdata.com
- FirstBank Holding Company
  www.efirstbank.com
- Guaranty Bank and Trust
  www.guarantybankco.com
- IHS Markit
  www.markit.com
- Specialized Loan Servicing LLC
  www.sls.net
- Urban Lending Solutions
  www.urban-ls.com
- U.S. Bank
  www.usbank.com
- Vectra Bank Colorado
  www vectrabank.com
- VISA Debit Processing Services
  www.visadps.com
- Wells Fargo Bank Colorado
  www.wellsfargo.com
- Western Union
  www.westernunion.com

Investments Economic Profile

The investments subcluster consists of 15, six-digit North American Industry Classification System (NAICS) codes including companies involved in securities, brokerage, real estate investment trusts, and holding companies.

*The nine-county region ranked 11th out of the 50 largest metro areas in investments employment concentration in 2016, up one position from the previous year.* With direct employment of 27,910 investment workers, the region ranked 12th. About 88 percent of Colorado’s investments subcluster employees work in the region.

**Investments Employment and Company Profile, 2016**

<table>
<thead>
<tr>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>27,910</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>7,460</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>6.6%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>22.1%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>4.1%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>1.2%</td>
</tr>
</tbody>
</table>


---

1 Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.
Investments Employment

The nine-county region’s investments employment (27,910 workers) rose 6.6 percent in 2016, compared with the previous year’s level, adding nearly 1,730 new jobs during the same period. National employment levels also grew over-the-year, rising 1.9 percent, representing an additional 25,810 jobs. About 2 percent of the nation’s investments employment is located in the region. Between 2011 and 2016, the region’s investments employment rose 22.1 percent, compared with 8.2 percent at the national level. Investment companies employed 1.2 percent of the region’s total employment base, compared with a 0.8 percent national employment concentration.

About 7,460 investment companies operated in the nine-county region in 2016. Approximately 84 percent of the region’s investment companies employed fewer than 10 people, while 0.1 percent employed 250 or more.
FINANCIAL SERVICES: Metro Denver and Northern Colorado Industry Cluster Profile

Major Investment Companies

- AIMCO  
  [www.aimco.com](http://www.aimco.com)
- ALPS  
  [www.alpsinc.com](http://www.alpsinc.com)
- Atlantic Trust  
  [www.atlantictrust.com](http://www.atlantictrust.com)
- Bank of America Merrill Lynch  
  [www.ml.com](http://www.ml.com)
- Charles Schwab & Co.  
  [www.schwab.com](http://www.schwab.com)
- Edward Jones  
  [www.edwardjones.com](http://www.edwardjones.com)
- Fidelity Investments  
  [www.fidelity.com](http://www.fidelity.com)
- Great-West Financial Empower  
  [www.empower-retirement.com](http://www.empower-retirement.com)
- Janus Capital Group  
  [www.janus.com](http://www.janus.com)
- Lipper Analytical Services  
  [www.lipperweb.com](http://www.lipperweb.com)
- Marsico Capital Management  
  [www.marsico.com](http://www.marsico.com)
- M.D.C Holdings, Inc.  
  [www.richmondamerican.com](http://www.richmondamerican.com)
- Morgan Stanley  
  [www.morganstanley.com](http://www.morganstanley.com)
- National Bank Holdings Corp.  
  [www.nationalbankholdings.com](http://www.nationalbankholdings.com)
- Oppenheimer Funds  
  [www.oppenheimerfunds.com](http://www.oppenheimerfunds.com)
- Partners Group  
  [www.partnersgroup.com](http://www.partnersgroup.com)
- PENSICO Trust Company  
  [www.pensco.com](http://www.pensco.com)
- Personal Capital  
  [www.personalcapital.com](http://www.personalcapital.com)
- Raymond James  
  [www.raymondjames.com](http://www.raymondjames.com)
- RBC Wealth Management  
  [www.rbcwm.com](http://www.rbcwm.com)
- Redwood Trust  
  [www.redwoodtrust.com](http://www.redwoodtrust.com)
- Scottrade  
  [www.scottrade.com](http://www.scottrade.com)
- Standard & Poor’s  
  [www.standardandpoors.com](http://www.standardandpoors.com)
- TIAA  
  [www.tiaa-cref.org](http://www.tiaa-cref.org)
- Transamerica Capital  
  [www.transamerica.com](http://www.transamerica.com)
- Walker & Dunlop  
  [www.walkerdunlop.com](http://www.walkerdunlop.com)

Insurance Economic Profile

The insurance subcluster consists of 13, six-digit North American Industry Classification System (NAICS) codes including companies involved in all types of insurance ranging from life, accident, health, casualty, title, and surety insurance to pension, health, and welfare funds businesses.

With direct employment in the insurance subcluster of about 31,820 workers, the nine-county region ranked 13th out of the 50 largest metro areas in 2016. The region ranked 28th for insurance employment concentration.4,5 About 75 percent of Colorado’s insurance subcluster employment was located in the region.

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4 Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest metropolitan statistical areas (MSAs). Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest MSAs.

5 The decline in the insurance subcluster employment concentration rank from 2015 to 2016 is a result of a data series revision that decreased overall employment concentration in the nine-county region. Concurrently, the employment concentration in the insurance subcluster increased for a number of the MSAs.
Insurance Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th></th>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>31,820</td>
<td>2,599,000</td>
</tr>
<tr>
<td>Number of direct companies, 2016</td>
<td>3,510</td>
<td>238,880</td>
</tr>
<tr>
<td>One-year direct employment growth, 2015-2016</td>
<td>2.1%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Five-year direct employment growth, 2011-2016</td>
<td>12.2%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Avg. annual direct employment growth, 2011-2016</td>
<td>2.3%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Direct employment concentration</td>
<td>1.4%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>


Insurance Employment

The nine-county region’s insurance employment (31,820 workers) rose 2.1 percent in 2016, compared with the previous year’s level, adding over 650 new jobs during the same period. National employment levels rose 1.7 percent between 2015 and 2016. About 1.2 percent of the nation’s insurance employment is located in the region. Between 2011 and 2016, the region’s insurance employment rose 12.2 percent, compared with a 12.3 percent increase at the national level. Insurance companies employed 1.4 percent of the region’s total employment base, compared with 1.5 percent employment concentration nationwide.

About 3,510 insurance companies operated in the nine-county region in 2016. Approximately 91 percent of the region’s insurance companies employed fewer than 10 people, while 0.5 percent employed 250 or more.
FINANCIAL SERVICES: Metro Denver and Northern Colorado Industry Cluster Profile

Major Insurance Companies

- 2-10 Home Buyers Warranty Corp.
  [www.2-10.com](http://www.2-10.com)
- Allied Insurance
  [www.alliedinsurance.com](http://www.alliedinsurance.com)
- Allstate Insurance
  [www.allstate.com](http://www.allstate.com)
- American Family Insurance
  [www.amfam.com](http://www.amfam.com)
- Anthem Blue Cross and Blue Shield
  [www.anthem.com](http://www.anthem.com)
- CNA Surety Corp.
  [www.cnasurety.com](http://www.cnasurety.com)
- Farmers Insurance
  [www.farmers.com](http://www.farmers.com)
- Great-West Financial
  [www.greatwest.com](http://www.greatwest.com)
- Liberty Mutual
  [www.libertymutual.com](http://www.libertymutual.com)
- Lockton Companies
  [www.lockton.com](http://www.lockton.com)
- New York Life
  [www.newyorklife.com](http://www.newyorklife.com)
- Northwestern Mutual
  [www.northwesternmutual.com](http://www.northwesternmutual.com)
- Optum
  [www.optum.com](http://www.optum.com)
- Pinnacol Assurance
  [www.pinnacol.com](http://www.pinnacol.com)
- State Farm Insurance
  [www.statefarm.com](http://www.statefarm.com)
- The Travelers Indemnity Company
  [www.travelers.com](http://www.travelers.com)

Sources: Market Analysis Profile, 2016; Development Research Partners.
FINANCIAL SERVICES: Metro Denver and Northern Colorado Industry Cluster Profile

Major Insurance Companies Cont’d

- IMA Financial Group
  www.imacorp.com
- Jackson National Life Insurance Co.
  www.jackson.com
- Kaiser Permanente
  www.kaiserpermanente.org
- Land Title Guarantee Company
  www.ltgc.com
- UnitedHealthcare
  www.uhc.com
- USI Colorado, LLC
  www.usi.com
- Voya Financial
  www.voya.com

2016 Industry Highlights

Key Company Announcements

The nine-county region’s highly skilled workforce, business-friendly environment, proximity to Denver International Airport (DEN), and low operational costs attract leading national and international companies. Forbes’ 2016 Global 2000 list included 11 companies headquartered in the region, the 2016 Fortune 500 list included 10 companies with revenues totaling $102.8 billion, and Inc. 500’s 2016 fastest-growing private companies included 15 local companies. Additionally, the region is home to many world-renowned financial services firms such as Charles Schwab, Oppenheimer Funds, Western Union, and Great-West Financial. Notable company announcements in 2016 included:

Banking and Finance

- Alliance Data Systems opened its second customer service center in Westminster and plans to double the size of its business by 2020. The 52,500-square-foot Westminster location employs about 800 people and the company is recruiting an additional 50 customer service representatives.
- CoBank celebrated the opening of its Greenwood Village headquarters. The 11-story, 245,000-square-foot building is Leadership in Energy and Environment Design (LEED) certified silver and utilizes sound technology to keep noise levels down. The new building provides a world-class working environment and employees helped to design the interior of the building, with focus on work space and co-working space. The location has 600 employees with room to grow.
- FirstBank added 127,000 square feet of space to its Jefferson County headquarters, including a parking garage, gym, cafeteria, patio, and outside courtyard. The 227,000-square-foot campus will house about 1,000 workers, with room to add 400 more.
- TransNational Payments, a payment processing and merchant services company, opened an office in downtown Denver. The new office will house an outside sales team and a software sales executive team.
- OnDeck Capital Inc. relocated to the 9th and 10th floors of the Denver Post’s headquarters building in downtown Denver. The 170-employee company plans to expand to 600 employees over the next eight years.
- First California Mortgage Company plans to consolidate and expand its Greenwood Village office. The company will relocate to a 9,800-square-foot office, which will be home to the Denver support services for its network of loan officers and retail branches.
- Colorado Springs-based Ent Credit Union plans to expand its membership area to Arapahoe, Douglas, and Jefferson Counties. The company will add ATMs and service centers to those counties over the next five years.
- San Francisco-based New Resource Bank opened a new loan production office in Boulder. The location will provide loans to businesses and nonprofits that benefit the community and preserve the planet.
- Bellco Credit Union opened a new 2,200-square-foot branch in Castle Rock. The new branch will feature the full suite of traditional services, 24-hour ATM access, and two express teller machines to conduct self-service banking transactions for on-the-go convenience.
- Bank of America opened two new Metro Denver branches in Denver and Boulder. The branches feature banking and lending services, retirement planning, and small business banking. The company plans to open 20 retail branches in Metro Denver over the next three years.
- Community Banks of Colorado opened a branch bank in Boulder. The company opened a loan production office in 2015, which will move to the new Boulder branch location.
• Fort Collins-based Bank of Colorado opened two branches in Metro Denver, one in Greeley and one in Longmont. The locations will specialize in commercial lending and will capitalize on the growth along the Front Range.
• Blue Federal Credit Union opened a new branch in Fort Collins and plans to open a third branch. The company was formed in April 2016 through a merger of Cheyenne, Wyo.-based Warren Federal Credit Union and Broomfield-based Community Financial Credit Union.

Investments
• TIAA will add 30,000 square feet of space to its downtown Denver office and plans to add nearly 700 more employees to its existing 1,500 Denver workforce in the next eight years. The company will occupy nearly 350,000 square feet of space by 2018.
• Fidelity Investments expanded its Greenwood Village operations, adding about 30,000 square feet of space and 100 additional employees over the past year. The expansion will help the company meet its hiring goal of 300 additional Colorado employees by 2018.
• Partners Group Holding AG, a Swiss investment manager, plans to build a campus in Broomfield that will serve as the company’s North American headquarters. The campus will accommodate several hundred employees, the first phase of which is expected to be completed in 2018. The company cited the city as an important financial hub that draws significant talent, a central location, and high quality of life as motivation for its new location.
• Chatham Financial, a financial advisory firm that is headquartered in Pennsylvania, plans to expand its Littleton office. The company will add 75 employees to its existing 42-person workforce.
• Greenwood Village-based Great-West Financial plans to create a new division focused on investment and retirement income programs. Great-West Investments is for retirement savers, plan sponsors, and their advisors.
• EKS&H, a nationally recognized professional services firm, formed a new Denver-based corporate finance and merger and acquisition (M&A) advisory firm named EKS&H Capital Advisors. EKS&H Capital Advisors will offer a range of investment banking services including sell-side and buy-side M&A advisory, capital formation, and strategic advisory services, investment banking, and security services.
• Fidelity Investments has launched Fidelity Health Marketplace, a private-sector insurance broker service, which offers access to health and wellness benefits to small and mid-size companies and their employees.

Insurance
• UnitedHealth Group Inc. plans to hire 70 customer service employees by the beginning of 2017 in Metro Denver. The new positions will help support the benefit needs of Optum and UnitedHealthcare (UHC) plan participants and clients, and help deliver improved healthcare experiences.
• Seattle-based QuoteWizard, an online insurance comparison site, opened an office in lower downtown Denver. The company plans to hire sales and technology professionals.
• Greenwood Village-based Cherry Creek Insurance Group changed its name to CCIG as part of its rebranding effort to highlight its growth, new products, and expanded digital operations. The rebranding initiative includes new online tools and products, a digital operations platform, and reinvigorated social media efforts.

Merger and Acquisition Activity
Several mergers and acquisitions in the region’s financial services industry drove company growth and expanded product offerings in 2016.
• Denver-based Janus Capital Group Inc. will merge with London-based Henderson Group PLC to create a new company called Janus Henderson Global Investors PLC. The new company’s international headquarters will be located in London. The combined company will employ 2,300 people in 23 locations worldwide, with about $320 billion of assets under management and a market capitalization of about $6 billion.
• 361 Capital will acquire BRC Investment Management LLC, both Denver-based firms. The combined firm will have $2.1 billion in assets under management and will broaden 361 Capital’s capabilities and expand its distribution footprint.
• Westminster-based Reed Group Ltd. acquired Aon Hewitt’s absence-management administration business. With the acquisition, the Reed Group will gain 1,300 employees and seven U.S. and Canadian locations and will be the second-largest provider of extended-leave services in the nation.
• Denver-based Guaranty Bancorp and Loveland’s Home State Bancorp will merge, forming the state’s third-largest bank holding company. The deal will include $3.3 billion in assets, $2.6 billion in deposits,
and $2.3 billion in total gross loans, in addition to expanded branches and greater career development opportunities.

- UHC acquired Rocky Mountain Health Plans (RMHP), an independent provider of health insurance in western Colorado. UHC plans to invest an undisclosed amount of money into RMHP to restore the organization’s capital base and help ensure that it becomes a stronger, more sustainable health plan in the long-run. RMHP will continue to operate as its own brand, maintain its existing healthcare provider agreements, and retain its current management team and base.

- Denver-based IMA Financial Group, Inc. acquired Dallas-based Waldman Bros. The deal expanded IMA’s market to five states and will provide new services and value to both companies’ existing clients.

- Kansas-based Sunflower Financial Inc. plans to merge with Texas-based Strategic Growth Bancorp Inc. The combined company will have their headquarters in downtown Denver and, with assets of $4 billion, will be the state’s third-largest headquartered bank by total assets.

- Arvada-based Sooper Credit Union and Denver Community Credit Union plan to merge. Under the agreement, the combined company will have more than $620 million in assets and operate nine Colorado locations.

- IHS Inc., a global business-intelligence provider, completed a merger with United Kingdom-based Markit Ltd. The company, renamed IHS Markit Ltd., will have a London headquarters. The combined company creates a $13 billion international market and financial data company.

- Boulder-based investment advisory firm Sargent Bickham Lagudis merged with Johnstown-based Colorado Financial Management. The combined company will operate as Colorado Financial Management with 27 employees and nearly $1.3 billion in assets.

**Academic and Education Announcements**

The region’s robust educational system and research centers help prepare the future financial services workforce with vital skills through leadership, mentorship, and professional experience.

- In 2016, the Colorado Investment Services Coalition (CISC) initiated a partnership with Colorado State University’s (CSU) Ascend Program, an organization within the career center that provides companies with a broad base of services and access to the entire university system. CISC is hosting student tours of facilities, sponsoring the Women and Business program to promote diversity, providing on-campus speakers for career events, and launching a marketing program to provide insights into the gratifying careers available in investment services to help people meet their life goals through financial planning.

- The Colorado Business School Career Fair is a collaborative effort between the business schools at the University of Denver (DU), University of Colorado, and CSU. For three years, CISC has served as the top-level sponsor for the Career Fair. Attending organizations have the opportunity to recruit top business talent from Colorado and Wyoming, which includes over 1,500 students and alumni from over 10 colleges and universities. This fair is the premier fall recruiting event in the Rocky Mountain region.

- Metropolitan State University of Denver (MSUD) earned the Association to Advance Collegiate Schools of Business (AACSB) International accreditation for its College of Business. AACSB International represents the highest achievement for an educational institution that awards business degrees, which has been earned by less than 5 percent of the world's business programs.

- Greenwood Village-based CSU-Global Campus received the Accreditation Council for Business Schools and Programs (ACBSP) of its business programs. In addition to the accreditation, the visiting team identified six areas that were considered best in class. ACBSP is the only organization offering specialized business accreditation for all degree levels.

- Bank of the West opened Colorado’s first HOPE Inside Center in its Aurora branch. The collaboration with national nonprofit Operation HOPE provides financial literacy to the community in the areas of homeownership, small business development, and personal money management. The HOPE Inside Center is the bank’s third HOPE location.

- BankWork$™ partnered with Goodwill industries of Denver to launch an eight-week program in Denver to train young adults from low income and minority communities for careers in the financial services industry. The program will be offered once per quarter and places graduates into Metro Denver banking positions including tellers, customer service representatives, and personal bankers. The program also offers job interview practice, job placement assistance, and ongoing coaching and mentoring to assist with career advancement.

- Oppenheimer Funds partnered with Galvanize to offer its employees a collaborative, alternative workspace. The company’s second Denver location provides employees a third option, beyond working
from the office or home, and provides opportunities to enhance their skills at monthly workshops or extended education programs.

Several of the region’s universities and research institutions overhauled or added to their MBA programs.

- MSUD launched its new Master of Business Administration (MBA) program. The 37-credit, part-time program offers three concentrations in strategic business, business analytics, or accounting and a Master's of Professional Accountancy.
- The Daniels College of Business at DU revamped its MBA curriculum, which includes a 21-month program that has four sets of 10-week-long challenges. The challenges will require students to create their own business product, work with agencies to develop business plans that support charitable causes, work directly with major Colorado employers, and study abroad.
- CSU’s College of Business overhauled its executive MBA program. The 21-month blended program caters to working adult professionals by combining 60 percent in-class sessions with 40 percent online learning. The program also focuses on entrepreneurship and has classes with lesson plans that mirror real-world situations.

Cross-Cluster Convergence

Metro Denver’s financial services industry is undergoing shifts as a result of changing consumer behavior, digitalization of business, cost reductions, and increased sales. The digital revolution’s wave of innovation is transforming the financial services industry with mobile applications, cloud computing, and big data to offer significant opportunities for financial services and information technology to converge. Regulations are also driving technological changes that rely on extensive reprogramming to financial services information technology systems.

- Capital One opened two new Capital One Cafés in Boulder and Denver. The new banking concept offers café-style service and ambassadors to assist with banking needs centered on discovery, conversations, hospitality, education, and community events. The concept is part of the shift toward smaller branch locations and fewer tellers as customers conduct more of their banking online.
- Bellco Credit Union redesigned its downtown Denver branch by replacing its traditional teller counters with two touch-screen pods and no-barriers teller tables. The new banking concept is geared toward digital banking products and customers that exclusively bank online or by mobile applications.

Industry Infrastructure Support

A number of associations and organizations unite the region’s active venture investors, angel investors, entrepreneurs, and firms.

- The Rocky Mountain Venture Capital Association (www.rockymountainvca.com) represents entrepreneurs, venture capitalists, and service providers in the Rocky Mountain Region and holds a bi-annual “Venture Capital in the Rockies” conference to showcase emerging companies and further venture funding in the region (www.vcintherockies.com). The organization also hosts a variety of networking and funding opportunities including VC’s Unplugged, PITCH Unplugged, and collaborations with leading conferences such as Invest Southwest and Colorado Venture Summit.
- The Rockies Venture Club (www.rockiesventureclub.org), a nonprofit organization that encourages entrepreneurship in the region by connecting entrepreneurs, service professionals, investors, and venture capitalists, offers workshops, training, and capital conferences for its members. The organization hosts the annual Angel Capital Summit and the Colorado Capital Conference that connects investors with entrepreneurial companies seeking funding.
- The Rocky Mountain MicroFinance Institute (RMMFI) is a nonprofit organization serving the needs of community entrepreneurs to foster growth in Colorado. RMMFI combines affordable and accessible business development services and flexible microloans to help entrepreneurs create economic self-sufficiency through business ownership (www.rmmfi.org).
- The Denver Office of Economic Development released the fifth edition of its Denver Capital Matrix, a resource directory of funding sources for Denver’s small businesses and entrepreneurs. The matrix identifies more than 400 funding sources including traditional bank lending, venture capital firms, private equity firms, angel investors, mezzanine sources, investment banking institutions, and others that have funded Colorado businesses (www.denvergov.org).
Financial Services Workforce Profile

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

Educational Attainment of Metro Denver and Northern Colorado’s Population Age 25 and Older

Source: U.S. Census Bureau, 2015 American Community Survey.

Metro Denver and Northern Colorado’s Labor Force Projections by Age (millions)

Source: Colorado Division of Local Government, State Demography Office.
FINANCIAL SERVICES: Metro Denver and Northern Colorado Industry Cluster Profile

Banking and Finance Workforce Profile

Age Distribution
The nine-county region’s banking and finance subcluster employs 39,150 people and includes a large pool of talented, well-educated, and highly skilled workers. The banking and finance subcluster has a larger share of employees (74.6 percent) that are between the ages of 25 and 54 years old, compared with the age distribution of all industries across the nine-county region (66.5 percent).

The banking and finance workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest banking and finance occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages
The 2015 average annual salary for a banking and finance worker in the nine-county region was $80,080, compared with the national average of $77,730. Total payroll for the banking and finance subcluster in the region reached nearly $3.1 billion in 2015.

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<td>1. Tellers</td>
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<td>4,407</td>
<td>198</td>
<td>370</td>
<td>$62,356</td>
<td>$23,025</td>
<td>$44,776</td>
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<td>3. Securities, commodities, &amp; financial services sales agents</td>
<td>8,105</td>
<td>778</td>
<td>0</td>
<td>$49,296</td>
<td>$31,179</td>
<td>$36,858</td>
<td>$79,706</td>
<td>$131,290</td>
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<tr>
<td>4. Customer service representatives</td>
<td>34,719</td>
<td>3,784</td>
<td>0</td>
<td>$35,742</td>
<td>$23,706</td>
<td>$27,755</td>
<td>$41,879</td>
<td>$51,228</td>
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<td>5. Loan interviewers &amp; clerks</td>
<td>3,066</td>
<td>334</td>
<td>0</td>
<td>$45,097</td>
<td>$29,810</td>
<td>$36,877</td>
<td>$52,353</td>
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<td>6. First-line supervisors of office &amp; administrative support workers</td>
<td>15,884</td>
<td>1,731</td>
<td>182</td>
<td>$56,785</td>
<td>$33,591</td>
<td>$44,302</td>
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<tr>
<td>9. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
<td>$97,749</td>
<td>$126,953</td>
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Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.
Investments Workforce Profile

Age Distribution

The nine-county region’s investments subcluster employs 27,910 people and includes a large pool of talented, well-educated, and highly skilled workers. The investments subcluster has a larger share of employees (53.2 percent) that are between the ages of 35 and 54 years old, compared with the age distribution of all industries across the nine-county region (43.7 percent).

The investments workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest investments occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages

Wages in the investments subcluster are among the highest across all industry clusters. The 2015 average annual salary for an investments worker in the nine-county region was $170,450, compared with the national average of $214,040. The region’s investment subcluster payroll reached nearly $4.5 billion in 2015.

Metro Denver and Northern Colorado Investments Occupation & Salary Profile, 2016

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<tbody>
<tr>
<td>1. Securities, commodities, &amp; financial services sales agents</td>
<td>8,105</td>
<td>778</td>
<td>0</td>
<td>$49,296</td>
<td>$31,179</td>
<td>$36,858</td>
<td>$79,706</td>
<td>$131,290</td>
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<td>2. Personal financial advisors</td>
<td>3,992</td>
<td>180</td>
<td>370</td>
<td>$79,706</td>
<td>$51,709</td>
<td>$64,355</td>
<td>$121,222</td>
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<td>3. Accountants &amp; auditors</td>
<td>30,194</td>
<td>1,359</td>
<td>861</td>
<td>$68,643</td>
<td>$42,898</td>
<td>$53,433</td>
<td>$89,842</td>
<td>$116,496</td>
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<tr>
<td>5. Secretaries &amp; administrative assistants, except legal, medical, &amp; executive</td>
<td>45,568</td>
<td>4,967</td>
<td>45</td>
<td>$37,664</td>
<td>$24,083</td>
<td>$29,685</td>
<td>$45,347</td>
<td>$53,942</td>
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<td>6. Brokerage clerks</td>
<td>755</td>
<td>82</td>
<td>335</td>
<td>$46,488</td>
<td>$28,725</td>
<td>$33,342</td>
<td>$58,053</td>
<td>$70,595</td>
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<tr>
<td>7. Customer service representatives</td>
<td>34,719</td>
<td>3,784</td>
<td>0</td>
<td>$35,742</td>
<td>$23,706</td>
<td>$27,755</td>
<td>$41,879</td>
<td>$51,228</td>
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<td>8. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
<td>$97,749</td>
<td>$126,953</td>
</tr>
<tr>
<td>9. Executive secretaries &amp; executive administrative assistants</td>
<td>9,079</td>
<td>990</td>
<td>158</td>
<td>$52,645</td>
<td>$38,397</td>
<td>$44,179</td>
<td>$61,942</td>
<td>$74,797</td>
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<tr>
<td>10. Office clerks, general</td>
<td>33,490</td>
<td>3,650</td>
<td>0</td>
<td>$35,941</td>
<td>$21,277</td>
<td>$27,490</td>
<td>$47,471</td>
<td>$59,800</td>
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Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.

The average annual salary in the investments services subcluster is significantly higher due to the large number of small, boutique investment services firms across the region who earn more from assets under management. Additionally, the average annual wage includes bonuses, stock options, severance pay, profit distributions, cash value of meals and lodging, and tips and other gratuities, which contributes to higher-than-average salaries in the investment services subcluster.
Insurance Workforce Profile

Age Distribution
The nine-county region’s insurance subcluster employs 31,820 people and includes a large pool of talented, well-educated, and highly skilled workers. The insurance subcluster has a larger share of employees (70.8 percent) that are between the ages of 35 and 64 years old, compared with the age distribution of all industries across the nine-county region (60.1 percent).

The insurance workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest insurance occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.

Wages
Total nine-county payroll in the insurance subcluster increased 4.6 percent over-the-year, totaling $2.4 billion in 2015. The 2015 average annual salary for insurance employees in the region was $75,450, compared with the national average of $84,900.
Education & Training

Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest financial services occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via http://highered.colorado.gov.

- Colorado State University [www.colostate.edu]
- Red Rocks Community College [www.rrcc.edu]
- University of Northern Colorado [www.unco.edu]
- Colorado State University Global Campus [www.colostate.edu]
- Regis University [www.regis.edu]
- University of Phoenix-Colorado [www.phoenix.edu]
- Front Range Community College [www.frontrange.edu]
- University of Colorado: Boulder, Denver [www.cu.edu]
- University of Colorado: South Campus [www.southdenver.cu.edu]
- Metropolitan State University of Denver [www.msudenver.edu]
- University of Denver [www.du.edu]

Key Reasons for Financial Services Companies to Locate in the Nine-County Region

The region is a top location for financial services companies offering:

1. Access to a large, highly qualified, and entrepreneurial workforce
   - Metro Denver has a higher-than-average concentration of employment in business and financial operations occupations. About 6.7 percent of Metro Denver’s labor force is employed in business and financial operations occupations, compared with the U.S. average of 4.8 percent. (U.S. Census Bureau, 2015 American Community Survey 1-Year Estimate)
   - Nearly 3 percent of the 75,580 certified financial planner certificates in the United States are held in Colorado even though Colorado’s population represents just 1.7 percent of the national population total. (Certified Financial Planner Board of Standards, Inc., 2016; U.S. Census Bureau, 2016)
   - Metro Denver ranked 12th among major U.S. metro areas creating the most finance jobs. Metro Denver’s financial services employment represented 7.4 percent of the area’s workforce and recorded a near 15 percent increase in employment between 2010 and 2015. (Forbes, 2016)
   - Three Metro Denver universities ranked among the nation’s best undergraduate business schools in 2016. The Daniels College of Business at the University of Denver (DU) ranked 56th, the Leeds School of Business at the University of Colorado Boulder (CU Boulder) ranked 62nd, and the College of Business at Colorado State University (CSU) ranked 90th. (Bloomberg Businessweek, 2016)
   - The College of Business at CSU, the College of Business at Metropolitan State University of Denver, and the College of Business and Management at Colorado Technical University ranked among the top 75 “Best for Vets: Business Schools 2016.” (Military Times, 2016)
   - The Leeds School of Business at CU Boulder ranked 81st and the Daniels College of Business at DU ranked 87th for full-time graduate business programs. (Bloomberg Businessweek, 2016)
   - Colorado Technical University was named to the list of the “Top Tier of Online MBA Programs” for 2016. (International Graduate Forum, 2016)
   - The College of Business at CSU and the Daniels College of Business at DU were named among “The Best 295 Business Schools” in 2016. DU ranked among the top five green MBA programs and CSU ranked among the top 10 best-administered programs. (The Princeton Review, 2016)
   - The College of Business at CSU ranked among the nation’s top-50 best online MBA programs in 2016. (U.S. News & World Report, 2016)
   - The Business School at the University of Colorado Denver (CU Denver) is the largest fully AACSB-accredited graduate business school in the Rocky Mountain region, placing the school in the top 5 percent of business schools worldwide. (The University of Colorado Denver, 2016)
The Risk Management and Insurance (RMI) Program at the CU Denver’s Business School educates students on minimizing and preventing loss as well as managing risk across a variety of industries. The program is the only RMI program between California and the Midwest and has a 100 percent job-placement record for graduates. (University of Colorado Denver, 2016)

The Daniels College of Business at DU is one of the nation’s eight original business schools and has one of the longest-running executive MBA programs. (University of Denver, 2016)

The Leeds School of Business at CU Boulder ranked among the top 100 “Best Executive MBA Programs” in 2016. CSU, CU Boulder, and CU Denver were recognized among the top 100 part-time MBA programs. (U.S. News & World Report, 2016)

Denver was named as the second-best city to start a career and ranked third for professional opportunities. (WalletHub, 2016)

Boulder ranked sixth among the “Best Cities for New College Grads” in 2016. The city’s growing tech hub, student and young professional population, and amenities contributed to its notable rank. (Zumper, 2016)

2. An overall better quality of life

Highlands Ranch ranked sixth in MONEY Magazine’s 2016 “Best Places to Live” list. Centennial (13th) and Broomfield (25th) were also named to the list’s top-25. (MONEY Magazine, 2016)

Metro Denver ranked as the third-fittest metropolitan area in the U.S. in 2016. Increased physical activity, low obesity and diabetes rates, and access to recreational opportunities contributed to its high rank. (American College of Sports Medicine, 2016)

Outdoor recreation is a fundamental component to Colorado’s healthy, active lifestyle and generates a $34.5 billion economic impact annually. The state has the fourth-highest percentage of state land area devoted to national forests and public lands, more than 70 state parks and wilderness areas, and is home to the highest concentration of 13,000 and 14,000-foot peaks in the nation. (Colorado Tourism Office, 2016)


Denver ranked fifth among the “2016’s Best Large Cities to Live In.” Denver scored first for livability and third for local economy and taxes. (WalletHub, 2016)

FasTracks is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.

3. Low to moderate costs of doing business

Metro Denver office rental rates averaged $29.52 per square foot in the fourth quarter of 2016, making the region’s office market highly competitive with other major markets in the U.S. (CoStar Realty Information, The CoStar Office Report, 4Q 2016)

Colorado’s initial registration fees for broker-dealers ($67) and sales representatives ($16) are the lowest in the nation. (State of Colorado, Division of Securities)

4. A pro-business environment and competitive tax structure

Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)

Colorado’s general Insurance Premium Tax is lower than taxes in 14 other states. The state’s Insurance Premium Tax is generally 2 percent, but businesses with a home or regional office in Colorado are only taxed 1 percent. (National Association of Insurance Commissioners, 2016)

Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)

Metro Denver ranked No. 1 among Forbes‘ 2016 “Best Places for Business and Careers” for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (Forbes, 2016)

Colorado ranked among the top five “Best States for Small Business Friendliness” in 2016. Fort Collins received an “A” grade and Denver received an “A-” grade for overall friendliness. (Thumbtack.com, 2016; Ewing Marion Kauffman Foundation, 2016)
5. **A central location and easy global access**
   - Denver International Airport was the sixth-busiest airport in the nation and 19th-busiest worldwide in terms of passenger traffic in 2015. (U.S. Bureau of Transportation Statistics, 2016; Airports Council International 2016; and Denver International Airport, 2016)
   - Metro Denver is the largest region in the U.S. to offer one-bounce satellite uplinks to six out of seven continents in one business day due to its unique geographic location in the Mountain time zone. (Metro Denver Economic Development Corporation)
   - Metro Denver’s central U.S. location on the 105th meridian at the midpoint between Tokyo and Frankfurt makes it a strategic choice for conducting national and international business. (Metro Denver Economic Development Corporation)
   - More than 1,000 miles from the nearest coast and outside of Tornado Alley, Metro Denver’s risk of natural disasters is minimal compared with locations in the east, west, and south. (National Oceanic and Atmospheric Administration, 2016; U.S. Geological Survey, 2016)

### Financial Services Industry Cluster Definition

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<th>NAICS Code</th>
<th>NAICS Description</th>
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### Financial Services Industry Cluster Definition Cont’d

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**Insurance**

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<td>Direct title insurance carriers</td>
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**Investments**

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*Note: NEC indicates "not elsewhere classified."*
Financial Services Industry Cluster Relationships

Financial Services
Banking and Finance
Insurance
Investments

Support Industries
Call Centers
Energy
Healthcare
Professional Services
Software
Telecommunications

Technologies
Internet
High-Speed
Infrastructure

Infrastructure
Angel Networks
CFA Society Colorado
CO Assoc. of Mortgage Professionals
CO Bankers Assoc.
CO Investment Management Consultants
CO Investment Services Coalition
CO Venture Capital Assoc.
Financial Planning Assoc. of Colorado
Rocky Mtn. Venture Capital Assoc.
RMMI
Rockies Venture Club

Client Industries
Consumers
Businesses
Government

For additional information, contact us:

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1445 Market Street
Denver, CO 80202-1790
303.620.8092
email: info@metrodenver.org
www.metrodenver.org

HEALTHCARE AND WELLNESS:
Metro Denver and Northern Colorado Industry Cluster Profile

Industry Overview

The nine-county Metro Denver and Northern Colorado region is the healthcare and wellness center of the Rocky Mountain West. The vibrant healthcare and wellness industry has one of the most active and fittest populations in the nation. In fact, the region has one of the lowest rates of adult obesity, a high rate of physical activity, and low rates of diabetes and heart disease. Metro Denver is the third-fittest metropolitan area in the nation and Fort Collins and Boulder are among the nation’s top metro areas for residents’ overall health and well-being. Outdoor recreation is a fundamental component to the region’s healthy, active lifestyle. Metro Denver boasts the nation’s largest public parks system, 11 world-class ski resorts within 100 miles, and more than 850 miles of paved off-road trails.

The healthcare and wellness cluster includes a dynamic and growing group of companies that provide preventive, curative, and rehabilitative services offered by healthcare providers, medical and specialty hospitals, kidney dialysis centers, nutrition and weight loss facilities, fitness centers, medical spas and massage facilities, public health and education, and other healthcare and wellness organizations. Extending beyond healthcare delivery, the cluster represents a continuum of businesses ranging from treating disease to a multidimensional and holistic approach that focuses on complete physical and mental health, social well-being, and disease prevention. The region’s healthcare and wellness industry is resilient to economic cycles, with employment increasing every year since 2004. With an employment base of 214,430 workers in 19,760 companies, the healthcare and wellness cluster is the region’s largest cluster in terms of employment. Healthcare and wellness companies employed 9.6 percent of the region’s total employment base in 2016 and total payroll in the industry exceeded $11.4 billion.

The region’s internationally renowned clinical systems and top-rated research institutions support the thriving healthcare and wellness cluster. The cluster is anchored by the 578-acre Fitzsimons campus, which includes the Anschutz Medical Campus and the Fitzsimons Innovation Campus. The project will be the largest medical-related redevelopment in the nation and the world’s only complete new research, education, and patient care complex. The campus is home to the schools and colleges of Medicine, Nursing, Dental Medicine, Pharmacy, and Public Health. With two world-class research hospitals—the University of Colorado Hospital (UCH) and Children’s Hospital Colorado—the campus will total 18 million square feet and employ more than 44,000 people at full buildout. The Campus is also home to the Anschutz Center for Health and Wellness, which will become the nation’s go-to-source of information and programs to reverse the upward trend of childhood and adult obesity. The Anschutz Medical Campus is the largest academic health center from Chicago to the West Coast and has a $5.4 billion annual economic impact to the state. In addition, several hospitals and healthcare systems in the region are undergoing major renovations and expansions to support the growing healthcare hub. The region is also a leader in the integration of IT-software and healthcare and wellness, developing wearables and apps to track well-being.

Demand for healthcare and wellness services and workers will continue to increase from the state’s growing and aging population, the changing health insurance landscape, and ongoing treatment for chronic conditions, among others. These trends will also drive further collaboration and cooperation among various healthcare and wellness facilities across the region for specialized services, research, workforce, and facilities. By 2040, Colorado’s population ages 65 and older is projected to double to 1.5 million. Concurrently, life expectancy in Colorado has increased from 77.2 years to 80.4 years since 1990, the third-highest growth rate in the nation. This demographic shift toward an older population will generate economic activity based on increased demand for health services. Further, the expansion of the insured population in the state will continue to increase the need for healthcare providers and infrastructure support.

1 The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
HEALTHCARE AND WELLNESS:
Metro Denver and Northern Colorado Industry Cluster Profile

Healthcare and Wellness Economic Profile

The healthcare and wellness cluster includes the offices of physicians, dentists, chiropractors, optometrists, mental health practitioners, physical and speech therapists, podiatrists, and other health practitioners. The cluster includes hospitals ranging from general medical, surgical, and psychiatric to substance abuse and specialty care. The cluster also includes centers focused on family planning, outpatient mental health and substance abuse, kidney dialysis, diagnostic imaging, and emergency care. Companies focused on nursing care, assisted living, and long-term care and businesses that provide services for individuals, families, and the elderly are also included.

The cluster encompasses home health and recreation equipment rental, fitness and recreation facilities, diet and weight reducing services, and massage and yoga services. Companies that manufacture ophthalmic goods, sports and athletic equipment, and outerwear and retailers engaged in vitamins and nutrition supplements are also a part of healthcare and wellness. The cluster includes government agencies engaged in the planning, administration, and coordination of public health programs and services. The healthcare and wellness cluster consists of 53, six-digit North American Industry Classification System (NAICS) codes.

With direct employment of 214,430 healthcare and wellness workers, the nine-county region ranked 13th out of the 50 largest metro areas in 2016. The region ranked 30th for healthcare and wellness employment concentration. Seventy percent of Colorado’s healthcare and wellness cluster employees worked in the region.

<table>
<thead>
<tr>
<th>Healthcare and Wellness Employment and Company Profile, 2016</th>
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</thead>
<tbody>
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<td><strong>Nine-County Region</strong></td>
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<tr>
<td>Direct employment, 2016</td>
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<td>Number of direct companies, 2016</td>
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<td>One-year direct employment growth, 2015-2016</td>
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<td>Five-year direct employment growth, 2011-2016</td>
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<td>Avg. annual direct employment growth, 2011-2016</td>
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<tr>
<td>Direct employment concentration</td>
</tr>
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</table>


2 Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest metropolitan statistical areas (MSAs). Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest MSAs.
HEALTHCARE AND WELLNESS:
 Metro Denver and Northern Colorado Industry Cluster Profile

Healthcare and Wellness Employment

The nine-county region’s healthcare and wellness employment (214,430 workers) rose 5.4 percent in 2016, compared with the previous year’s level, adding nearly 10,920 new jobs during the same period. National employment levels also grew over-the-year, rising 3.1 percent. About 1.2 percent of the nation’s healthcare and wellness employment is located in the region. Between 2011 and 2016, the region’s healthcare and wellness employment rose 22.8 percent, compared with 11.1 percent growth at the national level.

About 19,760 healthcare and wellness companies operated in the nine-county region in 2016. Approximately 88 percent of the region’s healthcare and wellness companies employed fewer than 10 people, while 0.4 percent employed 250 or more.
HEALTHCARE AND WELLNESS:
Metro Denver and Northern Colorado Industry Cluster Profile

Major Healthcare Companies
- American Medical Response  
  www.amr.net
- Comfort Dental  
  www.comfortdental.com
- DaVita Inc.  
  www.davita.com
- HealthGrades, Inc.  
  www.healthgrades.com
- HSS Inc.  
  www.hss-us.com
- InnovAge  
  www.myinnovage.org
- Kindred Healthcare, Inc.  
  www.kindredhealthcare.com
- Life Care Centers of America  
  www.lcca.com
- Quest Diagnostics  
  www.questdiagnostics.com
- Rocky Mountain Poison & Drug Center  
  www.rmpdc.org

Major Wellness Companies
- 24 Hour Fitness  
  www.24hourfitness.com
- CorePower Yoga  
  www.corepoweryoga.com
- Gaiam, Inc.  
  www.gaiam.com
- Massage Envy  
  www.massagenvy.com
- Natural Grocers by Vitamin Cottage  
  www.naturalgrocers.com
- SlimGenics, LLC  
  www.slimgenics.com
- United Natural Foods, Inc.  
  www.unfi.com
- Wellbridge, Inc.  
  www.wellbridge.com

Major Healthcare and Wellness Foundations and Community-Based Organizations
- Anschutz Family Foundation  
  www.anschutzfamilyfoundation.org
- Arapahoe House  
  www.arapahoehouse.org
- Aurora Mental Health Center  
  www.aumhc.org
- Belle Bonfils Memorial Blood Center  
  www.bonfils.org
- Caring for Colorado Foundation  
  www.caringforcolorado.org
- Catholic Health Initiatives  
  www.catholichealthinit.org
- Children’s Hospital Colorado Foundation  
  www.childrenscoloradofoundation.org
- Clinica Family Health Services  
  www.clinica.org
- Colorado Behavioral Healthcare Council  
  www.cbhc.org
- Colorado Community Health Network  
  www.cchn.org
- The Colorado Health Foundation  
  www.coloradohealthfoundation.org
- The Colorado Trust  
  www.coloradotrust.org
- Colorado Visiting Nurse Association  
  www.vnacolorado.org
- Community First Foundation  
  www.communityfirstfoundation.org
- The Denver Health Foundation  
  www.denverhealthfoundation.org
- The Denver Hospice  
  www.thedenverhospice.org
- El Pomar Foundation  
  www.elpomar.org
- Helen K. & Arthur E. Johnson Foundation  
  www.johnsonfoundation.org
- Kenneth King Foundation  
  www.kennethkingfoundation.org
- Jefferson Center for Mental Health  
  www.jeffersonmentalhealth.org
- Jewish Family Service of Colorado  
  www.jewishfamilyservice.org
- LiveWell Colorado  
  www.livewellcolorado.org
- Mental Health Center of Denver  
  www.mhcd.org
- Mental Health Partners  
  www.mhpcolorado.org
- Naturally Boulder  
  www.naturallyboulder.org
- North Colorado Health Alliance  
  www.northcoloradohealthalliance.org
- Rose Community Foundation  
  www.rcfdenver.org
- Western Dairy Association  
  www.westerndairyassociation.org
HEALTHCARE AND WELLNESS:
Metro Denver and Northern Colorado Industry Cluster Profile

Major Healthcare and Wellness Government and Research Facilities

- CO Department of Agriculture
  [www.colorado.gov/ag](http://www.colorado.gov/ag)
- CO Department of Human Services
  [www.colorado.gov/CDHS](http://www.colorado.gov/CDHS)
- CO Department of Public Health & Environment
  [www.colorado.gov/cdphe](http://www.colorado.gov/cdphe)
- Tri-County Health Department
  [www.tchd.org](http://www.tchd.org)
- University of CO Anschutz Medical Campus
  [www.ucdenver.edu](http://www.ucdenver.edu)
- U.S. Dept. of Agriculture
  [www.usda.gov](http://www.usda.gov)
- U.S. Dept. of Health & Human Services Health Resources & Services Admin.
  [www.hrsa.gov](http://www.hrsa.gov)
- CO Department of Public Health & Environment
  [www.colorado.gov/cdphe](http://www.colorado.gov/cdphe)
- U.S. Dept. of Veterans Affairs
  [www.va.gov](http://www.va.gov)

Nine-County Region Major Health Systems and Facilities

The nine-county region is home to major health systems and facilities that provide quality care to its residents. The region’s major health systems and facilities are highlighted below and their corresponding projects and developments that were announced in 2016.

Anschutz Medical Campus and Fitzsimons Innovation Campus

The 578-acre Fitzsimons campus includes the Anschutz Medical Campus and the Fitzsimons Innovation Campus. The project will be the largest medical-related redevelopment in the nation along with the world’s only complete new research, education, and patient care complex.

- The U.S. Department of Veterans Affairs (VA) medical facility is 78 percent complete and on-track for a 2018 completion. The U.S. Army Corps of Engineers was awarded a $571 million contract to complete the 1.2 million-square-foot medical center. When completed, the VA will employ about 2,100 people and will serve thousands of veterans. The facility will have 306,000 square feet of diagnostic and treatment space, 260,000 square feet of inpatient space, and 302,000 square feet of clinic space.
- The College of Nursing began a new project called the Healthcare Partners at Belleview Point. The health clinic will operate with nurse practitioners and will provide annual physicals, blood work, vaccines, and behavioral health services.
- The Barbara Davis Center for Childhood Diabetes is leading trials on the use of an artificial pancreas that holds potential to be a big breakthrough for the treatment of type 1 diabetes. The Center is testing the viability of the device that monitors glucose continually and could provide automatic insulin injections.
- The Center for Global Health was re-designated as the only maternal and child health collaborating center in North America by the World Health Organization. The designation boosts the Centers’ prestige and will likely increase the number of grants the facility receives.

Banner Health

Banner Health is a premier health system in Northern Colorado, providing services to the cities of Berthoud, Eaton, Fort Collins, Greeley, Johnstown, Loveland, and Windsor. Two major health centers—the North Colorado Medical Center (NCMC) and the McKee Medical Center—have serviced the region for a combined 130 years. NCMC in Greeley is rated nationally among the top 1 percent of hospitals for clinical quality. The McKee Medical Center is an acute-care hospital serving the Loveland community. [www.bannerhealth.com](http://www.bannerhealth.com)

- McKee Medical Center began offering three-dimensional, full-field digital breast mammography and tomosynthesis, becoming the second Banner Health facility in Northern Colorado to use the technology. The new imaging technology detects smaller cancers, as well as up to 60 percent more invasive cancers than conventional digital mammography.

Boulder Community Health

Boulder Community Health (BCH) is a community owned-and-operated health system dedicated to providing local access to high quality medical care to people and businesses in Boulder and the City and County of Broomfield. BCH provides clinical excellence in heart care, neurosurgery, stroke care, orthopedics, and cancer care. [www.bch.org](http://www.bch.org)
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- A 76,000-square-foot medical building is planned next to BCH’s Foothills Hospital Campus. The building will house units for behavioral health, in-patient rehabilitation and neurology, and electroconvulsive therapy.

Centura Health

Centura Health connects Coloradans to affordable, world-class care through an integrated network of healthcare staff and physician partners. Facilities in the nine-county region include Avista Adventist, Castle Rock Adventist, Littleton Adventist, Longmont United Hospital (LUH), OrthoColorado Hospital, Parker Adventist, Porter Adventist, St. Anthony, St. Anthony North Health Campus, and numerous urgent care, neighborhood health centers, surgery centers, and diagnostic imaging centers, among others. www.centura.org

- The new Centura Health Firestone Neighborhood Health Center opened, which promotes collaboration between different specialties, prevention, patient education, and easy access to the key components of optimal health. The center has two Centura Health Physician Group practices offering primary care services.
- A new emergency and urgent care center at the Indian Peaks Medical Center building opened in Frederick. The new center will be equipped with digital X-ray, CT scan, ultrasound, and other equipment.
- Plans for a 44,000-square-foot neighborhood health center in Littleton are underway. The center will provide primary care and urgent care services, and will be Centura’s third neighborhood health center in Jefferson County.
- A new Centura Health Emergency and Urgent Care Center opened near the Centura Golden Neighborhood Health Center. The facility has 10 exam rooms, a trauma room, laboratory, digital audiology room, bariatrics room, CT scan room, medication prep area, and a drive-up emergency entrance.

Children’s Hospital Colorado

Children’s Hospital Colorado (CHC), located on the Anschutz Medical Campus, is the region’s premier hospital for children. CHC provides care to more children than any hospital in the surrounding states through its network of over 3,000 pediatric specialists and more than 400 outreach clinics. www.childrenscolorado.org

- A new Center for Innovation opened that will transfer ideas from its staff and research into commercial products. The Center will allow hospital associates to submit ideas through a portal, where a team of healthcare professionals, venture development specialists, and patent attorneys will assess the proposals to then commercialize the products.
- CHC is one of six children-focused health systems that signed an agreement to form the Sanford Children’s Genomic Medicine Consortium. The health systems will attempt to advance the care of acute pediatric diseases through the further use of personalized and genomic medicine.
- Englewood-based Flight For Life Colorado and CHC will launch a new critical care helicopter in 2017 to transport and care for small children. Supplied by Englewood-based Air Methods Corp., the Airbus H130 T2 helicopter will have more interior space for an incubator and will be staffed by teams trained in neonates and children. The Airbus will transport patients within a 120-mile radius to all of CHC’s facilities in the region.

Craig Hospital

Craig Hospital in Denver is a world-renowned center for specialty rehabilitation and research for people with spinal cord injury (SCI) and traumatic brain injuries (TBI). Craig is a national center of excellence and has treated nearly 30,000 patients with SCI—more than any other single center in the world—and TBI since 1956. www.craighospital.org

- A $90 million renovation and expansion project was completed, which included a fourth-floor addition to the hospital’s west building and added a $3 million fitness facility designed specifically for partially paralyzed individuals. The expansion added 88,000 square feet, and allowed for a redesign of the rooms on each floor including a heavy-duty lift that can carry immobile patients. The Peak Center now includes a large pool, an underwater treadmill, and expanded training areas.
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Denver Health

Denver Health is a comprehensive, integrated organization providing level one care for all and is Colorado’s primary safety net institution. Denver Health is one of four Level I Trauma Centers in Colorado and one of the primary teaching hospitals in Denver. Twenty-five percent of all Denver residents, or approximately 150,000 individuals, receive their healthcare at Denver Health. [www.denverhealth.org](http://www.denverhealth.org)

HCA-HealthONE

HCA-HealthONE is one of the region’s largest hospital systems, which includes eight hospitals, six stand-alone emergency departments, numerous ambulatory surgery centers, occupational medicine clinics, physician practices, and imaging centers. Major facilities in the region include the Medical Center of Aurora, North Suburban Medical Center, Presbyterian/St. Luke’s, Rose Medical Center, Sky Ridge Medical Center, Spalding Rehabilitation Center, and Swedish Medical Center. HCA-HealthONE is home to AIRLIFE-DENVER, which provides critical care air and ground transportation across a 10-state region. [www.healthonecares.com](http://www.healthonecares.com)

- Sky Ridge Medical Center opened a dedicated pediatric emergency room. The 11-bed facility is staffed 24/7 with pediatric-specialist doctors and nurses, and emergency medical technicians. The department will house a suite of pediatric specialists including orthopedists, surgeons, and gastroenterologists.
- The Medical Center of Aurora opened a 20-bed inpatient adolescent behavioral health unit to treat children between the ages of 12 and 17 years old. The new facility will treat children for an average of two weeks before going to an intensive outpatient program and will help with the limited number of overnight beds in Metro Denver.

Kaiser Permanente Colorado

Kaiser Permanente provides comprehensive healthcare services to over 600,000 members through a network of 25 medical offices and affiliated hospitals and physicians throughout the region. [www.kaiserpermanente.org](http://www.kaiserpermanente.org)

- A second medical office building in Fort Collins will open in January 2017. The 3,000-square-foot Kaiser Permanente Spring Creek office will offer primary care, laboratory, and pharmacy services.
- Plans are underway to build a new health center at Catalyst HTI, Denver’s new health-tech innovation campus in the River North neighborhood. The facility will serve as a pilot site where new clinical innovations and processes will be tested, in addition to providing primary care services. The facility is slated to open in early 2018.

National Jewish Health

National Jewish Health is a worldwide leader in treating patients with respiratory, cardiac, immune, and related disorders. Founded in 1899 as a nonprofit hospital, National Jewish Health remains the only facility in the world dedicated exclusively to these disorders. Roughly 30 percent of National Jewish's patients come from out-of-state to receive pulmonology care. [www.nationaljewish.org](http://www.nationaljewish.org)

SCL Health System

SCL Health is a faith-based, nonprofit healthcare organization dedicated to improving the health of the people and communities. SCL Health provides care through five hospitals, ambulatory service centers, home healthcare, hospice, mental healthcare, and safety-net services. Major healthcare facilities in the region include Good Samaritan Medical Center, Lutheran Medical Center, Platte Valley Medical Center, Saint Joseph Hospital, and SCL Health Community Hospital. [www.sclhealthsystem.org](http://www.sclhealthsystem.org)

- Construction continued on the SCL Health Community Hospital-Northglenn, a 60,000-square-foot community hospital and medical office facility. The facility will include inpatient beds, laboratory and imaging services, and surgical amenities. The project is slated for completion in early 2017.
- A new microhospital opened in Jefferson County in the spring of 2016. Microhospitals range from 15,000 to 50,000 square feet, with the new hospital spanning just over 37,000 square feet. The facility provides many of the services of a large hospital, but on a smaller scale.

University of Colorado Health

University of Colorado Health (UCHealth) provides evidence-based healthcare and wellness services in Colorado, Nebraska, and Wyoming, and includes the University of Colorado Hospital (UCH), Poudre Valley
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Hospital (PVH), Medical Center of the Rockies, Greeley Emergency and Surgery Center, and other clinics and outpatient services. www.uchealth.org

- Construction is underway at the $125 million Longs Peak Hospital in Longmont. The hospital is slated to open in mid-2017 and will include 50 to 75 inpatient beds, an intensive care unit, operating rooms, an emergency department, advanced cardiology services, and a birth center.
- A four-story, 153,000-square-foot hospital in Greeley is slated to open in 2018. The UCHC Greeley Hospital will be the anchor of the proposed medical campus that will include a three-story, 112,000-square-foot UCHC Greeley Health Center, which is slated to open in late 2017.
- A $315 million, six-story hospital in Highlands Ranch will open in 2018. The 33-acre hospital campus will be part of a 100-acre Shea Homes master-planned community and will include 72 inpatient beds, an intensive care unit, operating rooms, advanced cardiac services, an emergency department, and complete imaging capabilities.
- In partnership with Adeptus Health, an 18-bed hospital opened in Broomfield. The UCHC Broomfield Hospital includes an intensive care unit, a comprehensive outpatient surgical center, and an emergency department.
- A new 36,000-square-foot Boulder Health Center opened that consolidated clinics that had been located at various locations throughout the city. Clinics at the center include family medicine, audiology, cardiology, endocrinology, and obstetrics and gynecology, among others. A new center for midwifery is slated to open in January 2017.
- A new freestanding emergency room opened in Longmont. The 7,000-square-foot emergency room is equipped with a radiology suite and on-site laboratories.
- The first phase of a two-phase tenant improvement at the UCHC Boulder Health Center began. The improvements to 6,600 square feet of space include updated infrastructure, an ophthalmology clinic, and staff amenities.

Key Company Announcements

Notable healthcare and wellness company expansions and announcements in 2016 included:

- Eye Center of Northern Colorado plans to build a medical and surgical eye care center in the Harmony Technology Park in Fort Collins. The project will house a surgery center and eye clinic with improved access for patients to retina, glaucoma, and cataract care. The completed 28,000-square-foot project is slated for mid-2017.
- The University of Colorado Denver broke ground on a $42.4 million, 92,000-square-foot Wellness Center at the intersection of Speer Boulevard and Auraria Parkway. The Center will include student lounges, study spaces, gaming rooms, and a health clinic.
- Front Range Orthopedic and Spine Center broke ground on a $12 million, 32,000-square-foot office building in Longmont. The building is slated for completion in early 2017. The company also plans to expand its Loveland medical building by adding 60,000 square feet that will house orthopedic specialists, surgical suites, ambulatory services, and physical therapy space.
- California-based Drever Capital Management and Oregon-based Vista Pointe Development Co. broke ground on a new 64-bed, 37,000-square-foot memory care facility in Fort Collins and plans to build a 52-unit facility in Greeley.
- Spectrum Medical Imaging opened a 6,500-square-foot facility in Brighton. The new facility will offer a full range of diagnostic radiology services, including a Hitachi Oasis MRI that provides high-field imaging with an open design.
- New York-based Brooklyn Boulders, a rock climbing gym, plans to relocate its headquarters to Denver and will employ over 30 workers. The company will lease 2,600 square feet of office space in the River North neighborhood and plans to open a new climbing gym in the area.
- Colorado Athletic Club opened its eighth location near Denver Union Station. The 38,000-square-foot space has specialized studios for heart rate training, group fitness, and hot yoga.
- CorePower Yoga opened a new location in Denver’s River North neighborhood and the company relocated its corporate headquarters to the facility.
- The Allen Co. Inc., a sporting goods manufacturer, closed on a $2.27 million purchase of a 20-acre site in the Colorado Technology Center business park. The company plans to construct a two-building, 313,290-square-foot campus to expand manufacturing for its hunting, fishing, and other outdoor gear products.
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- California-based Chuze Fitness plans to open five gyms in Metro Denver by mid-2017. The first gyms opened in Thornton and Westminster, which include swimming pools, kids rooms, and yoga/dance studios.
- Houston-based fitness studio DEFINE Body & Mind opened a Denver location and plans to open a Boulder location in mid-2017. The company has nearly 20 locations in four states and one in Dubai.
- SNÖBAHN opened the nation’s second European-style indoor ski and snowboard training gym in Centennial. The 9,000-square-foot facility includes ski ramps that can be adjusted to as steep as 20 degrees that use treadmill-like machines to replicate the feel of snow. The facility includes four slopes and a dedicated tubing hill.
- Red Fox Outdoor Equipment opened a new 3,100-square-foot flagship store in downtown Boulder. The company’s North American headquarters is located in Lyons and specializes in outdoor technical gear such as tents, climbing gear, and apparel with about 20 employees.

Health Tourism Announcements

The nine-county region is an expanding medical tourism hub, offering high-quality healthcare, exceptional healthcare facilities, and an array of healthcare services. Notable announcements in 2016 included:

- Rocky Mountain Cancer Centers (RMCC) is one of 197 participants nationwide and the only one in the state to be part of a five-year Oncology Care Model initiative offered by the Centers for Medicare & Medicaid Services Innovation Center. RMCC will offer the program at all 13 of its Colorado locations and will offer standardized, evidence-based care to ensure all patients are being treated in the same way. RMCC will also invest in new personnel to allow highly coordinated care and add patient navigators.
- BCH’s knee- and hip-replacement programs have been certified by The Joint Commission, the largest standards-setting and accreditation organization in the U.S. BCH has shorter-than-average length of hospital stays for patients who undergo hip or knee replacements.
- National Jewish Health established the Cohen Family Asthma Institute, which will address an emerging gap in severe asthma care, research, and education, while seeking a cure for the disease in five years. The Institute will have additional national reach through collaborations in New York with the Mount Sinai—National Jewish Health Respiratory Institute, and locally with SCL Health and the HCA-HealthONE’s Rocky Mountain Hospital for Children.
- Metro Denver is a leader in robotic surgery.
  - Robotic surgery is used at about one-third of Colorado hospitals, with 5,541 robotic procedures completed by surgeons in 2015. This was more than double the number of procedures completed in the state just five years ago, according to the Colorado Hospital Association. A majority of the procedures (3,705 procedures) took place in outpatient settings.
  - BCH’s Foothills Hospital is the first in Colorado and the only hospital in the Rocky Mountain region to offer Mako robot-assisted total knee replacements. The Mako system creates a three-dimensional virtual model of the knee, which allows a personalized pre-operative plan. The robotic arm guides the surgeon within the predefined area and helps prevent the surgeon from moving outside the planned boundaries.
  - Presbyterian/St. Luke’s Medical Center unveiled its new robotic operating system, bringing the hospitals robotics surgical systems to four and making it arguably the market leader for this sector. The hospital is one of only five hospitals nationwide to have the Flex system and the only one west of the Mississippi River. The hospital performed between 850 and 900 surgeries using the system in 2016.
- LUH received several certifications and accreditations. The Hope Cancer Care Center was awarded accreditation in radiation oncology from the American College of Radiology. Also, LUH received certification for its hip, knee, and shoulder replacement procedures from The Joint Commission.
- UCHealth acquired the Steadman Hawkins Clinic-Denver, adding high profile sports surgeons and physicians to its portfolio. The Steadman Hawkins Clinic provides the official team doctors for the Denver Broncos and Colorado Rockies. The partnership will allow UCHealth to care for more patients throughout the Rocky Mountain region, train additional sports fellows, and extend clinical trials. The new sports-medicine center will include a 90,000-square-foot medical office building, surgery center, four operating rooms, and a state-of-the-art rehabilitation and sports-performance training center.
- The Colorado Institute for Maternal and Fetal Health provides comprehensive care and treatment before, during, and after high-risk or routine pregnancies. The center is a partnership between the UCH, the University of Colorado School of Medicine, and Children’s Hospital Colorado, which provides care to about 3,800 patients per year. Additionally, the Center provides about 200 complex deliveries
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per year—a rate that has grown 10 percent per year since 2010—and is one of the most preeminent in
the world due to its collaboration between the school and two hospitals.

• The Colorado Center for Reproductive Medicine (CCRM) is one of the nation’s leading fertility clinics,
providing a wide variety of treatments ranging from basic infertility care to the most advanced
technology available. Two-thirds of CCRM’s patients travel to Colorado from other states and countries
for treatment. CCRM is internationally recognized for success rates and scientific achievements in the
field of reproductive endocrinology.

Major Collaborations and Partnership Activity

Numerous partnerships and collaborations were announced in 2016 that are helping to improve healthcare
delivery and increase efficiency. Further, several healthcare and wellness companies in the region announced
mergers and acquisitions in 2016.

• Boulder-based Command Health partnered with Alabama-based SourceMed to offer a new form of
clinical documentation for physicians working at the ambulatory surgery centers. The partnership will
integrate Command Health’s mobile clinical documentation app with SourceMed’s billing technology.

• Colorado State University (CSU) and UCHealth partnered to focus on academics and healthcare.
UCHealth will work with CSU Health Networks to build and help staff the CSU Health and Medical
Center. Further, UCHealth will continue to serve as the preferred healthcare provider, increasing the
quality and value of healthcare for CSU and will extend its role as the exclusive healthcare partner of
CSU Athletics.

• Denver Nephrologists P.C. and South Denver Nephrology Associates merged and created the state’s
largest nephrology services organization. Colorado Kidney Care P.C. will expand services to referring
physicians, hospitals, and patients.

• The Colorado Visiting Nurse Association and Northern Colorado’s Rehabilitation & Visiting Nurse
Association merged. The company’s combined headquarters in Denver will continue to serve 15 Front
Range counties.

• Greenwood Village-based Envision Healthcare Holdings Inc. merged with AmSurg Corp. The combined
company, called Envision Healthcare Corp., will have market capitalization of $10 billion and combined
revenue of $8.5 billion.

• Denver-based Bonfils Blood Center merged with Arizona-based nonprofit Blood Systems Inc. Bonfils
will retain its name and services in the communities and Blood System’s mountain division will be
headquartered in Denver.

• Nashville-based Correction Corporation of America purchased Boulder-based Correctional Management
Inc. (CMI) for $35 million. CMI operates seven correctional treatment centers with a total of 605 beds
in Colorado.

• Denver-based DaVita HealthCare Partners Inc. acquired The Everett Clinic Medical Group in a $385
million deal. The 20-site physician practice in Seattle will help DaVita expand growth in the Puget
Sound region.

• Denver-based BioScrip Inc. purchased New Jersey-based HS Infusion Holdings Inc. in a deal valued at
$85 million. The deal will provide customer-focused pharmacy and related healthcare infusion therapy
services into the home or alternate-site setting.

• Private equity firm Welsh, Carson, Anderson & Stowe purchased a majority stake in Denver-based
InnovAge, allowing the Denver-based senior-care company to transition from a nonprofit to a
for-profit and expand its Program for All-Inclusive Care for the Elderly services. InnovAge plans to
create the NextFifty Initiative, a new foundation that will fund programs for low- and moderate-income
and aging individuals with physical, cognitive, and behavioral issues.

Cross-Cluster Convergence

The region’s healthcare and wellness companies are developing breakthrough therapies to support the state’s
aging population and growing millennial population. For example, Boulder-based Accera opened two trial sites
in the state to research Alzheimer's disease. Additionally, more than 130 digital health companies are
appealing to health and wellness goals for millennials. Boulder-based SomaLogic is developing a wellness chip
to enable early detection of diseases and health conditions to monitor well-being. The synergy between
bioscience, healthcare, and IT-software supports the region as a national leader in expanding digital health.
Other digital health companies including Prima-Temp, RxREVU, Welltok, iTriage, RxAssurance, and Cerescan
are developing advanced technologies to improve health.
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- Metro Denver is an emerging digital health community. Founded in July 2012 by the Denver South Economic Development Partnership and Innovation Pavilion, Prime Health is a growing statewide community of 1,600+ health care executives, physicians, technologists, academics, entrepreneurs, and investors dedicated to improving health and lowering healthcare costs through the commercialization of digital health technologies. Prime Health is a resource ecosystem for Digital Health—the convergence of the digital and genetics revolutions with bioscience, healthcare and wellness, and information technology-software. Colorado is home to more than 130 digital health companies.

- StartUp Health Colorado launched to create a health innovation hub in the Rocky Mountain region. The organization partnered with Children’s Hospital Colorado, UCHealth, and the University of Colorado to streamline the pathways for health entrepreneurs to innovate and grow.

- Plans were announced for Catalyst HTI, a health-tech industry integration project slated to open in 2018 in Denver’s River North neighborhood. The project will integrate building space for startups, Fortune 500 companies, and healthcare providers in one location, enabling startups with resources to grow and exposing providers and larger companies to emerging technologies and human capital. The concept will be the first of its kind and has already received support from Terumo BCT, the University of Colorado Anschutz Medical Campus, and the American Diabetes Association.

Industry Infrastructure Support

The nine-county region is home to numerous foundations and organizations that are dedicated to advancing the vibrant healthcare and wellness industry.

- Flat 14ers is an initiative to encourage children, families, teachers, and community members to increase their levels of physical activity by climbing virtual 14,000-foot mountain peaks (14ers). The online tracking system provides individuals an easy and fun way to become active and stay active by converting minutes of physical activity such as running, playing basketball, cycling, or walking into steps toward reaching the summit of a 14er. The initiative is part of the Tri-County Health Department’s Communities Putting Prevention to Work Grant with partners including school districts, parks and recreation agencies in Adams, Arapahoe, and Douglas Counties, CBS4, America On the Move, and Children’s Hospital Colorado.

- Swedish outdoor gear manufacturer Fjällräven launched its first U.S. trekking event to Colorado. The Fjällräven Classic was a three-day, 20-mile camping and hiking trek through the mountains in August. The company’s U.S. operation is based in Loveland and is home to about 80 employees.

- The Center for Improving Value in Health Care (CIVHC) is a nonprofit organization that helps Colorado drive, deliver, and buy value in healthcare. The Center administers the pioneering Colorado All Payer Claims Database that offers the state’s most comprehensive healthcare cost, quality, and utilization claims data.

- The Colorado Health Foundation (CHF) is one of the largest health-focused foundations in the country, providing grants to nonprofits with the focus on encouraging healthy living. Located in Denver, CHF works to increase accessibility to quality healthcare, provides graduate medical education to increase the healthcare workforce, and works with foundation partners to address health issues in Colorado. CHF hosts the annual Colorado Health Symposium that is one of the leading national health policy conferences in the nation.

- The Colorado Trust was formed in 1985 as a dedicated foundation to advance the health and well-being of Coloradans. The Trust collaborates with individuals, organizations, and communities across the state to expand health coverage and improve the healthcare system. Through grant support, the Trust is dedicated to achieving access to healthcare for all Coloradans.

- The Colorado Outdoor Recreation Industry Office (OREC), located in Denver, supports and advances the state’s recreational opportunities and future health of Colorado. The office provides a central point of contact, advocacy, resources, and support for the diverse constituents, businesses, communities, and groups that rely on the ongoing health of the outdoor recreation industry. In 2016, OREC hosted its inaugural Colorado Outdoor Industry Leadership Summit to connect outdoor industry representatives from around the state.
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Healthcare and Wellness Workforce Profile

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

The nine-county region’s healthcare and wellness industry cluster employs 214,430 people and includes a large pool of talented, well-educated, and highly skilled workers. Compared with the age distribution across all industries in the region, the healthcare and wellness cluster has a larger share of employees in all age categories except the 16 to 24 years old and 65 years and older categories.

The healthcare and wellness workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest healthcare and wellness occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.
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Wages
The 2015 average annual salary for a healthcare and wellness worker in the nine-county region was $56,040, compared with the national average of $56,840. Total payroll for the healthcare and wellness cluster in the region exceeded $11.4 billion in 2015.

Metro Denver and Northern Colorado Healthcare and Wellness Occupation & Salary Profile, 2016

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<td>4. Home health aides</td>
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<td>5. Business operations specialists, all other</td>
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<td>$29,388</td>
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<td>$44,937</td>
</tr>
<tr>
<td>8. Secretaries &amp; administrative assistants, except legal, medical, &amp; executive</td>
<td>45,568</td>
<td>4,967</td>
<td>45</td>
<td>$37,664</td>
<td>$24,083</td>
<td>$29,685</td>
<td>$45,347</td>
<td>$53,942</td>
</tr>
<tr>
<td>9. Fitness trainers &amp; aerobics instructors</td>
<td>6,328</td>
<td>196</td>
<td>245</td>
<td>$40,627</td>
<td>$20,326</td>
<td>$26,051</td>
<td>$51,627</td>
<td>$61,911</td>
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<td>10. Medical secretaries</td>
<td>5,377</td>
<td>586</td>
<td>262</td>
<td>$37,501</td>
<td>$25,846</td>
<td>$31,216</td>
<td>$43,948</td>
<td>$49,750</td>
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Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.

Education & Training
Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest healthcare and wellness occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via http://highered.colorado.gov.

- American Sentinel University
  [www.americansentinel.edu](http://www.americansentinel.edu)
- Front Range Community College
  [www.frontrange.edu](http://www.frontrange.edu)
- Southwest Acupuncture College
  [www.acupuncturecollege.edu](http://www.acupuncturecollege.edu)
- Arapahoe Community College
  [www.arapahoe.edu](http://www.arapahoe.edu)
- Institute of Taoist Education and Acupuncture, Inc.
  [http://itea.edu](http://www.itea.edu)
- University of Colorado: Anschutz Medical Campus, Boulder, Denver
  [www.cu.edu](http://www.cu.edu)
- Colorado School of Traditional Chinese Medicine
  [www.cstcm.edu](http://www.cstcm.edu)
- Metropolitan State University of Denver
  [www.msudenver.edu](http://www.msudenver.edu)
- University of Northern Colorado
  [www.unco.edu](http://www.unco.edu)
- Colorado State University
  [www.colostate.edu](http://www.colostate.edu)
- Regis University
  [www.regis.edu](http://www.regis.edu)
- Colorado State University Global Campus
  [www.colostate.edu](http://www.colostate.edu)
- Rocky Vista University
  [www.rvu.edu](http://www.rvu.edu)
HEALTHCARE AND WELLNESS:  
Metro Denver and Northern Colorado Industry Cluster Profile

Key Reasons for Healthcare and Wellness Companies to Locate in the Nine-County Region

The region is a top healthcare and wellness location offering:

1. **A robust culture of health and wellness**
   - Colorado has the lowest adult obesity rate in the nation (20.2 percent) and is the only state with an obesity rate below 21 percent. (Trust for America’s Health, 2016; Robert Wood Johnson Foundation, 2016)
   - Colorado ranked as the most physically active state in the nation with over 82 percent of adults participating in physical activity in the past month. (The Henry J. Kaiser Family Foundation, 2016)
   - Metro Denver ranked as the third-fittest metropolitan area in the U.S. in 2016. Increased physical activity, low obesity and diabetes rates, and access to recreational opportunities contributed to its high rank. (American College of Sports Medicine, 2016)
   - The Boulder Metropolitan Statistical Area (MSA) ranked No. 1 among 190 metro areas for having the lowest rates of diabetes. The Fort Collins MSA ranked third and the Denver-Aurora-Lakewood MSA ranked 25th. (Gallup-Healthways, 2016)
   - Denver ranked among the nation’s 28 largest cities for several health indicators including the lowest incidence of tuberculosis, the highest rate of pneumonia vaccinations among adults 65 years and older, the second-lowest rate of adult obesity, and the second-highest rate of physical activity. (The Big Cities Health Coalition, 2016)
   - Outdoor recreation is a fundamental component to Colorado’s healthy, active lifestyle and generates a $34.5 billion economic impact annually. The state has the fourth-highest percentage of state land area devoted to national forests and public lands, more than 70 state parks and wilderness areas, and is home to the highest concentration of 13,000 and 14,000-foot peaks in the nation. (Colorado Tourism Office, 2016)
   - Colorado ranked seventh among the healthiest states for adults ages 65 years and older. Colorado’s seniors had the highest rate of physical activity among any other state, the second-lowest senior obesity rate, and the third-lowest rate of preventable hospitalizations. (United Health Foundation, 2016)
   - Fort Collins and Boulder ranked among the top 10 metro areas for residents’ overall health and well-being. Colorado ranked fourth for its residents’ overall well-being. (Gallup-Healthways, 2016)
   - Douglas County ranked as the healthiest county in Colorado. The City and County of Broomfield (second), Boulder (fourth), and Larimer (eighth) were also included in the top 10. (University of Wisconsin Population Health Institute, 2016)
   - Colorado scored among the top 10 in the nation on three of the six healthy aging indicators. The state’s older adults had the highest rate of physical activity of any state, low rates of activity limitations, and ranked ninth for immunization rates. (Colorado Health Foundation, 2016)
   - Colorado’s nearly 350 organic farmers, ranchers, and food processors account for an estimated $2.5 billion in organic sales, or approximately 10 percent of overall U.S. sales of organic products. (Colorado Department of Agriculture, 2016)

2. **The ability to recruit and retain a healthy, skilled, and productive workforce**
   - Healthy employees average 38 fewer unhealthy days per year and cost an average of $4,000 less each year in healthcare costs than unhealthy employees. (Gallup-Healthways Well-Being Index, 2016; University of Michigan Health Management Research Center, 2016)
   - Colorado has one of the nation’s most educated workforces, ranking second among the 50 states for percentage of residents (39.2 percent) with a bachelor’s degree or higher. (U.S. Census Bureau, 2015 American Community Survey)
   - Colorado ranked ninth for the number of science, engineering, and health graduate students per 1,000 individuals ages 25 to 34 years old in 2013. (National Science Foundation, 2015)
   - Boulder and Fort Collins ranked among the top five most-educated metro areas in the nation in 2016. (ValuePenguin.com, 2016)
   - Metro Denver ranked fifth among the top 15 major metros for college graduates in 2016. Fort Collins ranked fourth among small metro areas. (American Institute for Economic Research, 2016)
   - The Colorado Rural Health Center’s Colorado Provider Recruitment (CPR) program focuses on expanding the primary care workforce throughout Colorado’s rural and urban underserved healthcare communities. CPR has worked with over 80 communities and has recruited over 150 healthcare providers. (Colorado Rural Health Center, 2016)
3. **The convergence of health-related education, research, and application**

- The University of Colorado School of Medicine ranked 11th nationally for primary care, with the specialties of pediatrics (fourth), family medicine (fifth), and rural medicine (sixth) also ranking high. The School of Medicine ranked 35th for research. (*U.S. News & World Report*, 2016)
- The College of Nursing at the University of Colorado ranked among the nation’s top-25 nursing master’s and doctor of nursing practice programs in 2016. (*U.S. News & World Report*, 2016)
- The University of Colorado Denver and Red Rocks Community College are Metro Denver’s only institutions with accredited entry-level physician assistant programs. (Colorado Health Institute, 2016)
- The University of Colorado School of Medicine offers programs in dental medicine, medicine, nursing, pharmacy, and public health and 11.3 million square feet of newly built training facilities for future health professionals. (University of Colorado, 2016)
- The Colorado School of Public Health is the first accredited and only collaborative school of public health in the Rocky Mountain region. (The Colorado School of Public Health, 2016)
- The Skaggs School of Pharmacy and Pharmaceutical Sciences at the University of Colorado ranked among the top 25 percent of pharmacy schools in the nation and ranked fifth out of 75 academic pharmacy schools in total National Institutes of Health funding. (*U.S. News & World Report*, 2016; National Institutes of Health, 2016)
- The College of Nursing at the University of Colorado was the birthplace of the nation’s first school nurse programs and the first nurse practitioner programs in the world. The College’s Pediatric Nurse Practitioner and Informatics specialty programs ranked among the top 10 in the nation. (University of Colorado, 2015; *U.S. News & World Report*, 2016)
- The University of Colorado School of Medicine ranked among the nation’s top-25 institutions in total NIH funding, reaching $173.5 million in fiscal year 2015. The medical school departments of pediatrics, dermatology, obstetrics and gynecology, and physical medicine ranked among the nation's top-10 in NIH funding. (National Institutes of Health, 2016)

4. **A regional health hub, with expanding medical and wellness tourism opportunities**

- HealthGrades awarded several honors to hospitals in the nine-county region in 2016. Ten earned the 2016 Distinguished Hospital Award for Clinical Excellence, four were named among “America’s 100 Best Hospitals,” and six received awards for Outstanding Patient Experience. (HealthGrades, Inc., 2016)
- Nine nine-county region hospitals received “A” grades in hospital safety, 12 received a “B” grade, and four received a “C” grade. (The Leapfrog Group, 2016)
- The University of Colorado Hospital (Aurora), UCHealth-Poudre Valley Hospital (Fort Collins), and Rose Medical Center (Denver) were named among the nation’s top-100 hospitals. (Truven Health Analytics, 2016)
- Two Metro Denver hospitals were named to Becker’s Hospital Review “100 Hospitals with Great Orthopedic Programs” in 2016 including UCHealth-Poudre Valley Hospital and University of Colorado Hospital. (*Becker’s Hospital Review*, 2016)
- National Jewish Health is the leading respiratory hospital in the nation and the only healthcare organization to be fully focused on respiratory related illnesses. (National Jewish Health, 2016)
- The Barbara Davis Center for Childhood Diabetes is one of the largest diabetes programs specializing in type 1 diabetes research and care for children and adults in the world. (The Barbara Davis Center for Childhood Diabetes, 2016)
- Metro Denver is home to seven hospitals that have achieved Magnet® designation, the highest credential for nursing excellence. (American Nurses Credentialing Center, 2016)
- The University HealthSystem Consortium awarded UCHealth-Poudre Valley Hospital the Bernard A. Birnbaum Quality Leadership Award in 2016. (University HealthSystem Consortium, 2016)
- Children’s Hospital Colorado (CHC) ranked among the top 10 children’s hospitals in the nation with four of its specialty areas among the top 10 in their respective categories. CHC was also named to the *U.S. News’ Honor Roll*, ranked fifth on *Parents* magazine’s top children’s hospitals in the nation, and was named the winner of the 2015 American Hospital Association-Mckesson Quest for Quality Award. (*U.S. News & World Report*, 2016; *Parents*, 2013; American Hospital Association, 2015)
- Five Metro Denver hospitals were ranked among the 2016-2017 “Best Hospitals.” UCH was named as the top facility in Metro Denver and the 20th-best hospital in the nation. (*U.S. News & World Report*, 2016)
- HCA-HealthONE’s Rocky Mountain Hospital for Children (RMHC) houses the region’s largest neonatal intensive care unit and the largest, high-risk obstetrical program. RMHC cares for infants, children, and teenagers across a six-state region. (Rocky Mountain Hospital for Children, 2016)
5. An overall better quality of life

- Highlands Ranch ranked sixth in MONEY Magazine's 2016 "Best Places to Live" list. Centennial (13th) and Broomfield (25th) were also named to the list's top-25. (MONEY Magazine, 2016)
- Denver ranked No. 1 among U.S. News & World Report's 2016 "Best Places to Live." Denver’s healthy job market and access to the outdoors contributed to its notable rank. (U.S. News & World Report, 2016)
- Denver ranked fifth among the "2016's Best Large Cities to Live In." Denver scored first for livability and third for local economy and taxes. (WalletHub, 2016)
- Seven Metro Denver cities ranked among the 2016 list of the “100 Best Places to Live.” Boulder ranked fifth, followed by Fort Collins (13th), Longmont (23rd), Littleton (24th), Lakewood (26th), Loveland (41st), and Lafayette (44th). (Livability.com, 2016)
- The Fort Collins MSA and the Denver-Aurora-Lakewood MSA ranked among the top 10 "Best Cities to Retire" in 2016. Fort Collins ranked highly for healthcare and safety. (ValuePenguin.com, 2016)
- FasTracks is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.

### Healthcare and Wellness Industry Cluster Definition

<table>
<thead>
<tr>
<th>NAICS Code*</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
</tr>
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<tbody>
<tr>
<td>315220 (P)</td>
<td>Men's &amp; boys' cut &amp; sew apparel mfg.</td>
<td>2329-01</td>
<td>Men's &amp; boys' sportswear &amp; athletic clothing</td>
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<td>Women's &amp; misses' athletic clothing &amp; sportswear</td>
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<td>336991 (P)</td>
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<td>Bicycles &amp; related parts</td>
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<td>Dental laboratories</td>
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<td>Sporting &amp; athletic goods, NEC</td>
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<tr>
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<td>Medical, dental &amp; hospital equip. &amp; supplies (merchant wholesalers except those selling medical, dental, and hospital equipment and supplies via retail method)</td>
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<td>Vitamins &amp; minerals</td>
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<td>Offices of physicians, mental health specialists</td>
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<td>Offices of physicians, mental health specialists</td>
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### Healthcare and Wellness Industry Cluster Definition Cont’d

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<td>HMO medical centers</td>
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<td>7299-0200</td>
<td>Massage parlor &amp; steam bath services</td>
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<td>813212</td>
<td>Voluntary health organizations</td>
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<td>Health systems agency</td>
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<td>813319</td>
<td>Other social advocacy organizations</td>
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<td>Health &amp; welfare council</td>
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<td>Administration of public health programs</td>
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<td>Administration of public health programs</td>
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</table>

*(P) indicates that only part of the NAICS industry category is represented in the industry cluster definition.

Note: NEC indicates "not elsewhere classified."
HEALTHCARE AND WELLNESS:
Metro Denver and Northern Colorado Industry Cluster Profile

Healthcare and Wellness Industry Cluster Relationships

Technologies
- Bioinformatics
- Biotechnology
- Chronic Disease Management Devices
- Electronic Health Records
- Genomics
- Interactive Gaming
- Nuclear Medicine
- Physiological & Remote Monitoring Devices
- Radiology
- Robotics
- Stem Cells
- Telehealth
- Telemedicine

Support Industries
- Agriculture
- Aviation
- Bioscience
- Construction
- Education
- Financial Services-Insurance
- Government
- Hardware
- Legal
- Manufacturing
- Medical and Wellness Tourism
- Philanthropy
- Retail
- Software
- Sports and Recreation

Infrastructure
- Academic Research Institutions
- Anschutz Medical Campus
- Business Incubators and R&D Facilities
- Children’s Hospitals
- Counseling & Rehabilitation Centers
- Fitzsimons Innovation Campus
- General Medical and Specialty Care Hospitals
- Health Information Organizations
- Medical Specialty Schools
- Mental Health & Substance Abuse Clinics
- Nonprofit and Foundation Organizations
- Nutrition, Fitness, and Weight Mgmt. Centers
- Outreach Organizations
- Poison and Drug Centers
- Primary Care Hospitals
- Professional Healthcare and Wellness Organizations
- Public Health Schools and Organizations
- Referral Facilities
- Research and Teaching Hospitals
- Resorts and Sports Complexes
- School-Based Health Clinics
- Specialty Outpatient Clinics
- Sports and Training Facilities
- Telehealth Networks

Client Industries
- Bioscience
- Businesses
- Consumers
- Schools

For additional information, contact us:

Metro Denver Economic Development Corporation
1445 Market Street
Denver, CO 80202-1790
303.620.8092
e-mail: info@metrodenver.org
www.metrodenver.org

Industry Overview

The information technology (IT) cluster supports business activities in all other sectors of the economy with a variety of products and services, ranging from virus protection and other security programs for computers to specialized, custom software and computer integrated systems design. Technology enterprises are high-knowledge, human capital-based businesses that are expanding globally. This industry cluster report is based on a narrow definition of information technology to avoid double-counting workers in other technology clusters such as telecommunications and aerospace. This analysis divides information technology into two clusters: software and hardware.

- Hardware includes companies that manufacture computers and computer storage solutions to manage and protect electronic information.
- Software, which is covered in this report, includes companies involved in off-the-shelf software products to custom computer programming, computer facilities management, computer systems design, and data processing services. Software companies also provide network solutions, web-based applications, and operating systems.

A broader information technology cluster definition includes companies involved in software, hardware, and telecommunications. The definition can be expanded to include individuals employed in information technology occupations across all industries. Using this broader definition, the Colorado Technology Association (CTA) reports there are approximately 146,800 information technology workers in the state representing more than 12,000 software, Internet, hardware, telecommunications, and related technology companies.

IT-software was the nine-county Metro Denver and Northern Colorado region’s¹ fastest growing cluster in 2016, posting 9.4 percent employment growth between 2015 and 2016. In fact, this cluster grew at its fastest pace since 2001 as a result of landmark company expansion and venture capital activity. The region is home to more than 54,580 IT-software workers in nearly 5,180 companies, employing 2.4 percent of the region’s total employment base. Employment in the region’s IT-software industry grew for the sixth-consecutive year in 2016, adding over 13,920 workers between 2010 and 2016.

The region’s talent pipeline is a key ingredient for its entrepreneurial and innovative environment and is fueled by a growing IT-software workforce across the state. Colorado attracts young, scientific, and technical talent with millennials being the largest generational group of the total population. According to the U.S. Chamber of Commerce Foundation, one-half to two-thirds of the millennials are interested in entrepreneurship, and 27 percent are already self-employed. Colorado has the third-highest concentration of tech workers, with 9 percent of the state’s private sector workforce employed in technology firms, according to the CompTIA’s Cyberstates 2016 report. The state’s tech industry payroll was $19.9 billion, with the ninth-highest average tech wage totaling $106,350.

The region’s innovative ecosystem and growing startup hub support its increasing share of entrepreneurs. Additionally, the region’s collaborative culture, high quality of life, numerous coworking and shared workspaces, and strong job growth attract entrepreneurs. Moneyrates.com ranked Denver among the “10 Best Cities for Young Entrepreneurs” in 2016 and Denver and Boulder ranked among the top 10 emerging cities to live for tech professionals in 2016, according to Homes.com. The U.S. Chamber of Commerce Foundation’s Innovation That Matters 2016 ranked Denver third among U.S. cities that foster entrepreneurial growth and Denver ranked as the third-best city to start a tech career, according to ComputerTrainingSchools.com. Further, Metro Denver ranked among the top five cities for young entrepreneurs by NerdWallet in 2016. The Ewing Marion Kauffman Foundation ranked Metro Denver ninth

¹ The nine-county region is comprised of two principal areas, Metro Denver and Northern Colorado. Metro Denver consists of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson counties. Northern Colorado consists of Larimer and Weld counties.
Metro Denver and Northern Colorado Industry Cluster Profile

among the 40 largest metropolitan areas in the 2016 Kauffman Index: Startup Activity, with 360 people out of 100,000 adults becoming entrepreneurs each month.

The region is home to numerous programs and expansive real estate opportunities to support entrepreneurs and innovators. Denver, Boulder, Fort Collins, and Longmont hosted startup weeks to celebrate companies, innovation, and ideas in 2016. TechStars is a three-month program that provides up to $18,000 in seed funding for startups and an optional $100,000 convertible debt note, intensive mentorship, idea development, and the chance to present to angel investors and venture capitalists. Other entrepreneurial resources include TIE-Rockies, Startup Colorado, the Advanced Industries Accelerator Grant Program, and Blackstone Entrepreneurs Network. Further, real estate opportunities provide ample space for growing tech firms. According to CBRE's "Colorado Tech Book 2016," the tech industry was the most active industry to expand in Metro Denver office space in 2015. Further, tech firms in Denver leased 1.1 million square feet or 16.5 percent of the commercial office leases in Metro Denver. The region is also home to numerous coworking spaces that foster creativity and innovation. Metro Denver has more than 522,000 square feet of coworking space including INDUSTRY Denver, STRIDE, Shift Workspaces, and the Commons on Champa, among others. Galvanize is a technology coworking and office space for digital startups, with three campuses in Colorado, one in Boulder and two in Denver.

Software Economic Profile

The software cluster consists of seven, six-digit North American Industry Classification System (NAICS) codes including software reproduction, software publishers, custom computer programming, data processing and hosting, computer facilities management services, and computer systems design services.

The nine-county region ranked eighth out of the 50 largest metro areas in software employment concentration in 2016, up one position from the previous year. With direct employment of about 54,580 software employees, the region ranked 12th. Nearly 82 percent of Colorado’s software cluster employees work in the region.

### Software Employment and Company Profile, 2016

<table>
<thead>
<tr>
<th>Nine-County Region</th>
<th>United States</th>
</tr>
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<tbody>
<tr>
<td>Direct employment, 2016</td>
<td>54,580</td>
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<td>Number of direct companies, 2016</td>
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<td>One-year direct employment growth, 2015-2016</td>
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<td>Five-year direct employment growth, 2011-2016</td>
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<td>Avg. annual direct employment growth, 2011-2016</td>
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<tr>
<td>Direct employment concentration</td>
<td>2.4%</td>
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</tbody>
</table>


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2 Employment concentration is the direct cluster employment in a region expressed as a percent of total employment in all industries in the same region. Employment concentration is calculated and ranked for the 50 largest metropolitan statistical areas (MSAs). Direct employment is the number of employees in the industry cluster in a region. No multiplier effects are included. Direct employment is estimated and ranked for the 50 largest MSAs.
Software Employment

The nine-county region’s software employment (54,580 workers) rose 9.4 percent in 2016, compared with the previous year’s level, adding nearly 4,700 new jobs during the same period. National employment levels also grew over-the-year, rising 4 percent. About 1.7 percent of the nation’s software employment is located in the region. Between 2011 and 2016, the region’s software employment rose 27.5 percent, compared with 27.8 percent at the national level. Software companies employed 2.4 percent of the region’s total employment base, compared with a 1.9 percent national employment concentration.

About 5,180 software companies operated in the nine-county region in 2016. Nearly 85 percent of the region’s software companies employed fewer than 10 people, while 0.4 percent employed 250 or more.

Major Software Companies

- Alteryx, Inc.  
  www.alteryx.com
- AxisPoint Health (formerly McKesson)  
  www.axispointhealth.com
- CA Technologies  
  www.ca.com
- CGI Group Inc.  
  www.cgi.com
- CIBER, Inc.  
  www.ciber.com
- Cisco Systems, Inc.  
  www.cisco.com
- Coalfire Systems, Inc.  
  www.coalfire.com
- Constant Contact, Inc.  
  www.constantcontact.com
- Datavail Corp.  
  www.datavail.com
- Dell EMC Corporation  
  www.emc.com
- Envysion, Inc.  
  www.envysion.com
- Four Winds Interactive  
  www.fourwindsinteractive.com
- Gusto  
  www.gusto.com
- Hosting.com  
  www.hosting.com
- IBM Corp.  
  www.ibm.com
- Ibotta, Inc.  
  www.ibotta.com
- NetApp (formerly SolidFire Inc.)  
  www.solidfire.com
- Oracle Corporation  
  www.oracle.com
- Pearson eCollege  
  www.ecollege.com
- Ping Identity  
  www.pingidentity.com
- Pivotal Software, Inc.  
  www.pivotal.com
- Qualfon  
  www.qualfon.com
- Quark Software Inc.  
  www.quark.com
- Recondo Technology  
  www.recondotech.com
- SendGrid  
  www.sendgrid.com
- SoftTec Solutions  
  www.softtecinc.com
- Statêra, Inc.  
  www.statera.com
- Swiftpage ACT! LLC  
  www.swiftpage.com
- TalentReef Inc.  
  www.talentreef.com
- Tendril  
  www.tendrilinc.com
- TriZetto Corporation  
  www.trizetto.com
- Trustwave  
  www.trustwave.com
INFORMATION TECHNOLOGY-SOFTWARE:
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Major Software Companies Cont’d

- IHS Markit
  www.markit.com
- Intermap Technologies, Inc.
  www.intermap.com
- Kapost
  www.kapost.com
- LogRhythm Inc.
  www.logrhythm.com
- Long View Systems
  www.longviewsystems.com
- MapQuest, Inc.
  www.mapquest.com
- Microsoft Corporation
  www.microsoft.com
- TSYS (formerly Transfirst)
  www.transfirst.com
- Twitter, Inc.
  www.twitter.com
- VMware, Inc.
  www.vmware.com
- Webroot Inc.
  www.webroot.com
- Welltok
  www.welltok.com
- West Corporation (formerly Intrado Inc.)
  www.west.com
- Zillow Group Inc.
  www.zillow.com

2016 Industry Highlights

Key Company Announcements

The nine-county region’s reputation as a tech hub, high quality of life, and solid talent pool are prompting
companies to grow and expand. Notable IT-software company expansions and announcements in 2016 included:

- Amazon Web Services, a local division of the Seattle-based online retailer, opened a tech office in
  Broomfield. The company plans to hire software engineers at the location.
- Software development company Apto relocated its headquarters from Galvanize to lower downtown
  Denver and plans to add a couple dozen employees. The move is a result of aggressive company
  expansion over the past 12 months, accelerating revenue growth, and new industry partnerships.
- Billtrust, a New Jersey-based company that provides payment cycle management for businesses,
  expanded its Denver footprint. The company relocated its Denver office to a 26,570-square-foot space
  in the Gateway Business Park, which will accommodate up to 150 workers.
- Denver app maker Blinker relocated from Cherry Creek to Speer Boulevard to double the company’s
  office space. The company’s app is intended for private used-car transactions and the company plans
  to double its workforce to 42 employees in the next two years.
- Data recovery and security software company Code42 opened its third U.S. office in Broomfield. The
  expansion allows the company to be close to current and prospective customers and enable the
  company to recruit top talent in the area.
- Cuttlesoft, a Florida-based tech startup company specializing in information technology and software
  services, opened a second location in lower downtown Denver. The company cited Denver’s robust
  tech presence as motivation for its new office.
- Denver-based Dizzion Inc. relocated from the River North neighborhood to downtown Denver. The
  company plans to add additional workers as it expands.
- Idaciti relocated from New York City to the WeWork coworking space in Denver. The startup
  transforms electronic data into visual presentations including interactive graphics, charts, and other
  visuals to tell stories about businesses or groups.
- Newton Software doubled its Fort Collins workforce, hiring 25 additional employees in the next eight to
  10 months. The company leased about 5,000 square feet of space and plans to grow from 15 to 40
  employees.
- Denver-based NextHealth Technologies plans to at least double its workforce from the 15 current
  employees. The company secured additional venture capital funding that will help expand its
  workforce.
- nPloyed, a tech employee recruiting firm, relocated its business operations from Scottsdale, Ariz. to
  Denver. The company plans to grow from 30 to 40 employees in 2017. The company builds a software
  platform to help glean hiring insights as clients recruit job candidates.
Poetic Systems, a Houston-based website development and design company, opened an office in Denver. The expansion will help to boost its portfolio, as the company creates mobile applications and websites for startups and established companies.

Qualfon will hire 150 customer-service and inbound sales positions at its Fort Collins call center. The workers will serve its consumer brands across multiple industries.

Remote-Learner, an online educational company, relocated its headquarters from Waynesboro, Va. to Denver. The company has about 75 employees, eight of whom work in Colorado.

SendGrid relocated its corporate headquarters from Boulder to downtown Denver. The 52,000-square-foot space can accommodate more than 2.5 times the current Colorado employees and the company plans to grow to at least 630 workers by 2020.

Simpro Software, an Australian-based company, opened a U.S. headquarters in Boulder that could employ up to 100 people within two to three years. The company makes an operational software suite for contractors such as electricians and plumbers that help them manage a variety of tasks. The company raised $30.5 million to expand its operations.

SyncHR relocated its headquarters from Oakland, Calif. to Denver. The human relations-based software company increased hiring about 40 percent, with about half of these positions from Colorado. The move to Denver helped increase opportunities for collaboration with other technology leaders and offered a more central location to its business operations.

TapInfluence moved its headquarters from Boulder to downtown Denver. The new space will allow the company to grow to as many as 75 employees. TapInfluence manages a network of bloggers with established audiences who consumer-brand businesses can hire to make blogs, videos, podcasts, and other digital content highlighting their products and household goods.

TestPlant, a London-based software company, established a new U.S. headquarters in Boulder. The company moved into a 7,800-square-foot space that will host a range of functions including sales, human resources, presales, support, development, and marketing. The company has 35 employees and could grow to as many as 50 people next year.

Trustpilot, a Danish company that provides online reviews of companies, opened a Denver office at coworking space WeWork. The company plans to add up to 40 employees.

Twitter Inc. moved to a new location in Boulder and plans to increase its local employment base by 100 employees. The company leased a new 60,000-square-foot building with Class A office and retail space.

World Wide Technology Inc. and its subsidiary Asynchrony Labs opened a downtown Denver office. The locations will provide regional sales, engineering, and development hubs for the company. The company plans to add over 60 workers, with plans to expand to as many as 250.

Zillow Group Inc. plans to add 150 positions to its operations in Centennial. The company will hire business consultants and customer care consultants to its rentals and new home listings lines of business.

ZingFit, a software company that provides online scheduling and studio management for group fitness studios, relocated its headquarters from New York to Boulder. The company employs 14 people and 12 will relocate with the company. ZingFit plans to add up to 156 employees by the end of 2018, but ultimately plans to have 500 employees within eight years.

Colorado is a national hub for cybersecurity. In 2016, the National Cybersecurity Center opened in Colorado Springs, a first-of-its-kind partnership between industry, nonprofits, government entities, and academia. Several companies and training programs provide support to this growing industry.

Cybersecurity firm LogRhythm Inc. expanded its Boulder headquarters with 50 employees and 21,000 square feet of new office space. The company has grown to more than 500 employees worldwide, with close to 375 in Boulder.

Denver-based ProtectWise Inc. raised $25 million in venture capital to expand its footprint, doubling its size for the second-consecutive year. The company provides intrusion and infestation analysis, and has pioneered a new network history recorder in the cloud.

Westminster-based Coalfire Systems Inc. acquired Virginia-based Veris Group. The combined company will become a major cybersecurity and threat assessment consultancy to federal agencies, businesses, and cloud-computing companies. With the merger, Coalfire now has one of the most-advanced technical penetration testing and red team organizations in the industry.

CyberGRX, a Denver cybersecurity firm, raised $9 million in funding. The company will use the funding to deliver the CyberGRX platform to market. The company helps enterprises not only automate and standardize the collection of information, but also prioritize, evaluate, and remediate risk.
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- Red Canary, a Denver-based cybersecurity software startup, raised $6.1 million and plans to double its staff to about 30 employees. The company plans to hire engineers, sales, and marketing staff.
- Broomfield-based Webroot provides threat monitoring, detection, and protection on desktop and mobile devices for both end-users and businesses. The company has grown from a privacy upstart to a cybersecurity industry leader.
- Cybersecurity firm Swimlane raised $6 million in a Series A round of funding. The Louisville-based company will use the funding to accelerate growth through expanded sales and marketing, and additional software development.
- SecureSet Accelerator is a new Denver startup that is an offshoot of the SecureSet Academy, a cybersecurity training program. The accelerator aims to bring up to eight teams of cybersecurity startup founders and help them over four months by providing $40,000 in funding, office space, and mentorship.
- The University of Denver (DU) began a new fast-track program that could help close the gap between open cybersecurity positions and workers qualified for the positions. The program is one of five schools in the state whose cyber education programs have earned a Centers of Academic Excellence designation from the National Security Agency and the U.S. Department of Homeland Security. DU’s masters level cybersecurity program differs from most as students do not need an undergraduate degree in computer science. The program will provide an additional three months of instruction to those who come in without a computer background.

Venture Capital and Investment Activity

Companies in the nine-county region’s IT-software cluster received significant venture capital and investments to accelerate growth and expand product offerings.

- Denver-based PaySimple received $115 million in private equity. The company will use the funding to expand its product offerings, manage invoicing and payments, billing, and recurring bill-pay setup for customers.
- SendGrid Inc. closed on a $33 million Series D funding round to expand its email marketing product and customer service offerings, develop new products, and accelerate global expansion plans. The company is a transactional email delivery and management service.
- FullContact, a Denver-based software developer, raised $25 million in venture capital funding. The company plans to increase its workforce and possibly acquire other startups with the funding. After the funding round, the company also purchased Boulder-based Conspire.
- GoSpotCheck, a web and mobile app developer, secured $16.5 million in venture capital funding. The company plans to use the money to improve its designs, expand office space, and hire 30 additional employees.
- Greenwood Village-based Recondo Technology secured $16 million to support product development designed to improve financial outcomes for patients and customers. Recondo’s products and services enable patients and providers to monitor benefits and payments for high-deductible insurance and health savings plans.
- Boulder-based VictorOps Inc. raised $15 million in a round of Series B funding for customer acquisition, sales and marketing, and product development. The company expects to hire another 15 to 25 employees in 2017. The latest round brings the company’s total funding to about $33 million.
- TapInfluence Inc. secured $14 million in financing to build its sales and support teams and will continue opening additional offices. The company provides marketing software.
- Boulder-based 10-4 Systems Inc. raised $13.9 million in a round of Series A financing. The company also completed a spinoff from Arizona-based GlobalTranz that will allow the company to focus on product development and customer acquisition. The company reported that the investment would continue to fuel their growth, expansion, and innovation for years to come.
- Cloud Elements Inc. raised $13 million in venture capital financing and plans to increase its staff by a third to expand the market for the Denver-based startup’s technology. Cloud Elements helps software developers publish, integrate, aggregate, and manage their application program interface through a unified platform. Since launching in 2013, the company has raised $21.2 million.
- Avoka Technologies received $12 million from private investors to expand its business. The company plans to increase its workforce by 50 percent across Broomfield and London over the next year and increase its customer base.
- Denver-based Convercent raised $11 million in funding and plans to increase its workforce by one-third. Convercent creates software that organizes employee disclosures and other compliance
data in one place, striving to help customers’ compliance officers manage investigations and spot trends.

- Parkifi, a Denver tech startup, raised $8 million in funding. The company makes a system of sensors and software that provides real-time data to show available parking spaces in garages, surface lots, and on-street parking. The funding will help the company add jobs amid a national expansion.
- TrackVia raised $7.5 million from five investors. The company develops software to help businesses manage inventory and production processes. TrackVia plans to hire between 12 and 20 employees for its marketing, sales, and engineering departments.
- Dizzion secured $6.4 million in funding to help expand its Denver presence. The company plans to more than double its workforce in 2017.
- Boulder-based JumpCloud Inc. raised $4.3 million in a Series B round of funding to expand its product offerings. The company is a central source of authentication, authorization, and management of employees and their devices, and the IT applications they access.
- Zvelo Inc., a Greenwood Village-based online security and data company, closed $2.75 million in royalty-debt financing from Cypress Growth Capital. The company plans to hire engineers and sales employees to help the company combat online advertising malware and fraud.
- Denver-based Kwippo Inc. raised $2.5 million in seed funding. The company will use the funding to further develop its messaging app called Kwippit that provides a custom smartphone keyboard and replaces the standard emoji figures with more elaborate and varied pictures.
- Denver-based Greystone Technology raised $2 million in private capital to expand into the enterprise market. The company provides IT support and integrated web services.
- Field Squared secured $1.9 million in equity. The company will expand its workforce with the new funding, with plans to increase staff from 15 to 20 employees.

### Industry Infrastructure Support

The region’s organizations and professional associations are dedicated to advancing the vibrant IT-software industry.

- Several cities in the nine-county region hosted startup weeks including Denver, Boulder, Fort Collins, and Longmont. Denver hosted the fifth-annual Denver Startup Week in September 2016, which showcased the entrepreneurs, employees, and startup companies fueling innovation in the region. Hosted by the Downtown Denver Partnership, the 2016 event attracted a record 13,330 registrants and more than 5,000 companies were represented. Boulder Startup Week and Fort Collins Startup Week occurred in early 2016, with numerous events, startup job fairs, and entrepreneurship mentoring. The second-annual Startup Longmont celebrated the city’s booming entrepreneurial zone with over 70 events.
- The Colorado Technology Association is a not-for-profit organization dedicated to advancing the state’s technology industry. In 2016, it hosted the second-annual Colorado Tech Tour showcasing powerful tech stories happening in five different regions across the state and the annual Colorado Tech Summit pulling together Colorado’s technology leaders to explore the latest tech trends. The 2016 Summit also included a youth innovation showcase.
- KPMG Ignition in Denver is an incubator dedicated to project-focused workspaces designed for information sharing, collaboration, and increasing efficiencies. The Denver facility created 125 jobs in the areas of data science, enterprise architecture, application programming, solution development, and IT integration.
- A new Denver tech accelerator, The Hop Up Program, aims to give underrepresented college students in Colorado the opportunity to test business ideas in the creative-technology space through a four-week program. Participants develop their own business ideas and get insight into concept development, marketing, sales planning, financial planning, and budgeting. At the end of the program, participants pitch their business plan to mentors, corporate partners, and the creative community. The program is a partnership with workspace developer INDUSTRY and StickyDocs.
- Boulder startup accelerator TechStars is a three-month program that provides up to $18,000 in seed funding for startups and an optional $100,000 convertible debt note, intensive mentorship and idea development, and the chance to present to angel investors and venture capitalists for those companies selected to participate. TechStars Ventures is the venture capital arm of TechStars and has $265 million under management. TechStars hosted its 10th class of startups in 2016, a group of 11 companies that raised $4.73 million. After graduating from TechStars, companies average more than $2 million in outside venture capital.
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- TiE-Rockies was founded in 2001 to inspire, foster, and support entrepreneurship in the Rocky Mountain region. TiE-Rockies provides more than 100 events per year, an ongoing mentoring program, the TRIP Funding Program, and other various programs, initiatives, workshops, seminars, and networking opportunities to local entrepreneurs.

- The Longmont Economic Development Partnership and the City of Longmont are helping leverage the Longmont Ignite! Fund by allocating $15,000 in grant money to a new Advance Longmont Ignite! Matching Grant. Longmont Ignite! is a group of community-minded individuals who have established a fund to make grants available to entrepreneurs developing products or business concepts that will add to the economic vitality of the area.

- Fort Collins-based Innosphere is an incubator formed to accelerate the success of high-impact scientific and technology companies, and to promote the development of a regional, entrepreneurial ecosystem in Colorado. Innosphere also has satellite locations in Denver, Fort Collins, and Boulder to better serve entrepreneurs. Since 2009, Innosphere graduated over 50 companies, raised $220 million in capital, and created more than 1,400 jobs in Colorado. In 2016, 13 software-related companies graduated from Innosphere.

- Denver is home to a chapter of the Founder Institute, the world’s largest entrepreneur training and startup launch program. Based in Silicon Valley, the Founder Institute assists aspiring founders across the globe build enduring technology companies and has helped create more than 20,000 jobs in over 2,500 companies.

- Founded in 2014, the Blackstone Entrepreneurs Network is designed to help entrepreneurs find resources and thrive in Colorado. The network has a variety of business advisors in fields for entrepreneurship, technology, biotechnology, and health technology industries.

- The Denver Office of Economic Development released the fifth edition of its Denver Capital Matrix, a resource directory of funding sources for Denver’s small businesses and entrepreneurs. The matrix identifies more than 400 funding sources including traditional bank lending, venture capital firms, private equity firms, angel investors, mezzanine sources, investment banking institutions, and others that have funded Colorado businesses.

The region is home to numerous coworking spaces that foster creativity and innovation.

- Galvanize, a technology coworking and office space for digital startups, is helping to attract new businesses and foster entrepreneurship. The concept combines venture capital, flexible workspace, and an experimental engineering and business school called gSchool. In 2016, Galvanize raised $45 million in Series B funding to provide more students access to Galvanize’s modern web development, data science programs, and expand employer’s needs to re-skill existing employees.

- INDUSTRY Denver is the nexus of creativity and technology in downtown Denver and includes shared office space and amenities. The coworking space includes several IT-software companies such as Uber, Roximity, Zenman, and Spotzer Media Group, which have leased more than 50,000 square feet of creative and coworking office space.

- WeWork opened two Denver locations at 1550 Wewatta St. and 17th and Platte in the lower Highlands neighborhood. The coworking space has attracted about 120 companies ranging from one-person operations to divisions of large tech firms.

- Modworks Coworking doubled its space in Denver’s Petroleum Building, undergoing $800,000 of construction and renovation. The space caters to freelancers, remote workers, and small businesses.

- STRIDE is a 150,000-square-foot coworking space that serves as the second incarnation of INDUSTRY Denver. The space provides incubators, innovation laboratories, outdoor spaces, and large meeting and conference facilities.

- Shift Workspaces opened its second shared office and coworking campus in the Golden Triangle. Shift unveiled the 22,000-square-foot building with 87 private offices. A third location is planned at the old Cathedral High School in Uptown.

- Enterprise Coworking opened a new shared workspace in Denver’s Curtis Park. The 66,000-square-foot space hopes to attract diverse clientele and will offer flexibility as companies scale. Enterprise includes office and conference space, a café and bar, a video game room, a full-service kitchen, and a rooftop patio.

- Alchemy, a newly designed creative coworking space in Denver, welcomed entrepreneurs in late 2016. The facility includes dedicated desks, coworking memberships, and private office suites for startups and small businesses. The two-story building has lounge seating areas, high top tables, bar, kitchen, and a main conference room.

- The Commons on Champa is a public-private partnership between the City and County of Denver, the Downtown Denver Partnership, and the CTA. The 20,000-square-foot facility serves as a gathering
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place for startups and entrepreneurs and is the headquarters for the CTA. The campus includes a 200-person event venue, conference rooms with cutting-edge technology, and offers a speaker series, classes, mentoring for entrepreneurs, and industry meetups.

Academic and Education Announcements
The region’s robust educational system and research centers help prepare the future IT-software workforce with vital skills through leadership, mentorship, and professional experience.

- Colorado State University-GLOBAL Campus will offer a computer programming certificate and undergraduate degree specialization program. The online classes are geared toward novices and by the end of the program, students will be able to design a simple web and mobile app and master basic software development. Bridging the gap between non-accredited accelerators and traditional semester-long programs, the courses are designed on the school’s eight-week course schedule, allowing students to gain an accelerator experience.

- H5 Data Centers opened a science, technology, engineering, and mathematics (STEM) Innovation Center at its flagship Denver data center campus in Greenwood Village. H5 opened the center in conjunction with the CTA, Handy Networks, and Eaton Corp.

- CareerWise Colorado is an initiative created by leading industry associations to equip high school students with the skills necessary to enter today’s workforce. Using the Swiss Apprenticeship System as a model for inspiration, CareerWise aims to unite businesses and educators to provide a business-led, student-centered program that addresses real-world needs.

- The Colorado STEMworks Database is the premier source for high-quality STEM education programs in Colorado. Each program in STEMworks has been independently vetted and cleared a high bar of quality.

- Totara Learning welcomed Remote-Learner to the global Totara Partner network. As a long-standing leader in the world of open source e-learning platforms, Remote-Learner consistently provides innovation in learning and training solutions. With this partnership, the Denver-based company can offer the award-winning Totara platform to business, government, and education markets.

- Metro Denver is home to a growing number of coding schools, coding bootcamps, and programs to train software developers.
  o General Assembly, an international software coding and design school, opened a campus in lower downtown Denver. The New York City-based company offers part-time and full-time classes in the WeWork coworking space.
  o The DaVinci Institute in Westminster is one of the nation’s top-rated programmer training centers for the coding profession. The coding school and think tank hosts a collaborative work space and offices for startups.
  o Galvanize offers 12- and 24-week coding bootcamps in web development and data science. The web development bootcamp covers full-stack JavaScript including AngularJS, Node.js, and Express.js. The data science bootcamp covers Python, SQL, and Hadoop.
  o SecureSet Academy is a 20-week, full-time cybersecurity bootcamp in Denver. The program includes hands-on instruction in state-of-the-art labs, guided product training, and essential certifications (CISSP and Security+).
  o RefactorU is a 10-week web application development boot camp in Boulder. The program was one of the first schools to offer a full-stack JavaScript bootcamp.
  o Denver’s Turing School of Software & Design is a seven-month, full-time program for people who want to become professional developers.
  o Greenwood Village’s Skill Distillery is a 19-week coding school and software bootcamp aimed at training web developers and software programmers.
  o Boulder’s Techtonic Academy was founded in 2002 to provide software and mobile application development to a diverse customer base. Techtonic Academy is a unique training program that equips disconnected youth and military veterans with software development skills and new career paths through training, mentoring, and hands-on project work.

Cross-Cluster Convergence
Collaboration across the region’s industries including digital health, aerospace, bioscience, and IT-software has fueled innovation, discoveries, and advancements.

- Metro Denver is an emerging digital health community. Founded in July 2012 by the Denver South Economic Development Partnership and Innovation Pavilion, Prime Health is a growing statewide community of 1,600+ health care executives, physicians, technologists, academics, entrepreneurs,
and investors dedicated to improving health and lowering healthcare costs through the commercialization of digital health technologies. Prime Health is a resource ecosystem for Digital Health—the convergence of the digital and genetics revolutions with bioscience, healthcare and wellness, and information technology-software. Colorado is home to more than 130 digital health companies.

- Plans were announced for Catalyst HTI, a health-tech industry integration project slated to open in 2018 in Denver's River North neighborhood. The project will integrate building space for startups, Fortune 500 companies, and healthcare providers in one location, enabling startups with resources to grow and exposing providers and larger companies to emerging technologies and human capital. The concept will be the first of its kind and has already received support from Terumo BCT, the University of Colorado Anschutz Medical Campus, and the American Diabetes Association.

- Denver-based RxRENU is a cloud-based platform company that enables healthcare systems and payers to enrich existing electronic health records workflows and alerts with patient cost, personalized efficacy and adherence, and aligns with clinical protocols to drive prescription decisions. RxRENU partnered with UCHealth to validate the technology in 2016.

- Lockheed Martin Space Systems released new software to help speed relief to victims of natural disasters across the globe. The software, called HelpNowMap.com, helps provide clear data to residents, first-responders, and aid agencies on the ground after floods, earthquakes, hurricanes, and other natural disasters. The program uses satellite imagery from DigitalGlobe as the base layer for a heat map of human need and infrastructure damage.

- DigitalGlobe partnered with Amazon Web Services, CosmiQ Works, and NVIDIA to launch an open-data initiative to improve image analysis tools. SpaceNET will be an online, publically available repository of over 60 million satellite imagery and labeled training data to advance the development of machine learning and deep learning algorithms.

**Merger and Acquisition Activity**

IT-software companies in the nine-county region announced several mergers and acquisitions in 2016.

- IHS Inc., a global business-intelligence provider, completed a merger with United Kingdom-based Markit Ltd. The company, renamed IHS Markit Ltd., will have a London headquarters. The combined company creates a $13 billion international market and financial data company.

- New York-based Verve acquired Denver-based Roximity. The deal will help expand Roximity’s Denver presence as it grows its wireless beacon software and hardware that provide location-based analytics and advertising.

- Denver-based FullContact acquired two companies—Brewster and Conspire—to broaden its product offerings and solidify its position as a unified contact management leader. The company also received $25 million in venture capital to fund growth and acquisitions.

- Ping Identity Corp. purchased Austin-based UnboundID Corp., a maker of identity-protection software. The purchase will broaden Ping’s technologies offered to corporate clients. Ping Identity makes software that helps companies authenticate the identities of employees logging in to their work computer networks and software applications.

- Centennial-based IQNavigator and VMSBeeline will merge to form one of the largest independent VMS software providers in early 2017. The combined company will be co-headquartered in Centennial and Jacksonville, Fla., which is Beeline’s domestic operations hub, and will deliver the next generation of technology innovation, end-to-end customer engagement services, and value-add capabilities for managing the contingent workforce.

- Denver-based RO Innovation acquired Boulder Logic after raising $1 million in capital funding. With the acquisition, RO Innovation now has 30 employees and about 120 customers.

- PayScale acquired Denver-based MarketPay. Both companies specialize in different types of technology and data platforms that help businesses determine their salaries. PayScale intends to retain all of MarketPay’s employees and add about 20 people to the existing staff.

- Denver-based Granicus Inc. and St. Paul, Minn.-based GovDelivery merged to create the largest hosted subscription government software company in North America and the United Kingdom. The combined business employs 375 people and serves more than 3,000 government clients. Granicus employs 90 people in Denver and the merger will improve the company’s position to grow locally.

- Broomfield-based Webroot acquired the assets of San Diego, Calif.-based CyberFlow Analytics. Webroot’s purchase will enhance its ability to access Internet-connected devices and improve the increasingly complex threat landscape.
Software Workforce Profile

Many companies choose locations because of the available workforce. With nearly half of the nine-county region’s 3.8 million residents under the age of 35, employers can draw from a large, young, highly educated, and productive workforce. Of the region’s adult population, 42.6 percent are college graduates and 91 percent have graduated from high school. The state has the nation’s second-most highly educated workforce as measured by the percentage of residents with a bachelor’s degree or higher.

The attractiveness of the region draws new residents through in-migration. The region’s population is expected to grow 31 percent from 2020 to 2040, driving a 21.2 percent increase in the region’s labor force over the same period. It is important to note the changing composition of the workforce supply as the baby boomers begin to retire, which will pose implications for businesses whose employee pool includes significant numbers of these workers.

The nine-county region’s software industry cluster employs 54,580 people and includes a large pool of talented, well-educated, and highly skilled workers. The age distribution of workers in the region’s software cluster is concentrated in the younger age brackets, especially the 35-44 and 45-54 age groups.

The software workforce supply consists of four main components: those currently working in the industry; those doing a similar type of job in some other industry; the unemployed; and those currently in the education pipeline. The Metro Denver and Northern Colorado Occupation & Salary Profile below includes the 10 largest software occupations in the region. For these 10 largest occupations, the chart details the total number of workers employed in that occupation across all industries, the number of available applicants that would like to be working in that occupation, the number of recent graduates that are qualified for that occupation, and the median and sample percentile annual salaries.
InformatIOn TechnoloGy-SofTware:
Metro Denver and Northern Colorado Industry Cluster Profile

Wages
Total payroll for the software industry cluster in the nine-county region reached nearly $5.3 billion in 2015. The 2015 average annual salary for software cluster employees in the region was $106,110, compared with $111,580 nationwide.

Metro Denver and Northern Colorado Software Occupation & Salary Profile, 2016

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<tbody>
<tr>
<td>1. Software developers, applications</td>
<td>19,949</td>
<td>339</td>
<td>921</td>
<td>$103,454</td>
<td>$65,735</td>
<td>$81,356</td>
<td>$122,826</td>
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<td>2. Software developers, systems software</td>
<td>10,829</td>
<td>184</td>
<td>1,038</td>
<td>$108,739</td>
<td>$68,046</td>
<td>$86,965</td>
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<td>3. Computer user support specialists</td>
<td>11,439</td>
<td>194</td>
<td>928</td>
<td>$57,610</td>
<td>$34,918</td>
<td>$43,203</td>
<td>$69,054</td>
<td>$87,818</td>
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<td>4. Computer systems analysts</td>
<td>7,787</td>
<td>132</td>
<td>1,580</td>
<td>$93,447</td>
<td>$57,265</td>
<td>$119,730</td>
<td>$181,893</td>
<td>$300,447</td>
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<td>5. Network &amp; computer systems administrators</td>
<td>9,014</td>
<td>153</td>
<td>852</td>
<td>$83,869</td>
<td>$51,933</td>
<td>$65,942</td>
<td>$102,033</td>
<td>$119,858</td>
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<td>6. Sales representatives, services, all other</td>
<td>19,331</td>
<td>1,856</td>
<td>55</td>
<td>$67,160</td>
<td>$25,477</td>
<td>$37,558</td>
<td>$83,399</td>
<td>$121,144</td>
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<tr>
<td>7. Computer &amp; information systems managers</td>
<td>5,788</td>
<td>480</td>
<td>1,483</td>
<td>$157,749</td>
<td>$98,837</td>
<td>$119,730</td>
<td>$181,893</td>
<td>$300,447</td>
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<tr>
<td>8. Computer occupations, all other</td>
<td>7,623</td>
<td>130</td>
<td>1,353</td>
<td>$92,053</td>
<td>$52,876</td>
<td>$71,741</td>
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<td>9. Business operations specialists, all other</td>
<td>33,547</td>
<td>1,510</td>
<td>50</td>
<td>$79,615</td>
<td>$41,759</td>
<td>$54,434</td>
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<td>10. Computer programmers</td>
<td>3,013</td>
<td>51</td>
<td>584</td>
<td>$86,279</td>
<td>$51,966</td>
<td>$65,738</td>
<td>$103,726</td>
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Notes: The number of available applicants is a point-in-time measurement of the number of people who have registered in Colorado’s workforce development system’s statewide database, Connecting Colorado, as being able and available to work in a particular occupation. Results should be interpreted with caution since registration in Connecting Colorado is self-reported. In addition, the skills rubric may assign up to four occupation codes for each registrant. Therefore, the number of available applicants could be inflated. Source: Provided by Arapahoe/Douglas Works!; QCEW Employees, Non-QCEW Employees, & Self Employed - EMSI 2016.3 Class of Worker.

Education & Training
Colorado’s higher education system provides an excellent support system for businesses in the region. There are 28 public higher education institutions in Colorado, of which seven four-year and six two-year public institutions offering comprehensive curricula are located in the nine-county region. In addition, there are more than 100 private and religious accredited institutions and more than 350 private occupational and technical schools offering courses in dozens of program areas throughout the state. Although not exhaustive, a list of the major, accredited educational institutions with the greatest number of graduates for each of the 10 largest software occupations in the nine-county region are included below. A directory of all higher education institutions with corresponding websites may be accessed via http://highered.colorado.gov.

- Colorado State University
  www.colostate.edu
- Colorado State University Global Campus
  www.colostate.edu
- Front Range Community College
  www.frontrange.edu
- Metropolitan State University of Denver
  www.msudenver.edu
- Red Rocks Community College
  www.rrcc.edu
- Regis University
  www.regis.edu
- University of Colorado: Boulder, Denver
  www.cu.edu
- University of Denver
  www.du.edu
- University of Phoenix-Colorado
  www.phoenix.edu
Key Reasons for Information Technology Companies to Locate in the Nine-County Region

The region is a top information technology location offering:

1. The ability to attract and retain high-quality IT professionals and technical talent
   - Colorado has one of the nation’s most educated workforces, ranking second among the 50 states for percentage of residents (39.2 percent) with a bachelor’s degree or higher. (U.S. Census Bureau, 2015 American Community Survey)
   - Boulder and Fort Collins ranked among the top five most-educated metro areas in the nation in 2016. (ValuePenguin.com, 2016)
   - IT services and software publishing were among Colorado’s top-five leading tech industry sectors by employment in 2015. The state’s average high-tech wage ($106,350) was double that of the average private-sector worker. (CompTIA, Cyberstates 2016: The Definitive State-by-State Analysis of the U.S. High-Tech Industry, 2016)
   - Metro Denver ranked as the fourth-best metro area for young entrepreneurs in 2016. The metro area received accolades for its highly educated population and high rate of small business loans. (NerdWallet, 2016)
   - Denver ranked third among the top 25 U.S. cities for fostering innovation and entrepreneurial growth. The city ranked among the top five for a healthy quality of life, a well-connected ecosystem, a vibrant cultural foundation, and a highly educated young population. (U.S. Chamber of Commerce Foundation, 2016)
   - Denver ranked as the third-best city to start a tech career in 2016. Denver scored highly in nearly every category related to the technology industry and investors gave more than $500 million to high-tech businesses in 2015. (ComputerTrainingSchools.com, 2016)
   - Boulder ranked as the third-best place for science, technology, engineering, and mathematics (STEM) graduates in 2016. STEM jobs in Boulder represented more than 14 percent of all jobs, earning an annual mean wage of $91,800. (NerdWallet, 2016)
   - Denver ranked among the top 10 “Best American Cities for Women in Tech Jobs” in 2016. (Fortune, 2016)
   - Metro Denver ranked fifth among the top 15 major metros for college graduates in 2016. Fort Collins ranked fourth among small metro areas. (American Institute for Economic Research, 2016)
   - Boulder ranked sixth among the “Best Cities for New College Grads” in 2016. The city’s growing tech hub, student and young professional population, and amenities contributed to its notable rank. (Zumper, 2016)

2. Direct access to a large and growing customer base
   - Colorado ranked third in the nation for Small Business Innovation Research (SBIR) grants per worker. The state received more than 200 grants totaling nearly $82.1 million, or $32.90 in grants per worker compared with the U.S. average of $11.80. (U.S. Small Business Administration, 2016; U.S. Bureau of Labor Statistics, 2016)
   - Colorado ranked fifth for startup activity out of the 25 largest states by population in the 2016 Kauffman Index: Startup Activity, with 330 people out of 100,000 adults becoming entrepreneurs each month. (Ewing Marion Kauffman Foundation, 2016)
   - Colorado had the sixth-highest venture capital investments per $1,000 of gross domestic product in 2015. The state has consistently ranked among the top 10 since 1997. (PricewaterhouseCoopers, MoneyTree Report, 2016; Bureau of Economic Analysis, 2015)
   - Colorado’s largest export—computers and electronic products—accounted for 25 percent of all exports (totaling $2 billion) in 2015, compared with 14 percent of U.S. exports. (U.S. Department of Commerce, International Trade Administration, 2016)

3. Low to moderate costs of doing business and a competitive tax structure
   - Colorado has one of the nation’s most favorable corporate income tax structures. The state’s corporate income tax rate of 4.63 percent is one of the lowest in the nation and is based on single-factor apportionment, which allows companies to pay taxes based solely on their sales in the state. (State of Colorado; The Tax Foundation)
   - Installed or downloaded standardized software products are exempted from state sales and use tax. The City and County of Denver also exempts custom software products from sales tax. (Colorado Department of Revenue)
Colorado has the nation’s ninth-best tax climate for entrepreneurship and small business. (Small Business & Entrepreneurship Council, 2016)

Forbes ranked Metro Denver first among the “Best Places for Business and Careers” in 2016 for the second-straight year. Four other Colorado metropolitan areas were included on the list. The Colorado Springs metro area ranked 12th, Fort Collins ranked 18th, Boulder ranked 26th, and Greeley ranked 51st. (Forbes, 2016)

4. An overall better quality of life


Highlands Ranch ranked sixth in MONEY Magazine’s 2016 “Best Places to Live” list. Centennial (13th) and Broomfield (25th) were also named to the list’s top-25. (MONEY Magazine, 2016)

Seven Metro Denver cities ranked among the 2016 list of the “100 Best Places to Live.” Boulder ranked fifth, followed by Fort Collins (13th), Longmont (23rd), Littleton (24th), Lakewood (26th), Loveland (41st), and Lafayette (44th). (Livability.com, 2016)

Metro Denver ranked as the third-fittest metropolitan area in the U.S. in 2016. Increased physical activity, low obesity and diabetes rates, and access to recreational opportunities contributed to its high rank. (American College of Sports Medicine, 2016)

Outdoor recreation is a fundamental component to Colorado’s healthy, active lifestyle and generates a $34.5 billion economic impact annually. The state has the fourth-highest percentage of state land area devoted to national forests and public lands, more than 70 state parks and wilderness areas, and is home to the highest concentration of 13,000 and 14,000-foot peaks in the nation. (Colorado Tourism Office, 2016)

FasTracks is a multibillion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across the eight-county district.

Metro Denver’s moderate temperatures, low humidity, and sunshine on almost 70 percent of the days each year provide an ideal climate for residents. (U.S. National Oceanic and Atmospheric Administration, National Climatic Data Center, 2016)

### Information Technology-Software Industry Cluster Definition

<table>
<thead>
<tr>
<th>NAICS Code</th>
<th>NAICS Description</th>
<th>SIC Code</th>
<th>SIC Description</th>
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<td>Software reproducing</td>
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<td>Prepackaged software</td>
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<td>511210</td>
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<td>Data processing</td>
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<td>541511</td>
<td>Custom computer programming services</td>
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<td>Custom computer programming services</td>
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<td>541512</td>
<td>Computer systems design services</td>
<td>7373</td>
<td>Computer integrated systems design</td>
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<td>541513</td>
<td>Computer facilities management services</td>
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<td>Computer facilities management</td>
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<td>541519</td>
<td>Other computer related services</td>
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<td>Computer related services NEC</td>
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*Note: NEC indicates “not elsewhere classified.”*
INFORMATION TECHNOLOGY-SOFTWARE:
Metro Denver and Northern Colorado Industry Cluster Profile

Information Technology-Software Industry Cluster Relationships

Technologies
- Cloud Computing
- Cybersecurity
- Internet
- High-Speed Infrastructure

Client Industries
- Aerospace
- Aviation
- Bioscience
- Businesses
- Consumers
- Energy
- Finance
- Geospatial
- Healthcare
- Security/Defense
- Telecommunications

Support Industries
- Computer Hardware
- Computer Storage
- Telecommunications

Infrastructure
- CO Technology Partners
- Colorado School of Mines-Computer Engineering Department
- CompTIA
- Coworking Spaces
- CTA-Colorado Technology Association
- CU-Software Engineering Research Lab
- DU Center for Tech. Innovation
- Numerous Accelerators & Incubators

For additional information, contact us:

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