



ASSESSMENT OF THE OIL AND GAS WORKFORCE AND EMERGING OPPORTUNITIES

Studies A and B Resulting from House Bill 23-1074

Office of the Future of Work and the Colorado Department of Labor and Employment

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Authors

Nate Hunt, BW Research
Cai Steger, BW Research
Andrea Gustafson, BW Research
Jazmine Amoako, BW Research
Abe Gomez, BW Research

Reviewers

Christi Mimra, Brendle Group
Zach Owens, Brendle Group

Office of Future of Work Project Management

Katherine Keegan, Director

About The Colorado Office of the Future of Work¹

The world of work is changing, propelling some to greater heights while leaving others behind. Globalization, advances in technology, demographic shifts, and other factors leave many wondering whether we, as a society, are ready to face the many challenges tomorrow's economy will bring. That's why the Office of the Future of Work (OFW) was created: **to understand, prepare for, and develop policy and programmatic solutions to foster an economy that works for everyone in Colorado.** The OFW shapes an equitable economy of the future and ensures that Coloradans are equipped with the necessary education, training, skills, and tools to fully participate in the labor force.

The office, created by an [Executive Order from Governor Polis](#) on September 4, 2019 and codified into law in [SB23-051: Conforming Workforce Development Statutes](#) in March 2023 also seeks to raise awareness about the future of work. To accomplish its goals, the office works in partnership with other state departments, convenes summits with diverse stakeholders across regions, and establishes task forces and working groups.

¹ <https://cdle.colorado.gov/future-of-work>

About BW Research

BW Research delivers research and strategic consulting that supports stronger communities and drives healthier economies, ecologies, and labor markets. Our comprehensive research approach to workforce and economic development, and deep-rooted commitment to equity, has made BW Research a sought-after partner for governmental agencies at all levels, nonprofits, educational institutions, and the private sector. In the past fifteen years, BW has led hundreds of workforce, supply chain, community benefit, policy, and market research studies across a wide range of sectors, integrating needs for equitable access to opportunities throughout.

About Brendle Group

Brendle Group is a full-service engineering and planning firm with nearly 30 years of experience. Our mission is to accelerate equitable solutions to the climate crisis through robust engineering analysis, practical planning, and actionable implementation. Each project is approached with thought leadership and creativity, focusing on building the capacity of clients to help solve local and global environmental challenges. With offices in Denver and Fort Collins as well as remote workers in Durango and Salida, Brendle Group has an extensive statewide portfolio working with communities and utilities to achieve their climate goals.



EXECUTIVE SUMMARY

This report is provided to the Colorado State Department of Labor and Employment as established through HB23-1074, “Study Workforce Transitions to Other Industries.” This legislation required research focused on Colorado’s oil and gas workforce and consideration of impacts from an evolving energy economy. Key findings and recommendations from data analysis and stakeholder engagement are presented in this summary.

Key Findings - Quantitative Analysis

Historically, the Colorado oil and gas industry offers workers periodically volatile employment prospects but virtually unparalleled wages. Over a twenty-year period (2004 to 2024) the industry experienced three different boom and bust cycles, during which several employment swings of roughly +/-10,000 jobs (30% or more of all oil and gas employment) occurred (Figure 2). During the upswings, the industry offers accessible career opportunities with education requirements similar to the broader Colorado economy and median wages that are 54% higher than the overall economy (Table 4), but downswings mean sudden substantial job loss concentrated within a few communities and evaporation of the local tax base.

Employment in the oil and gas industry is largely concentrated within only a few counties in the state (Figure 3), although the oil and gas sector employs at least one worker in most counties in the state. Oil and gas employment makes up more than one percent of the workforce in Weld (six percent of the county’s total workforce), Garfield (four percent), and Mesa (three percent) Counties.

Colorado oil and gas workers frequently travel to their jobs, and relocating between states is not uncommon. More than half (54%) of surveyed oil and gas workers stated that they work more than one hour away from home at least one month out of the year (Figure 15). More than half (56%) of surveyed workers also stated they had relocated at least once for their job (Figure 16). The workforce as a whole tends to be geographically dynamic, with many workers flowing from one job site to the next, both within and outside the state. Future workforce planning needs to account for this comfort with geographic mobility and the potential impacts of workers transferring out-of-state.

More than \$14.7 billion in federal and state funding has been made available to support industries and emerging technologies adjacent to oil and gas over the past four years. This funding has the potential to support 11,060 Colorado workers for ten years, based on modeling conducted by BW Research. Two thirds of the jobs created are in transportation and internet infrastructure. Energy-related activities are projected to create 2,400 sustained full-time jobs over 10 years (Figure 23), and much of this activity occurs in emerging technologies like hydrogen fuels and carbon capture, utilization, and storage (CCUS) technologies where oil and gas worker skills are transferrable.

The impacts of federal funding available through the Inflation Reduction Act and the Bipartisan Infrastructure Law were large enough in scale to counter a potential significant downturn in Colorado's oil and gas sector, though the timeline and longevity of funding is unlikely to coincide with any significant disruption of the oil and gas industry. The funding identified in this report largely expires on or before the mid-2030s, which very likely predates any disruption in Colorado's oil and gas sector at scale. However, analyzing currently available infrastructure funding is useful in identifying the type and scale of investments that would create the types and number of jobs that oil and gas workers could feasibly transition into.

With appropriate offsetting economic activity, only a small portion of oil and gas workers would be likely to have challenges meeting the skill requirements for new jobs created within adjacent industries and emerging technologies. Our analysis finds that only about 1,800 workers out of the Colorado oil and gas workforce of 28,000 are likely to need a dedicated skills-oriented workforce strategy. This figure was determined after accounting for a large number of already-migratory workers, retirement rates, workers with broad skill bases, and shifting to similar occupations that would require lighter touch support (Figure 6). Affected communities will likely require greater support, but detailed analysis of community impact was outside the scope of this study. Future research efforts should consider community-level interests, concerns, and impacts.

Workers involved in construction and operations of oil and gas systems have developed niche skillsets. These are the workers most likely to struggle with a reduction in Colorado oil and gas activity, and these workers may simply opt to follow oil and gas activity outside the state rather than shift to new employment opportunities. The skills that these workers have are less directly transferrable than other workers in the industry, and, crucially, the wages for many potential alternative occupations are often more than 10% lower than their current occupation's wages. However, alternative opportunities are still feasible for these workers. Their ability to operate equipment, understand safety regulations and identify faults in equipment, monitor systems and patterns, and use those patterns to develop action plans are all valuable abilities that translate to other occupations within the state (see more on page 57). It is also possible, if not likely, that many of these most uniquely skilled oil and gas workers will simply continue to seek oil and gas work where they can find it, even if it means leaving the state.

Many emerging technologies and adjacent industries could develop close to current oil and gas industry activities, providing transfer opportunities for some incumbent oil and gas workers, but geography is a potential constraint. Although some natural resources like geothermal are most concentrated in regions that lie outside of the vicinity of the Wattenberg and Front Range Urban Corridor oil and natural gas fields, activities in hydrogen, CCUS, and well capping and remediation are likely to occur within the same geographies as existing oil and gas activities (see more on page 61). A skilled workforce that is already used to traveling from project to project is an invaluable asset in standing up early systems for these new projects.

Training programs for trades roles can be found throughout the state. Nine out of the ten counties with the most oil and gas workers have a large number of trades training opportunities available to workers, including apprenticeships, degrees, certifications, and job-readiness programs. Training is readily available online and in-person for workers interested in wastewater, solar and geothermal industries, although CCUS, hydrogen and biofuel industries currently have a less developed technology-specific training infrastructure (see more on page 68).

Key Findings - Stakeholder Outreach

This section is a synthesis of our interviews with a range of stakeholders, including employers, training providers, local government officials, industry associations, and organized labor, among others. For more detailed information on these interviews, please see the appendix section beginning on page 92.

The conversation around the energy workforce is off to a challenging start in Colorado, highlighting the complexity of shifting industries, historical context, and a need for greater collaboration. The potential transition from oil and gas to other sources of energy and industries has been a difficult conversation across the state that is viewed by key oil and gas players as forced and artificially accelerated. At the community level, there has been difficulty as well, although, depending on the historical experience with previous declines, some communities can more easily envision a reduction in oil and gas activity. The discussion is also hampered by a lack of agreement connected to the timing of transition to specific alternative energy or decarbonization technologies and the government's role in promoting those outcomes. This contention will lead to challenges building cross-sector partnerships and the trust needed to develop long-term strategies and policies.

Interviewees advised that the most effective entry point into energy workforce conversations remains pursuing an “all of the above” approach that seeks to maximize energy production across the technologies. Many technologies have their individual proponents, and when aggregated, the enthusiasm for one or more alternative energy options is significant. Much of the support among those closest to the oil and gas sector does not fall directly into renewable-specific opportunities but instead across hydrogen, carbon capture storage and utilization (CCUS), and geothermal, which are supported across the state. Some communities are starting to see alternative energy technologies as an opportunity rather than a threat to the existing oil and gas industry in their areas, and they are taking steps to participate in the development of emerging energy technologies. Demonstrating that these technologies have market growth potential beyond pilot projects will be important in garnering enthusiasm for future workforce planning.

The Colorado oil and gas sector is undergoing continuous evolution, including an increasing presence of large companies. As it has in the past, the oil and gas industry continue to evolve rapidly. Historic booms and busts are a regular feature of this industry. When times are good, jobs are plentiful and wages are high, but when times are bad, communities suffer, and workers leave the state. In general, predicting how the oil and gas industry will respond to change, and if the industry is poised to see growth or decline in the near term, is impossible.

One recent development in Colorado is the consolidation of small and mid-sized oil and gas companies, acquired by much larger multi-national companies. Larger companies may be more willing to invest long-term in alternative energy and decarbonization opportunities given their exposure to these technologies globally and access to capital. This consolidation can have workforce benefits in terms of resources and training, and larger companies are likely to have an easier time assisting employees during a transition or adjusting their business model to remain competitive in the energy economy.

Key players in the Colorado workforce system ecosystem may need guidance in understanding the full suite of energy technologies and their opportunities for job seekers. The Colorado workforce system offers a breadth of services at a variety of skill levels; however, the technical skills needed in oil and gas, the rapid rate of technological advancement in the energy sector, and broader trends of an evolving energy market mean the public workforce system may struggle to fully support this workforce. In addition, the concentration of oil and gas work in Colorado exacerbates long-standing challenges between rural and urban service providers. While there is some emerging engagement on transition

issues, decarbonization, and emerging energy technologies from educational institutions like vocational and technical schools, community colleges, and four-year universities, the post-secondary system generally moves more slowly than the pace of change within industry. Community colleges seem to be best positioned for near-term engagement and energy workforce development. Even still, the community college system might not have sufficient visibility into industry changes to connect workforce needs and emerging technologies. Finally, renewable energy has not been a significant source of growth or opportunity for unionized labor, however, individual crafts believe they could thrive within an “all of the above” framework, and many locals are very interested in specific emerging technologies or industries.

Conclusions and Recommendations

- 1. The state government will need to play a prominent role in engaging workers and communities for future transitions.** The timing of a transition is unknown, but early planning and preparation is critical, especially given the amount of uncertainty that surrounds the energy sector. There are several things that can be pursued to mitigate negative effects of this uncertainty. First, conducting research and extensive engagement of communities, workers, and industry can provide visibility into when industry changes might occur. This report—and other work being conducted in parallel—are an important first step in preparing for changes in the industry. Additional research that dives deeply into current worker and employer interests and concerns is important, as well as tracking employment trends, workforce ecosystem capacity and development, and emerging community impacts. Waiting to have conversations, develop plans, and take action until change occurs will result in actions that come too late.
- 2. Government transition planning should initially emphasize community and worker learning and engagement prior to taking significant action.** Overall, there remains a shortage of research into understanding how oil and gas skills might translate into alternative energy industries or decarbonization, and what those best practices look like. What oil and gas workers are interested in and want to do remains a knowledge gap. We do not know to what extent wages, a desire to stay close to their current job, and the type of job will impact a worker’s decision to transition into another industry. It is possible, given the mobility of this workforce, that some workers may choose to move out of state to remain in the industry. **The bottom line is that workers need agency in the process, and more attention should be paid to learning about their interests and needs.** There also is also a need to engage directly with the communities in the same process of exploration and hearing how they want to participate in any transition. Finally, we do not know how industry is responding to market changes in demand for oil and gas and greenhouse gas reduction goals. More work is needed.
- 3. The state should deploy economic development and diversification programs in oil and gas communities.** Economic development that is oriented towards industry diversification is one way that communities can begin to hedge against future uncertainty. Having a broader base of industries that support high quality employment opportunities for workers of all backgrounds can help workers, families, communities, and local governments better weather any downturns in oil and gas.

The current federal and state funding for infrastructure improvements and emerging technologies offers a large number of quality transition opportunities for oil and gas workers, but these funds are competitive and should be viewed as an opportunity not a guarantee. It is therefore important that Colorado continues to work with local communities to diversify their economies so that communities remain resilient as industries change.

4. **Furthermore, the state should pursue policies and investments that spur technological demonstrations of emerging technologies geared toward decarbonizing the economy.** One way to offset future declines in oil and gas employment is to drive demand for emerging technologies and derisk these emerging technologies to generate private sector investment. Investing in hydrogen, geothermal, and CCUS technologies now can help drive down the cost of future projects so that future publicly funded incentives will not be necessary to spur private investment. Early experience and investment in emerging technologies can also put communities at the forefront of the next energy and technology booms. Larger oil and gas companies are already beginning to invest in emerging technologies and the workers that develop these new projects, however, smaller firms, independent operators, and contractors are less likely to have the capital or ability to break into these new technologies.

5. **Any policies oriented towards worker transitions should factor in changes in wages and earnings.** The high wages and benefits that oil and gas workers currently receive are difficult to match and will require intentional policy. Much of the oil and gas workforce is mobile, so offering transition opportunities with comparable wages is an essential component to any plan or strategy to transition workers. If wages are not commensurate with those offered currently within industry, workers are likely to instead relocate to other states with oil and gas activity rather than undergo retraining for a job that ultimately offers lower wages.

There are several means by which to develop and promote transition opportunities with higher wages. First, economic development policies that target industries with higher wages can bring higher quality jobs into a region. Higher wage industries involving engineering and advanced manufacturing often require many occupations similar to the oil and gas sector. Second, policies that incentivize entrepreneurship and the success of small businesses can offer earnings and a quality of life that is attractive to many. The Colorado Small Business Development Center Network, as well as a range of initiatives through the University of Colorado and Colorado State University systems, offer a range of services to support the development of small businesses. These existing resources could place deliberate focus on workers from the oil and gas sector and additional efforts could better connect workers transitioning from the sector.

6. **Public training providers should align training with state investments in emerging technologies.** The state's strong foundation in training and education programs for construction and trades workers means that much of the foundational training for adjacent industries and emerging technologies are already well-established. Additional "top-up" programs or short-term stackable certificates for specific emerging technologies that are complementary to existing comprehensive training programs, such as apprenticeships and associate degrees, are the best way to leverage robust existing

training systems. The annual production of the Colorado Talent Pipeline Report could incorporate information on careers in emerging technologies as careers in these fields grow in demand.

In addition to a strong network of public community colleges and vocational schools, there are a number of private and independent training organizations that assist in specialized oil and gas-related skills. Apprenticeship training providers and employers are also important partners in providing technical expertise on emerging technologies. Front Range Community College offers one model for how public institutions can work with employers to develop training and education programs that are specific to employers to help workers upskill to new technologies or practices.

Emerging technology modules may also be a great way to help introduce these new technologies to those just entering the workforce. Including multiple technologies within single programs can help attract young talent who will be able to bridge the technological divide by training on existing technologies and emerging ones simultaneously so that they are prepared for whatever form the future may take.

The state should assist in facilitating connections between companies developing emerging technologies and students at local colleges and universities. Internship programs are another opportunity to support the college-educated side of the emerging technologies workforce. However, new and emerging technology start-ups can lack the human resources capacity to manage internship and other job-entry initiatives. Programs that match students with employers, and potentially even subsidize these internships, can help new talent learn emerging technologies while offering emerging technology companies access to derisked talent pools.

- 7. The state should develop more effective messaging responding to the needs and concerns of workers and communities.** Language around the ‘just transition’ is fraught with preconceptions and a range of definitions, and stakeholders unanimously agreed that the phrase should generally be avoided. Reframing the conversation around supporting the industry in responding to innovation and evolution, mitigating economic and employment volatility, diversifying local economies, striving to maintain job quality, and meeting community needs can more effectively respond to the challenges of an energy transition.

It is also important to consider that many members of the oil and gas community feel that government, through regulation and climate priorities, is the reason that their industry is facing heightened challenges, leading to mistrust of government officials. This dynamic will make community outreach and engagement challenging, though being aware of this dynamic is an important first step to starting dialogue. Locally trusted community-based organizations can play a role in outreach efforts, as they may be better-received than state agency representatives.

- 8. The Governor’s Office of Federal Funds and Strategic Initiatives can leverage organizational knowledge and capacity that already exists.** There is a wide range of federal funding opportunities that can support the preceding recommendations, and the team within the Governor’s Office of Federal Funds and Strategic Initiatives is best suited

to pursue this diffuse funding, but a broadening of scope may be necessary to fully pursue all opportunities relevant to supporting oil and gas communities. The team is comprised of individuals situated throughout state government offices who are acutely aware of the various funding needs across jurisdictions and priorities. This structure allows them to identify and coordinate applications for funding opportunities that cut across several industries or state departments. The team was assembled specifically to pursue opportunities related to the Inflation Reduction Act and the Bipartisan Infrastructure Law, but expanding their purview to broader federal opportunities—such as the range of general funds through the Economic Development Administration—will enable the State to pursue a greater range of federal funds that are likely to persist in the coming years. Several other agencies—including the Office of Economic Development and International Trade (OEDIT), Colorado Department of Labor and Employment, Colorado Department of Local Affairs (DOLA), and Colorado Energy Office (CEO) can work with the Governor’s Office of Federal Funds and Strategic Initiatives to support these efforts as well.

9. **Explore ways to support local-level capacity to pursue additional federal funding opportunities.** State offices have the funds to appropriately plan and budget capacity to support programs in the long term, however, local governments often have tighter budgets for programs to begin with, and there is little appetite or ability to offer capacity and support beyond what is funded through the initial grant.
10. **There are three categories of federal funds and programs that would be especially beneficial to pursue:**
 - a. **Federal money that can support additional economic development and diversification planning for oil and gas communities.** There are a range of federal funds that can support these efforts—primarily through the Economic Development Administration—including planning and technical assistance, including the Economic Adjustment Assistance program.
 - b. **Federal funding for emerging technologies, which can help markets develop for these technologies and their products and help the industry drive down costs and scale faster.** Federal programs like the Advanced Hydrogen and Fuel Cell Technologies to Drive National Decarbonization program and the Carbon Dioxide Transportation Infrastructure Finance and Innovation Program can help to spur demand for the deployment of emerging technologies and drive down their costs as well.
 - c. **Funding from federal programs that can support small businesses.** Programs like the Office of Economic Development and International Trade’s Rural Jump-Start Program and the Advanced Industries Export Grant are strong ways to support entrepreneurs and small businesses.

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INTRODUCTION

The oil and gas sector in Colorado is substantial in size and has an outsized impact on state employment and in the specific communities in which it operates. One reason for this greater impact is that pay within the sector is notably higher than the economywide average despite requiring educational attainment at roughly the same rate as the economy overall. While overall employment is relatively moderate in scale compared to other Colorado industries, the industry is heavily concentrated within a few communities, which means it plays a particularly important and powerful role in the economic success—or challenges—of those communities.

However, it is a volatile industry, subject to international price fluctuations, tariffs, wars, and supply chain disruptions, as well as natural, but unpredictable changes in extraction rates and accessibility of resources. Rapidly evolving energy technology innovation and investment patterns, the Polis Administration’s strong renewable energy goals, and a societal need to limit pollution and emissions are all additional factors contributing to uncertainty and volatility in this sector. The industry within Colorado has also recently undergone a wave of consolidation, with several multi-national oil and gas companies now responsible for much of the downstream and midstream investment in the region. These dynamics all shape the industry and are therefore vital to explore to more accurately understand what a transition of oil and gas workers could look like.

In 2023, the Colorado Legislature passed HB23-1074, “Study Workforce Transitions to Other Industries”, which required research to address the potential oil and gas employment-related impacts from a Colorado energy transition towards technologies that produce renewable or lower-emission energy. It also sought to understand how Colorado could maximize federal funding in support of those clean technologies, and how automation could impact Colorado’s statewide workforce.

This report does not predict any specific timelines, economic or technological outcomes, or transition pathways for the different industries comprising Colorado’s oil and gas sector. Rather, this report investigates what options exist for the state’s oil and gas workers in light of future innovation, automation, industry volatility, or other economic changes. In turn, it explores how the state of Colorado can most effectively, and flexibly, support those workers under varying circumstances. This outcome-agnostic approach is especially prudent with the re-election of President Donald Trump, whose administration will most likely promote an “all of the above” energy strategy. It is also important to note that industry and workforce dynamics of the coal industry are largely not

translatable to oil and gas, and therefore the insights and models developed for the coal industry transition should not be conflated with oil and gas sector.

The combination of a historically volatile industry that is subject to increased regulation and technological innovation—and also has an outsized and concentrated impact on communities across the state—underscores the importance of research and planning efforts such as this report. Given the anticipated rapid pace of change, be it through corporate consolidation, automation, energy transition, or other means, developing foundational knowledge about Colorado’s oil and gas workers and the Colorado workforce ecosystem is also imperative. Colorado’s employers, workforce stakeholders, and state agencies will be well-served by a better understanding of the current workforce’s interests and perspectives, knowledge and abilities, the opportunities and substitutes that are best suited for these workers, and how to support workers as they navigate this volatility.

Greater engagement and partnership with the oil and gas industry is needed in future research and planning activity. The research team was generally unable to engage with Colorado oil and gas employers and employees throughout the research process. Any transition planning and policy developed without participation by industry employers and workers is likely to face low adoption and high inefficiency, which are suboptimal outcomes for all parties involved. Further engagement in ways that seek common ground is a vital next step for any planning around oil and gas workers.

Timing is another important factor in any transition. Identification of, and preparation for various scenarios, and proactive action can decrease the likelihood of negative impacts in any decline of Colorado’s oil and gas industry, while simultaneously supporting Colorado’s workers, communities, and climate. However, it is likely premature to develop a comprehensive workforce transition strategy in the state. The future trajectory of oil and gas is unclear, as are other factors, such as which technologies will achieve market leadership or how communities will respond to potential changes in their local economies. Given these unknowns, it is important to develop a foundation of clear data and information, form connections and build networks among industry, workers, local government, and other key stakeholders, and set aside resources to foster these networks. This report serves as an initial step to help decision makers plan, understand scenarios, and undertake proactive action that ultimately can benefit the state of Colorado in navigating uncertain times.



CURRENT STATE OF OIL AND GAS IN COLORADO

This section of the chapter discusses the current state of the oil and gas sector in Colorado and highlights some key factors to consider when it comes to transitioning workers.

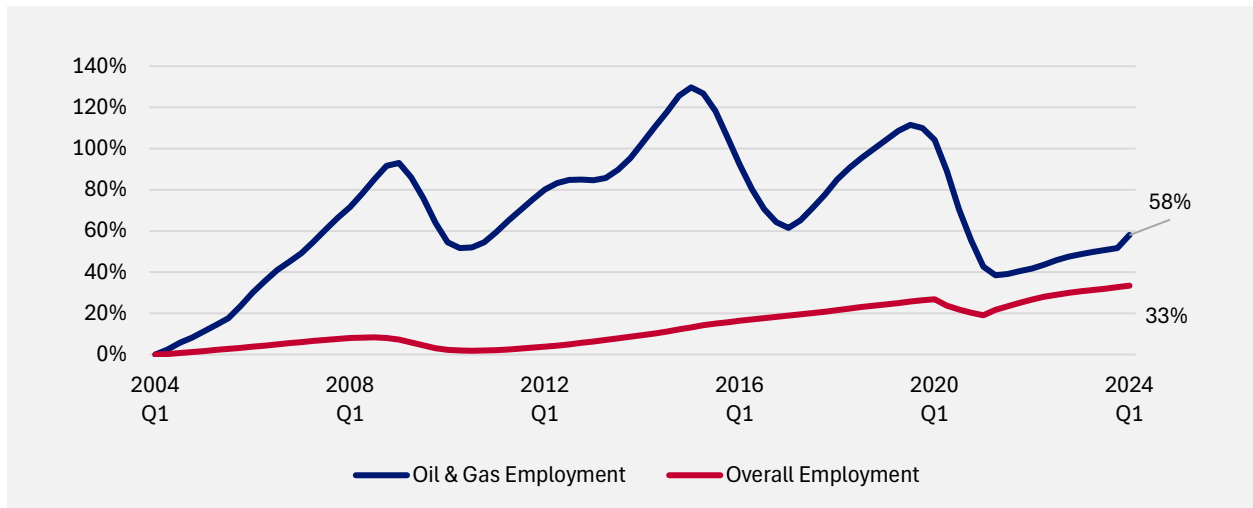
Employment Analysis

As of Q1 of 2024 there were 28,005 people employed in Colorado's oil and gas² sector, which is about the same size as the Electrical Contractors and Other Wiring Installation Contractors industry (NAICS 238210) and the Services for the Elderly and Persons with Disabilities industry (NAICS 624120). Between 2004 and 2024, employment grew 58 percent and outpaced overall employment growth (33 percent) (Figure 1). Although oil and gas employment growth outpaced overall employment growth, the sector has experienced substantial volatility.

Figure 1: Oil and Gas Employment Growth Compared to Overall Employment Growth, 2004-2024³

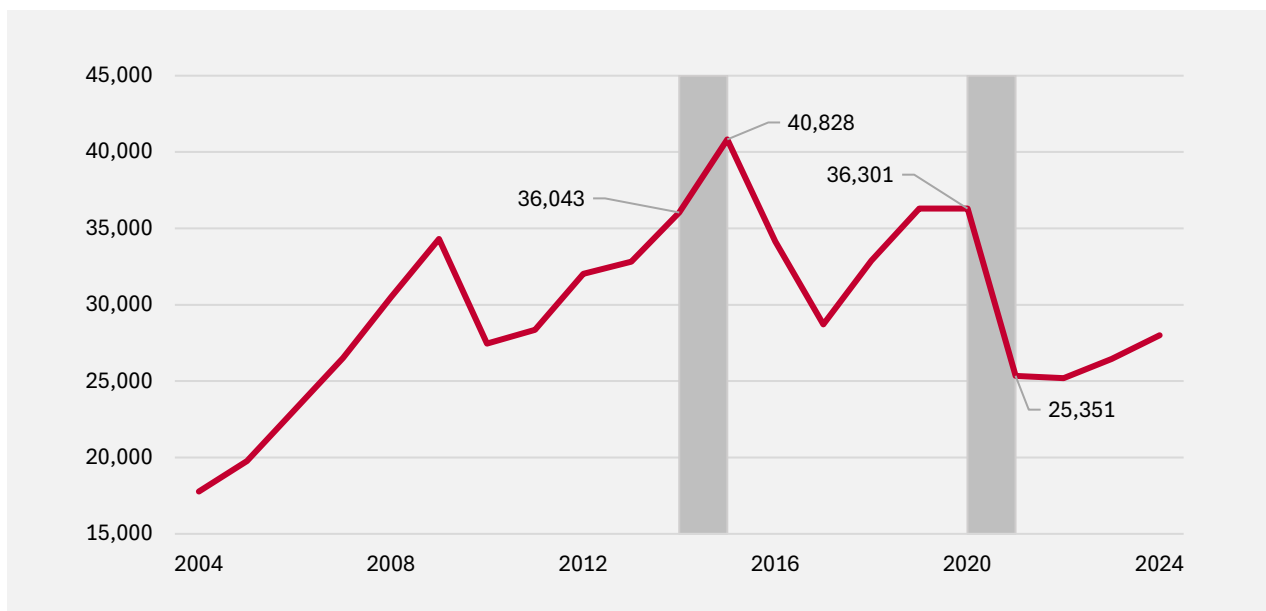
² This definition includes NAICS 221112 Fossil Fuel Electric Power Generation, which includes both natural gas and coal-fired electric power generation. This employment cannot be disaggregated further, though the scale of this industry is marginal relative to the other industries which are exclusive to oil and natural gas.

³ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).



The research team graphed absolute oil and gas employment to further analyze the volatility of the oil and gas sector and identify periods of economic booms and busts. Colorado experienced the biggest annual oil and gas boom between 2014 and 2015 with an increase of nearly 4,800 workers. The largest oil and gas bust occurred between 2020 and 2021 where oil and gas employment declined by roughly 11,000 workers (-31 percent) in a single year. As shown in Figure 2, the sector has faced numerous economic booms and busts with essentially no period of sustained employment.

Figure 2: Absolute Annual Oil and Gas Employment, 2004-2024⁴

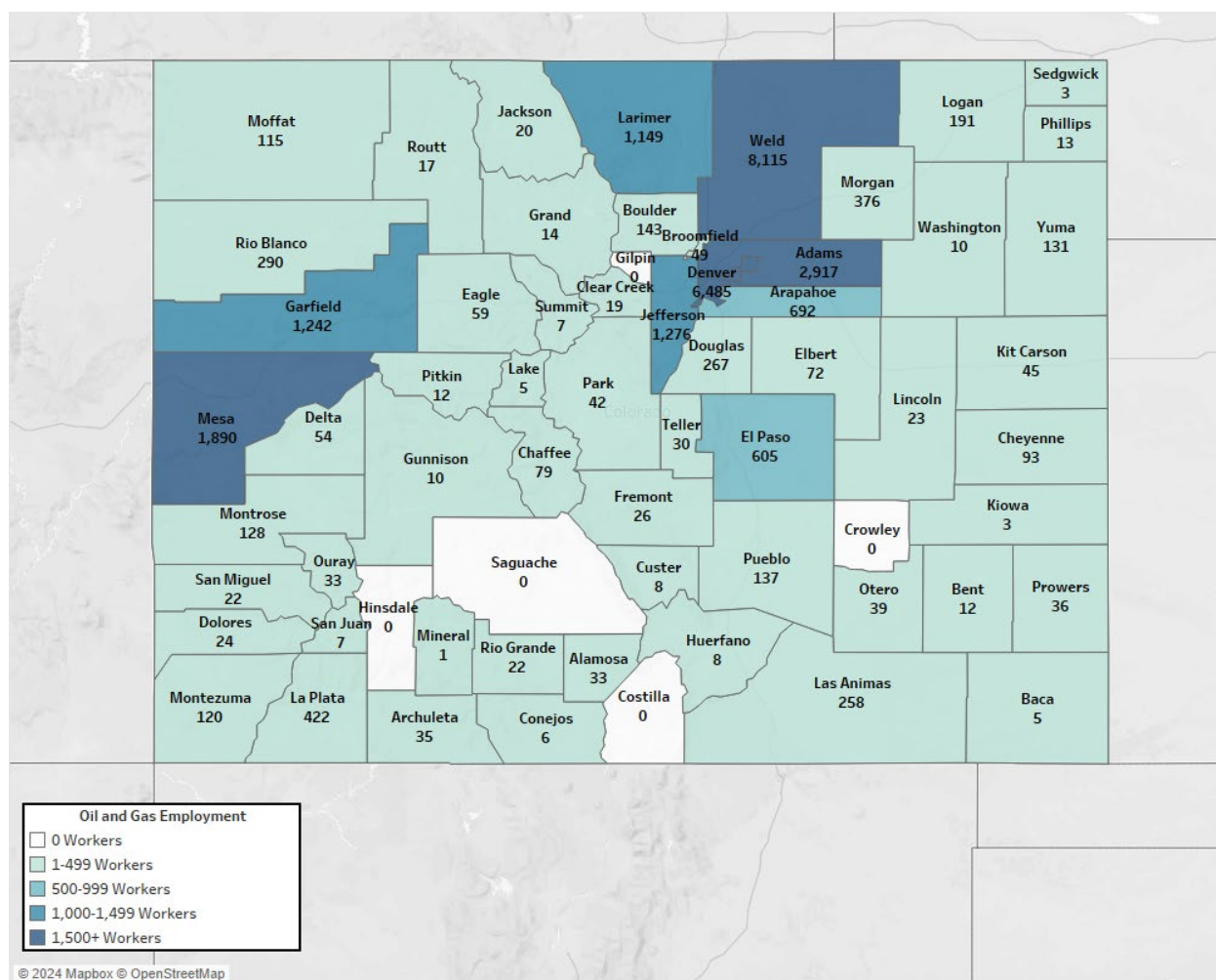


⁴ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Figure 3 showcases the geographical distribution of oil and gas employment within Colorado while Table 1 highlights the 10 counties with the largest employment increases between 2004 and 2024. The counties with the largest oil and gas workforces (shaded darker blue in Figure 3) have also experienced the largest increases in oil and gas employment over the past ten years (Table 1). The counties with the greatest concentration of oil and gas workers are found in the western part of the state (Mesa, Garfield, etc.) and the Front Range region (Weld, Denver, etc.).

Seven of the ten counties with the largest growth in oil and gas employment have oil and gas workforces that constitute less than one percent of the county's overall employment. The only counties where oil and gas employment make up more than one percent of the workforce are Weld (six percent), Garfield (four percent), and Mesa and Morgan Counties (three percent). This data shows that some counties have a substantial portion of their economies connected to the oil and gas sector, but this is relatively few counties by number, meaning that efforts can primarily be concentrated among a select number of counties.

Figure 3: Map of Colorado Oil and Gas Employment by County⁵



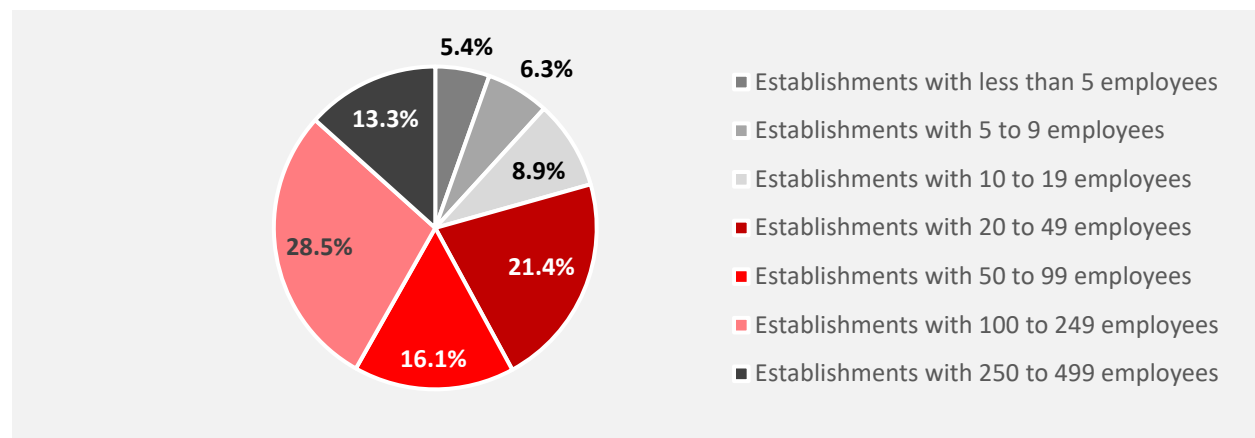
⁵ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Table 1: Counties with the Largest Oil and Gas Employment Growth⁶

County	2024 Employment	Share of Oil & Gas Employment Compared to Overall Employment	Absolute Employment Growth (2004-2024)	Employment Growth Rate (2004-2024)	Location Quotient (Industry Concentration)
Weld County	8,115	6%	5,954	276%	9.23
Denver County	6,485	1%	1,834	39%	1.59
Adams County	2,917	1%	1,449	99%	1.65
Mesa County	1,890	3%	847	81%	3.88
Larimer County	1,149	1%	826	255%	0.89
Garfield County	1,242	4%	651	110%	6.09
Jefferson County	1,276	0.5%	610	92%	0.70
Douglas County	267	0.2%	137	105%	0.25
Morgan County	376	3%	84	29	3.96
Elbert County	72	1%	55	334%	1.66
Colorado Overall Oil and Gas	28,005	1%	17,772	58%	1.31

There are about 1,100 oil and gas establishments⁷ in Colorado, and more than half (55%) of them have fewer than five employees.⁸ In fact, 93% of oil and gas establishments in the state have fewer than 50 workers. Despite this high number of small businesses, the majority (58%) of all workers in the industry work within establishments with 50 or more employees (Figure 4).

Figure 4. Oil and Gas Employment by Establishment Size



⁶ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

⁷ This list includes the same 19 oil and gas NAICS codes used throughout this report except for Fuel Dealers (NAICS 457210) which did not have data available within the US Census Bureau's County Business Pattern database.

⁸ United States Census Bureau, County Business Patterns (2022), <https://www2.census.gov/programs-surveys/cbp/data/2022>.

This information is important to consider when developing strategies to support transitioning workers and the companies that they work for. Larger companies will have the resources and strategic interest in pursuing early advancements in emerging technologies, which can give employees early access to relevant training and knowledge development. Smaller employers are less likely to have the resources or interest in pursuing emerging technologies, so employees of these smaller organizations may have less exposure to and awareness of emerging technologies and would require additional training to access opportunities with these technologies. This dichotomy between employers is discussed further on page 49.

Industry Analysis

Also important to note is that the oil and gas sector in Colorado is not a monolith. Rather, it is a collection of 16 different industries defined by NAICS codes (listed in Table 2) and encompassing all parts of the value chain, ranging from extraction to refining and transportation and sale. This section highlights some of the industry-level distinctions within the oil and gas sector.

Support Activities for Oil and Gas Operations is the largest and fastest growing oil and gas industry in Colorado. Between 2004 and 2024, employment in the industry increased by roughly 6,700 people and currently more than 10,000 people are employed. Other oil and gas industries with large employment increases include Crude Petroleum Extraction (1,634 workers), Oil and Gas Pipeline and Related Structures Construction (1,587 workers) and Natural Gas Extraction (1,079 workers).

Although the oil and gas sector has grown substantially over the past 20 years, several industries within the sector have declined. Fossil Fuel Electric Power Generation experienced the largest decline within the oil and gas sector, shedding 2,100 jobs between 2004 and 2024, representing an 84 percent decline. This decline was largely driven by closures of several coal powered plants as coal electric power generation reduced by 36 percent between 2010 and 2023,⁹ in addition to the increased automation of the power plants remaining online. Three other industries experienced employment declines during this time including Fuel Dealers (eight percent), Drilling Oil and Gas Wells (13 percent), and Natural Gas Distribution (24 percent). Petroleum Refineries experienced a minimal employment decline of one percent during the same period.

⁹ “Colorado State Profile and Energy Estimates,” United States Energy Information Administration, Data as of October 2024, <https://www.eia.gov/state/?sid=CO>.

Table 2: Oil and Gas Industries Employment by Employment Change¹⁰

NAICS CODE	INDUSTRY	2024 EMPLOYMENT	2004-2024 EMPLOYMENT CHANGE	2004-2024 EMPLOYMENT % CHANGE
213112	Support Activities for Oil and Gas Operations	10,190	6,706	193%
211120	Crude Petroleum Extraction	5,169	1,634	46%
237120	Oil and Gas Pipeline and Related Structures Construction	3,643	1,587	77%
211130	Natural Gas Extraction	2,221	1,079	95%
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	1,087	192	21%
486210	Pipeline Transportation of Natural Gas	933	139	18%
486110	Pipeline Transportation of Crude Oil	69	45	186%
333132	Oil and Gas Field Machinery and Equipment Manufacturing	138	27	25%
424710	Petroleum Bulk Stations and Terminals	568	24	4%
486910	Pipeline Transportation of Refined Petroleum Products	45	16	57%
325110	Petrochemical Manufacturing	0	0	0%
324110	Petroleum Refineries	531	-6	-1%
457210	Fuel Dealers	662	-61	-8%
213111	Drilling Oil and Gas Wells	1,356	-194	-13%
221210	Natural Gas Distribution	978	-305	-24%
221112	Fossil Fuel Electric Power Generation ¹¹	415	-2,108	-84%

Table 3 highlights the three counties with the most employment within each oil and gas industry. The most counties that most frequently have the most employment within each industry include Weld,

¹⁰ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

¹¹ This industry code includes both natural gas and coal-fired electric power generation and cannot be disaggregated further. The closure of at least three coal-fired power plants (Nucla, Martin Drake, Lamar) are included in this figure.

Denver, and Adams County. This is expected given these three counties account for 63% of all oil and gas employment in Colorado.

Table 3: Counties with the Largest Employment by Industry¹²

NAICS CODE	INDUSTRY	COUNTY	2024 EMPLOYMENT
211120	Crude Petroleum Extraction	Denver County	3,035
		Weld County	1,259
		Arapahoe County	172
211130	Natural Gas Extraction	Denver County	875
		Garfield County	476
		Las Animas County	188
213111	Drilling Oil and Gas Wells	Denver County	532
		Mesa County	362
		Garfield County	175
213112	Support Activities for Oil and Gas Operations	Weld County	5,086
		Denver County	1,303
		Mesa County	1,013
221112	Fossil Fuel Electric Power Generation	Morgan County	86
		Weld County	74
		Jefferson County	67
221210	Natural Gas Distribution	El Paso County	306
		Denver County	163
		Weld County	124
237120	Oil and Gas Pipeline and Related Structures Construction	Weld County	1,016
		Adams County	829
		Larimer County	813
324110	Petroleum Refineries	Adams County	513
		Mesa County	7
		Moffat County	6
325110	Petrochemical Manufacturing	-	-
333132	Oil and Gas Field Machinery and Equipment Manufacturing	Weld County	68
		Delta County	19
		Jefferson County	8

¹² JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

424710	Petroleum Bulk Stations and Terminals	Adams County	278
		Weld County	60
		Montrose County	30
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	Denver County	341
		Adams County	125
		Weld County	124
457210	Fuel Dealers	Adams County	119
		El Paso County	65
		Jefferson County	46
486110	Pipeline Transportation of Crude Oil	Arapahoe County	48
		Denver County	10
		Weld County	10
486210	Pipeline Transportation of Natural Gas	Jefferson County	362
		La Plata County	113
		Weld County	112
486910	Pipeline Transportation of Refined Petroleum Products	El Paso County	19
		Adams County	12
		Denver County	7

Geographic Distributions of Oil and Gas Industries Employment

The oil and gas sector can be found in most counties in the state; however, the sector is very concentrated amongst only a handful of counties. This section examines different portions of the oil and gas value chain through geography to get a better understanding of where different types of workers and oil and gas activities are concentrated.

Extraction Industries

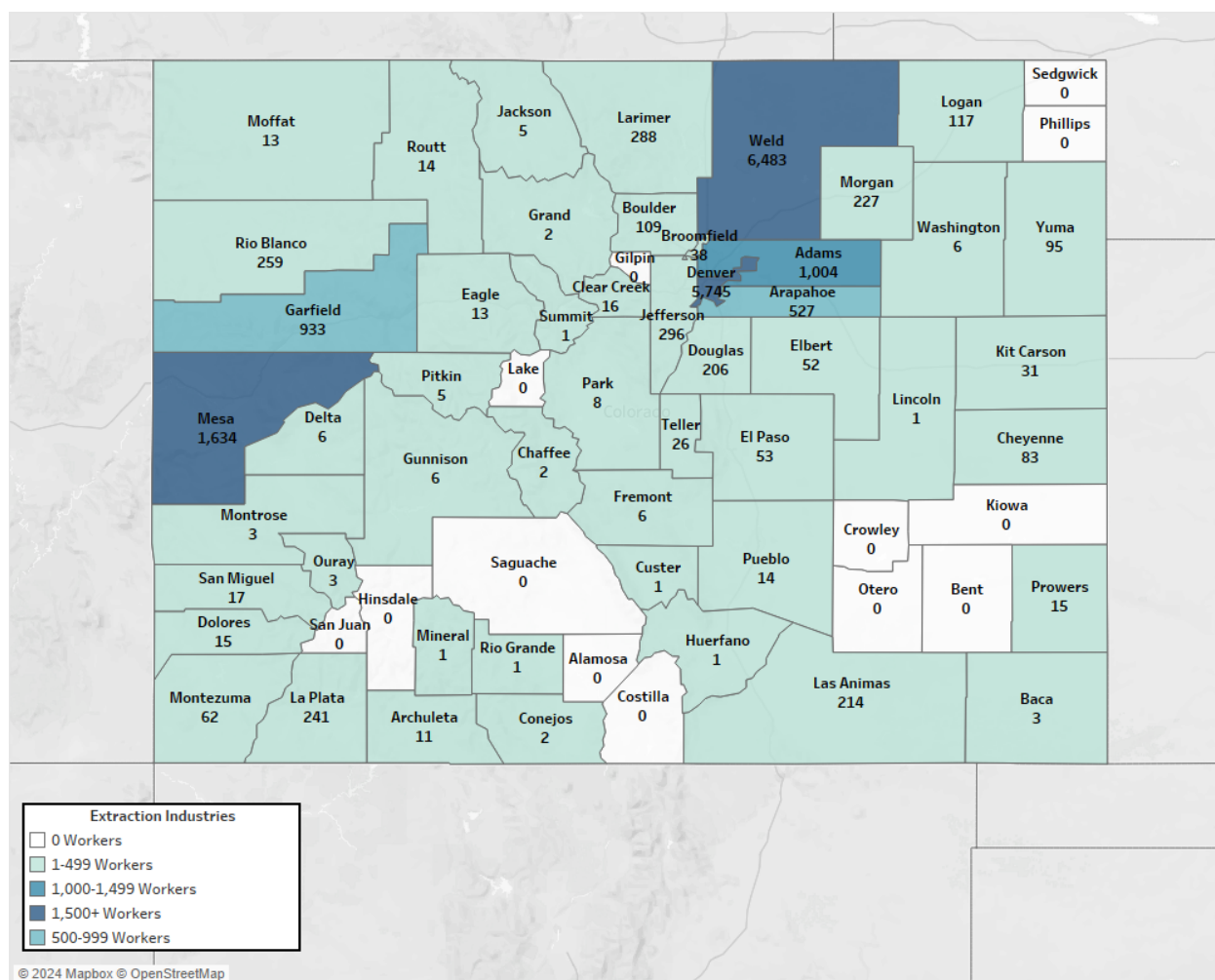
Oil and gas extraction industries include:

- 211120, Crude Petroleum Extraction
- 211130, Natural Gas Extraction
- 213111, Drilling Oil and Gas Wells
- 213112, Support Activities for Oil and Gas Operations

Oil and gas extraction activities are largely concentrated in the Front Range region of Colorado. In this region, there are nearly 13,800 mining workers, representing 73 percent of Colorado's oil and gas extraction workforce. Weld and Denver County are the main drivers of this concentration as roughly 12,200 of the 13,800 Front Range extraction workers are within these counties.

A large portion of extraction workers can also be found in the western part of Colorado in Mesa and Garfield County where nearly 2,600 oil and gas extraction workers can be found.

Figure 5: Geographic Distribution of Mining Employment¹³



Utilities Industries

Utilities industries related to the oil and gas sector include:

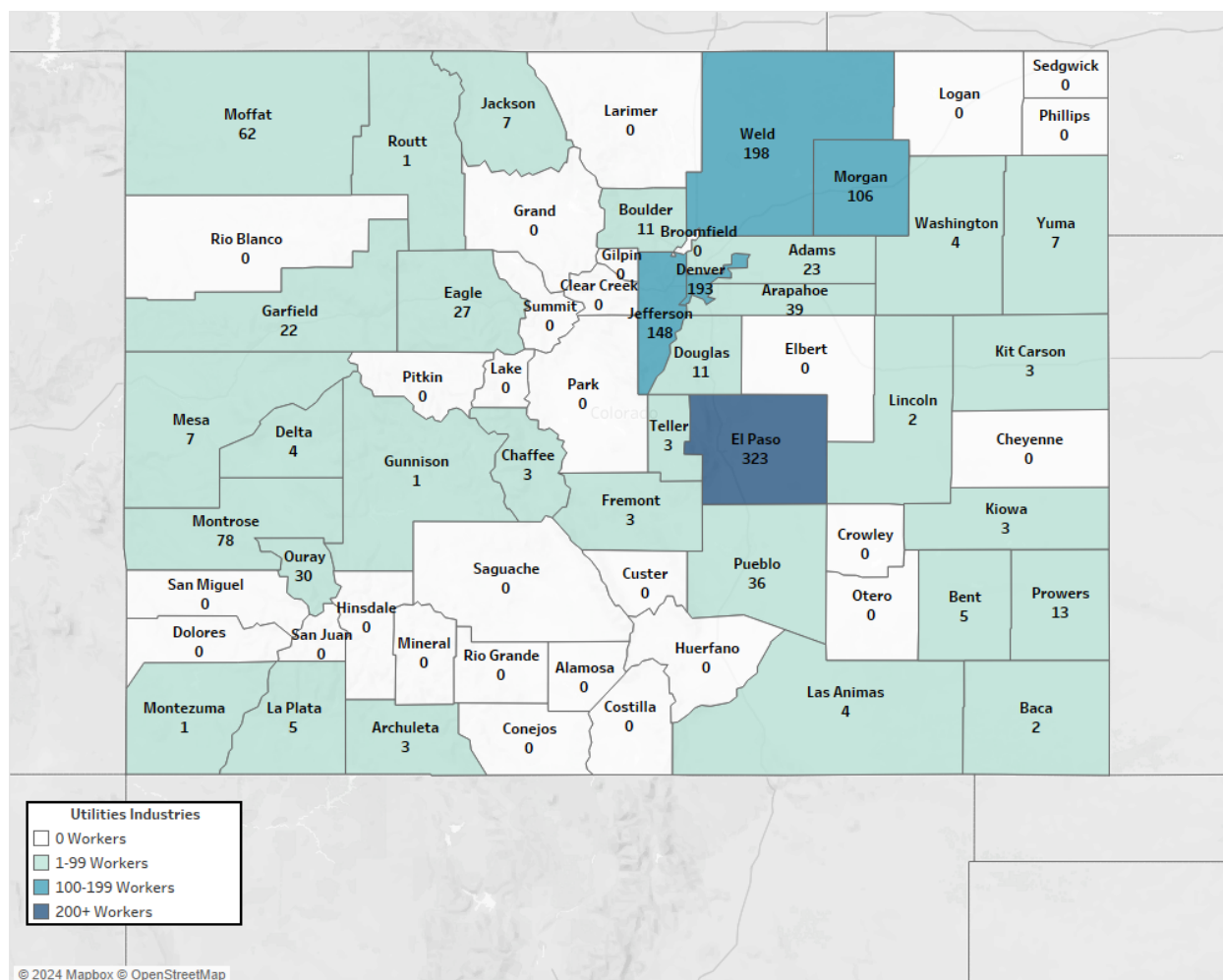
- 221112, Fossil Fuel Electric Power Generation
- 221210, Natural Gas Distribution

Oil and gas utilities workers are mostly found in the Front Range region of Colorado. In this region, El Paso County has the most utilities employment (323 workers), followed by Weld (198 workers), Denver

¹³ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

(193 workers), and Jefferson County (148 workers). These four counties represent 62 percent of Colorado’s oil and gas utilities workforce.

Figure 6: Geographic Distribution of Utilities Workers¹⁴

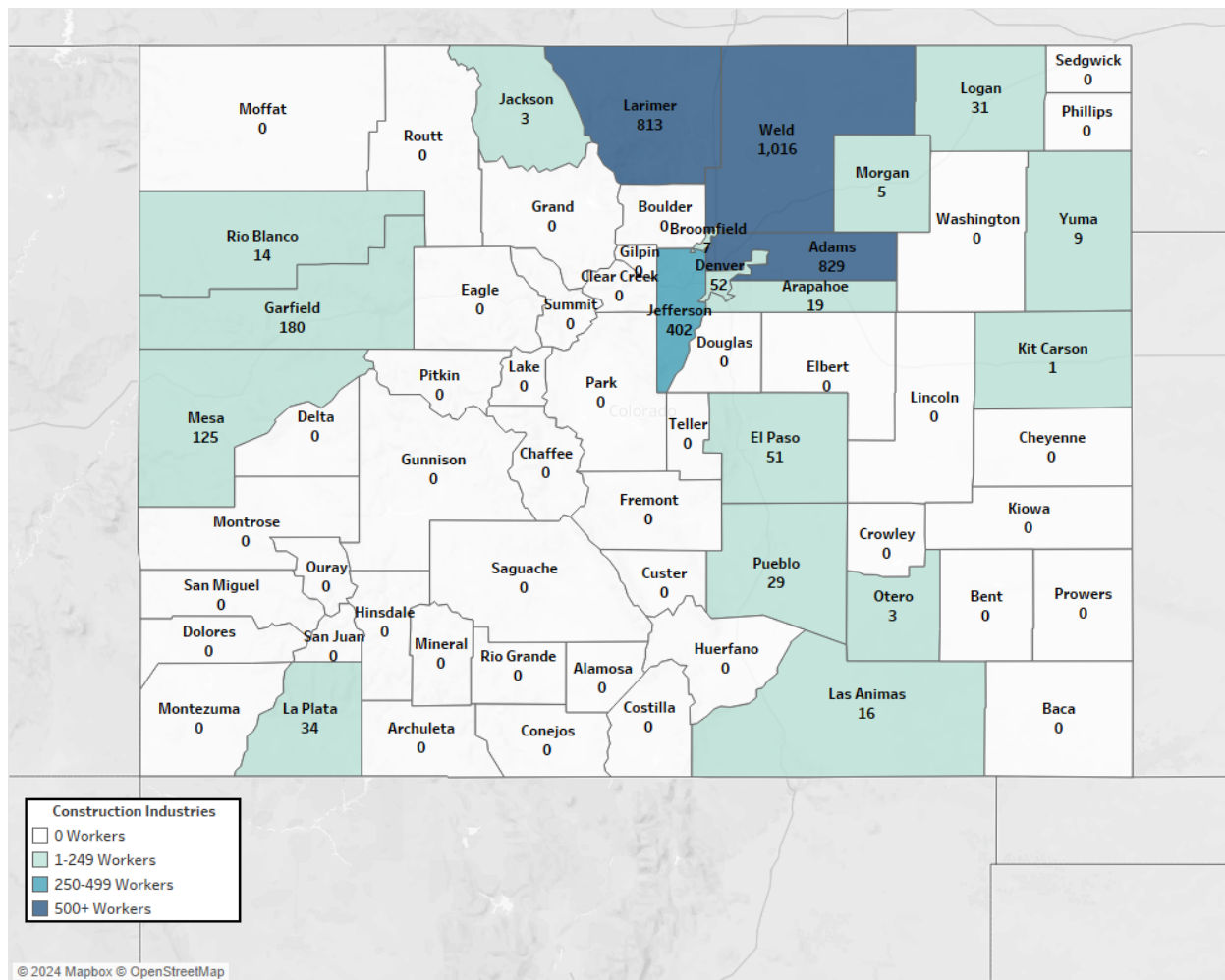


Construction Industries

Oil and Gas Pipeline and Related Structures Construction (237120) is the only construction industry directly related to the oil and gas sector. Most oil and gas construction employment is found in the northern part of the Front Range region. Weld County has the most employment with more than 1,000 workers, followed by Adams (829 workers) and Larimer County (813 workers). These three counties account for 73 percent of oil and gas construction workers. It is also notable that this workforce is largely migratory, and workers tend to follow wherever new oil and gas infrastructure is being built.

¹⁴ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Figure 7: Geographic Distribution of Construction Workers¹⁵



Petroleum Production Industries

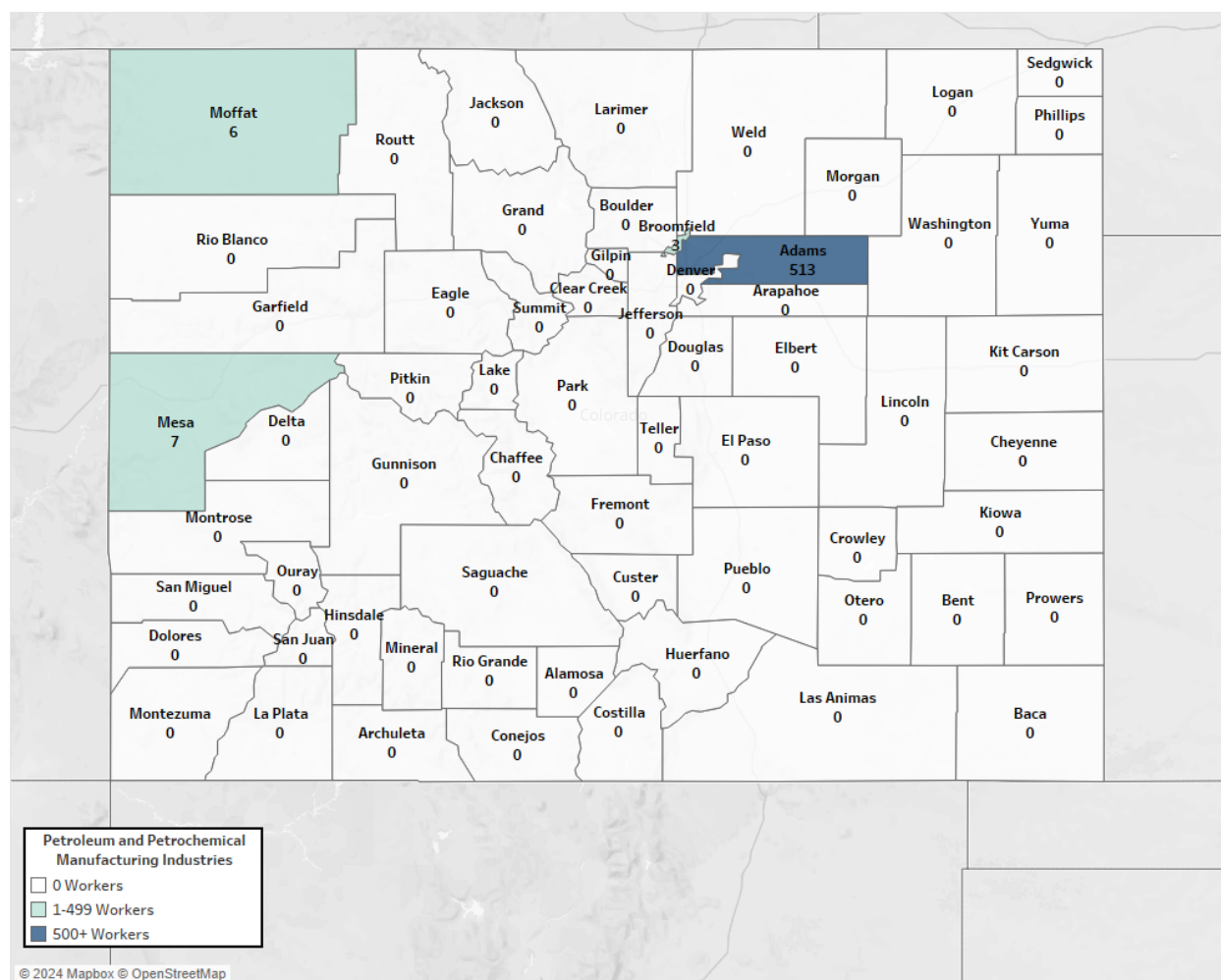
Petroleum production industries include:

- 324110, Petroleum Refineries
- 325110, Petrochemical Manufacturing

The two petroleum production industries within oil and gas are relatively small with roughly 530 total workers. Of these 530 workers, 513 of them are within Adams County in the Front Range region. Three other counties have petroleum production related employment including Broomfield (3 workers), Moffat (6 workers), and Mesa County (7 workers).

¹⁵ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Figure 8: Geographic Distribution Petroleum Manufacturing Employment¹⁶

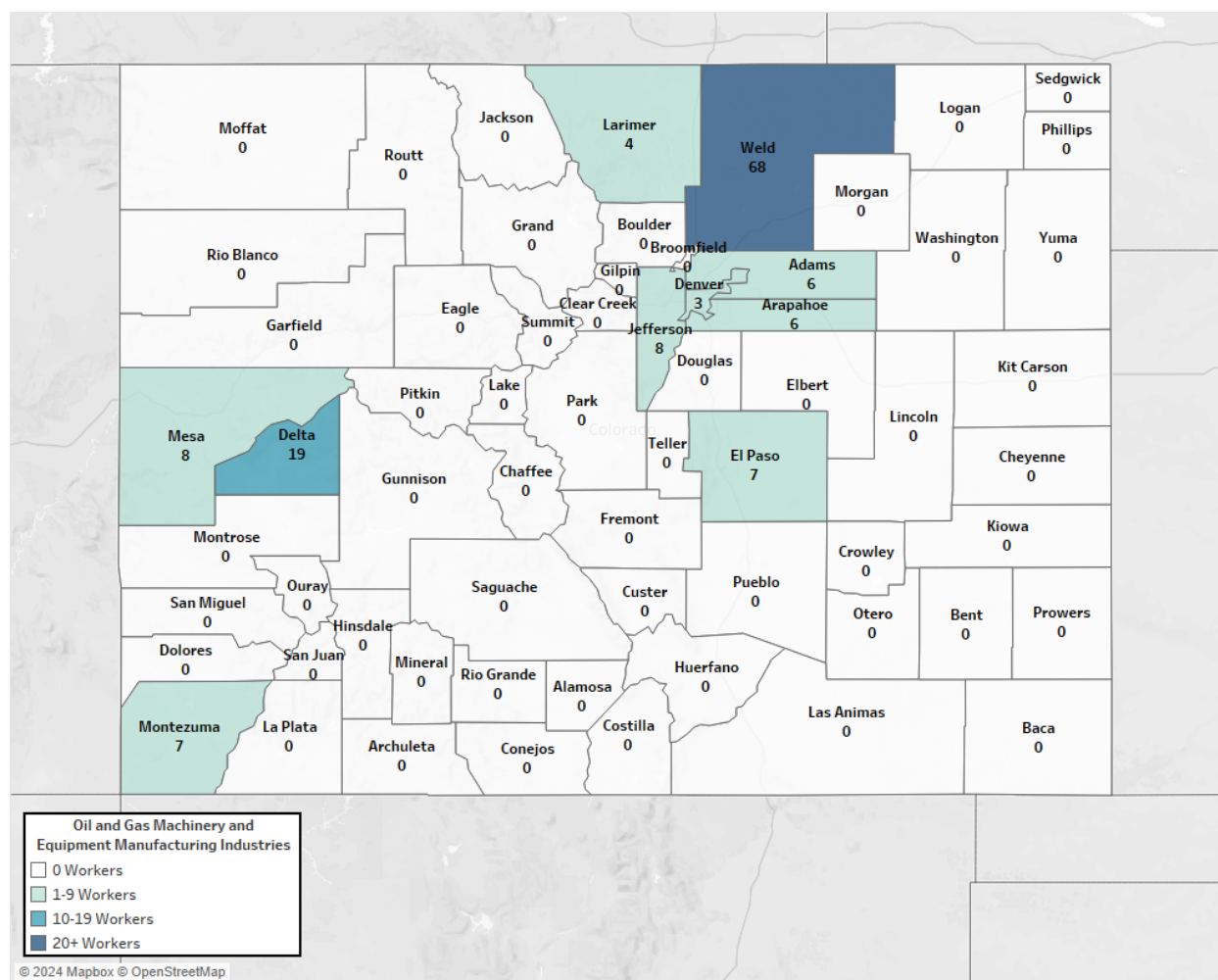


Oil and Gas Machinery and Equipment Manufacturing Industries

Oil and Gas Field Machinery and Equipment Manufacturing (333132) is the only manufacturing industry directly related to the oil and gas sector. Employment within this industry is also small in Colorado. Roughly 140 workers exist within this industry, and most are found in the Front Range Region. Weld County has the most employment in these industries with 68 workers, followed by Delta County with 19 workers.

¹⁶ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Figure 9: Geographic Distribution of Oil and Gas Machinery and Equipment Manufacturing¹⁷



Oil and Gas Logistics and Wholesale Industries

Logistics and wholesale industries within the oil and gas sector include:

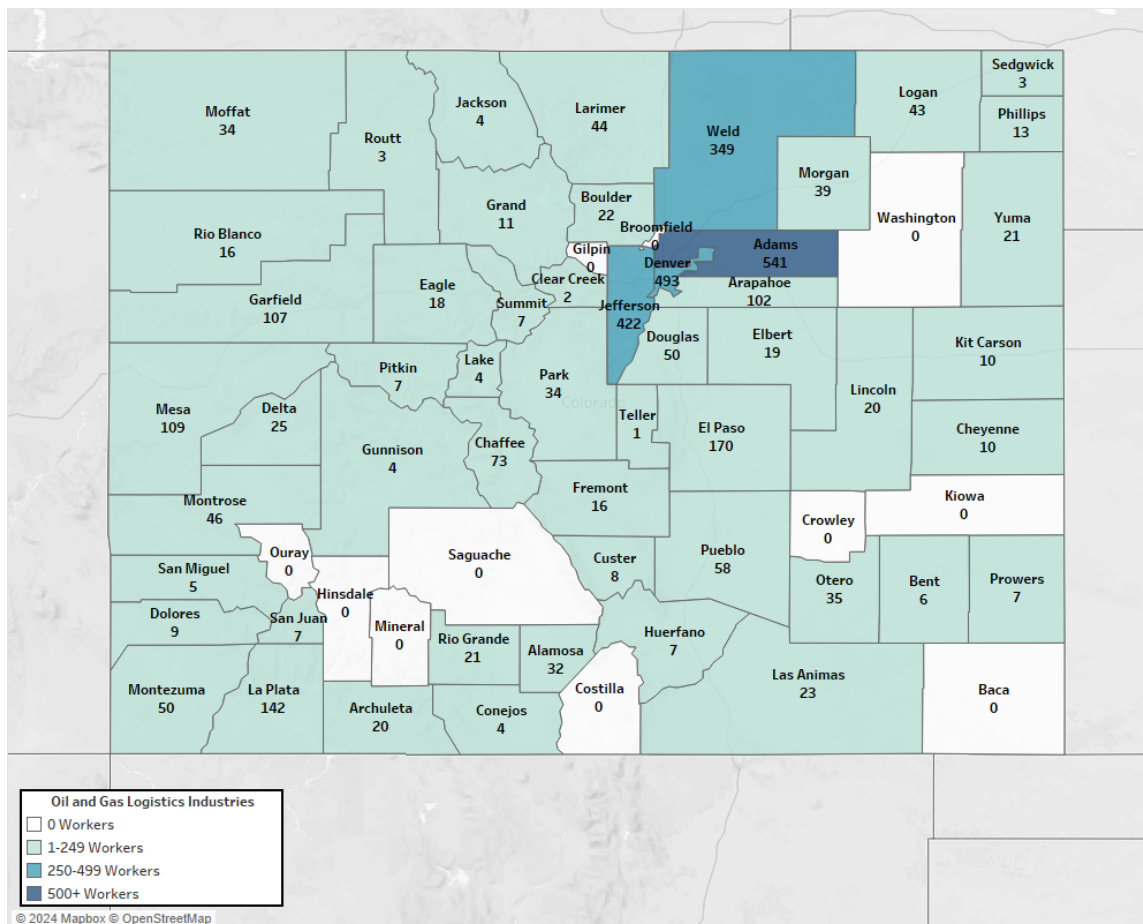
- 424710, Petroleum Bulk Stations and Terminals
- 424720, Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)
- 457210, Fuel Dealers
- 486110, Pipeline Transportation of Crude Oil
- 486210, Pipeline Transportation of Natural Gas
- 486910, Pipeline Transportation of Refined Petroleum Products

Employment within oil and gas logistics and wholesale industries is concentrated in the Front Range Region. Adams County has the most employment (541 workers), followed by Denver (493 workers),

¹⁷ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Jefferson (422 workers), and Weld County (349 workers). These four counties account for 54 percent of the oil and gas logistics workforce.

Figure 10: Geographic Distribution of Oil and Gas Logistics Industries¹⁸



¹⁸ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Occupation Analysis

The largest share of oil and gas workers fall within construction, extraction, installation, and maintenance occupations, representing 43 percent of oil and gas employment (Figure 10).

*Figure 11: Oil and Gas Occupations*¹⁹

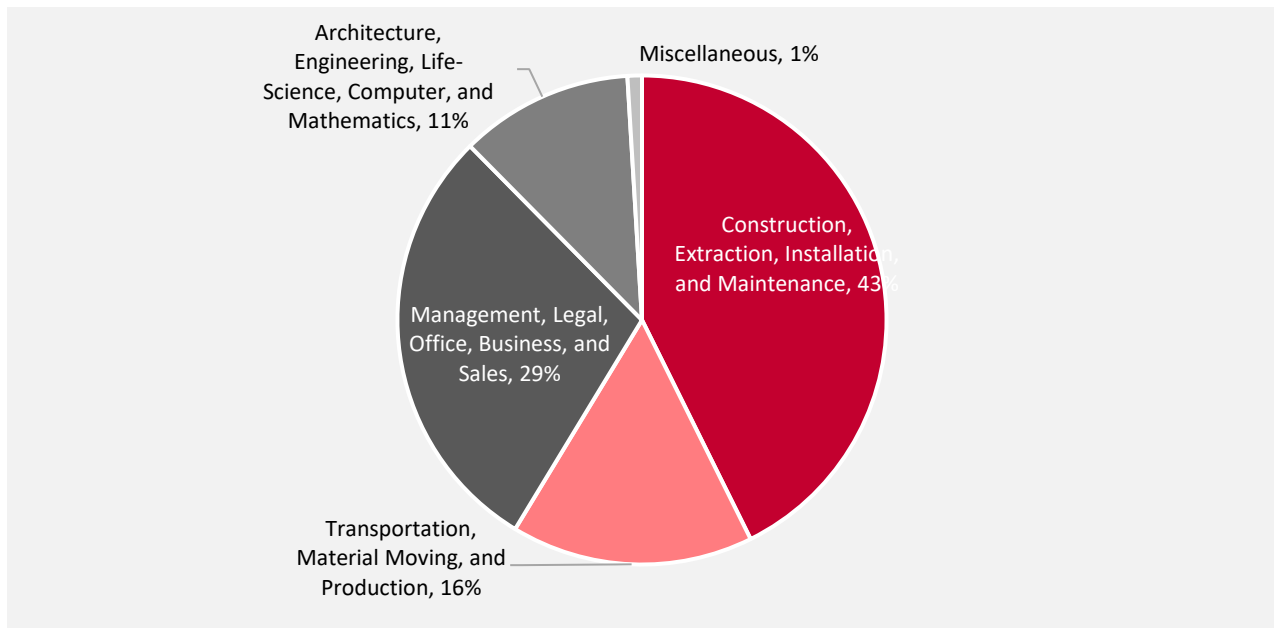


Table 4 displays the 30 most common oil and gas occupations within Colorado, in addition to the wage distribution. These occupations have a collective median wage of \$82,800, which is substantially higher than the overall median wage in Colorado of \$55,800.

¹⁹ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Table 4: Top 30 Oil and Gas Occupations²⁰

SOC CODE	OCCUPATION	EMPLOYMENT 2024 Q1	25 TH PERCENTILE WAGE	50 TH PERCENTILE (MEDIAN) WAGE	75 TH PERCENTILE WAGE
47-5013	Service Unit Operators, Oil and Gas	2,075	\$51,400	\$61,300	\$74,700
47-5071	Roustabouts, Oil and Gas	1,701	\$42,300	\$47,100	\$51,800
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	1,645	\$68,500	\$81,500	\$99,500
47-2061	Construction Laborers	1,075	\$39,800	\$46,400	\$51,800
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,021	\$51,600	\$59,700	\$68,300
47-2073	Operating Engineers and Other Construction Equipment Operators	837	\$52,900	\$60,800	\$68,700
11-1021	General and Operations Managers	755	\$95,400	\$134,300	\$195,800
17-2171	Petroleum Engineers	613	\$125,100	\$167,300	\$205,000
11-9199	Managers, All Other	587	\$125,500	\$161,500	\$199,800
13-2011	Accountants and Auditors	576	\$69,400	\$88,600	\$115,600
49-9041	Industrial Machinery Mechanics	548	\$60,600	\$71,400	\$84,500
19-2042	Geoscientists, Except Hydrologists and Geographers	506	\$82,200	\$118,900	\$175,900
53-7073	Wellhead Pumpers	500	\$61,500	\$76,900	\$85,300
47-5011	Derrick Operators, Oil and Gas	498	\$52,000	\$55,000	\$62,300
43-9061	Office Clerks, General	424	\$43,800	\$53,200	\$65,100
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	422	\$78,100	\$93,900	\$106,000
43-3031	Bookkeeping, Accounting, and Auditing Clerks	415	\$45,300	\$54,000	\$63,600
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	396	\$61,600	\$86,500	\$148,900

²⁰ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	393	\$40,000	\$47,000	\$55,200
11-9021	Construction Managers	390	\$85,100	\$109,600	\$138,900
47-5012	Rotary Drill Operators, Oil and Gas	343	\$67,900	\$78,800	\$89,000
13-1082	Project Management Specialists	342	\$80,300	\$103,500	\$133,700
13-1199	Business Operations Specialists, All Other	335	\$65,600	\$86,400	\$118,200
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	290	\$57,400	\$67,200	\$81,600
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	284	\$54,700	\$77,800	\$109,100
47-2152	Plumbers, Pipefitters, and Steamfitters	281	\$79,000	\$98,200	\$125,800
51-8092	Gas Plant Operators	278	\$50,300	\$63,300	\$78,900
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	269	\$65,600	\$82,200	\$103,200
51-4121	Welders, Cutters, Solderers, and Brazers	253	\$49,000	\$57,000	\$65,200
19-5011	Occupational Health and Safety Specialists	242	\$85,200	\$96,100	\$102,900
-	Colorado Overall Oil and Gas	28,005	\$64,400	\$82,800	\$109,500



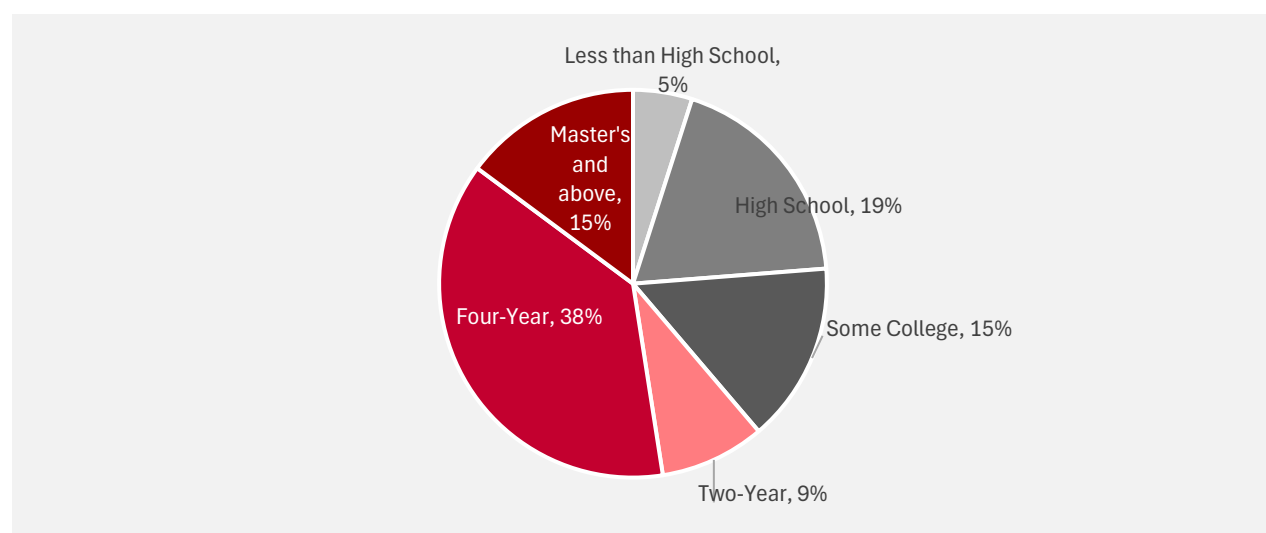
OIL AND GAS DEMOGRAPHIC ANALYSIS

Understanding worker demographics helps to address specific needs and challenges faced by various groups within a workforce and informs decision-making processes related to policy and program support. The research team gathered demographic data for relevant oil and gas occupations but was unable to narrow the data to be specific to oil and gas workers. Because of this, demographics discussed in this analysis reflect economy-wide demographics for these occupations, but the research team does not expect significant demographic variation across industries.

Educational Attainment

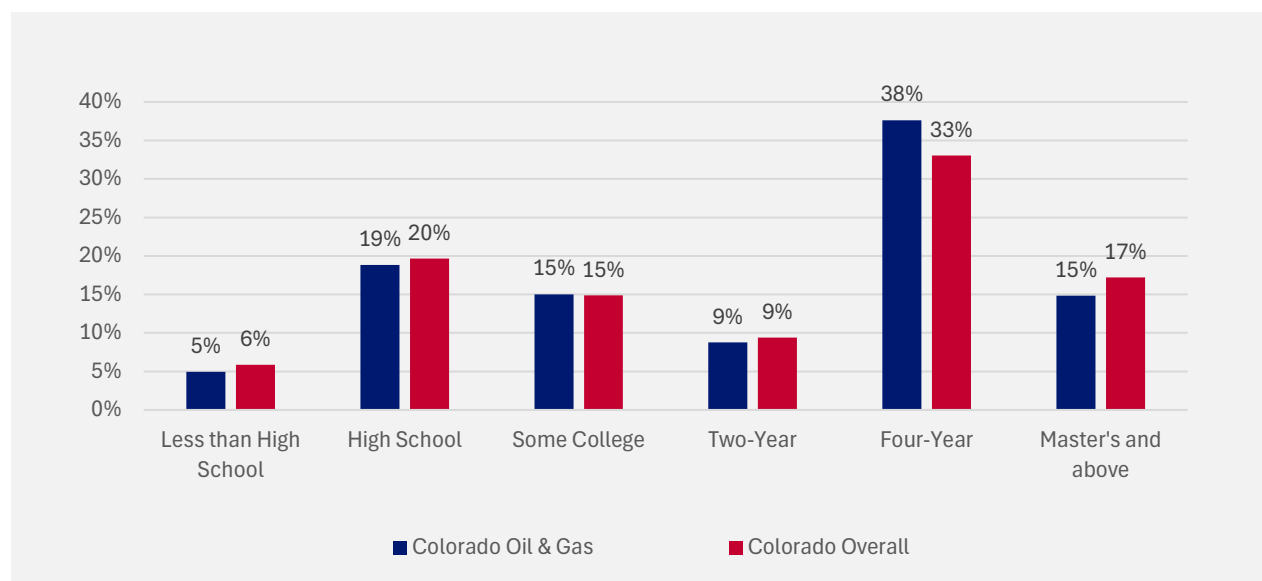
Educational attainment rates are similar between relevant oil and gas occupations and the overall workforce in Colorado. Fifty-three percent of workers in relevant oil and gas occupations have a four-year degree or higher, compared to 50 percent in the overall workforce (Figure 12).

Figure 12: Educational Attainment of Oil and Gas Sector Occupations²¹



²¹ JobsEQ 2024 Q1. Data Extracted from the United States Census Bureau, 2018-2022 American Community Survey 5-Year Estimates (2024).

Figure 13: Educational Attainment of Oil and Gas Sector Occupations Compared to Overall Workforce²²



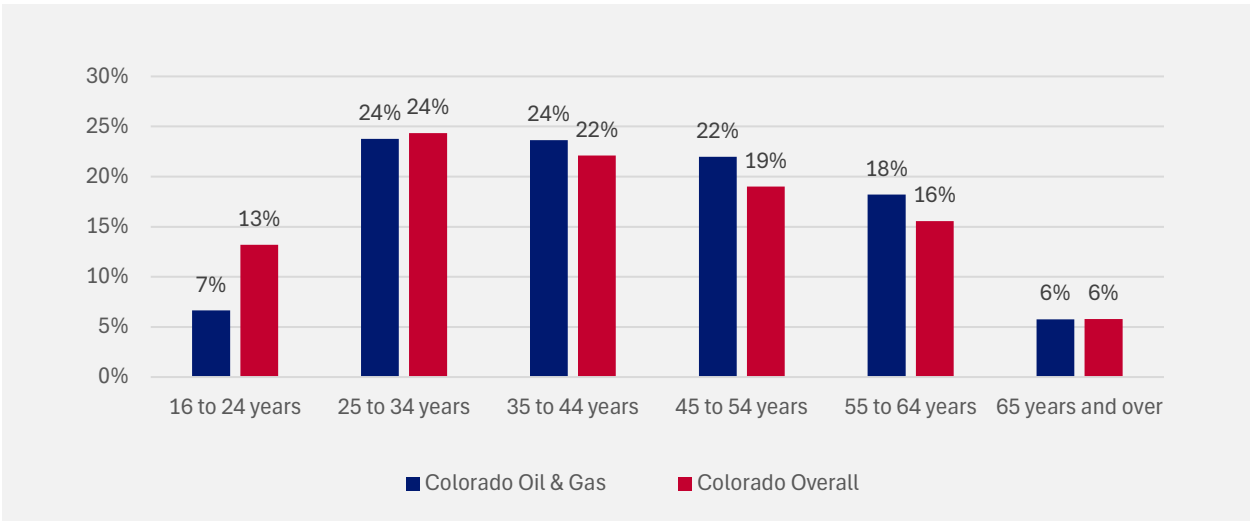
Age

Workers in the relevant oil and gas occupations are older than workers in the overall workforce (Figure 13). Within the relevant oil and gas occupations, a larger share of the workforce is above the age of 55 (24 percent), compared to the overall workforce (22 percent). More workers within the relevant oil and gas occupations are also within the prime working age range of 35-54 (46 percent), compared to the overall workforce (41 percent), and relatively few are under the age of 24.

This age distribution has important implications on transition planning efforts. If peak transition were to occur within the next ten years, workers above the age of 55 may need extra support in successful job transition or early retirement, while any transition further out than 10 years will give current workers more “runway” to find alternative careers but will result in more of the current prime working age cohort bearing the brunt of any workforce disruption. Worker age is also impacted by employer dynamics; larger employers or those that offer pensions may treat worker transitions differently than smaller employees that have little resources or responsibilities to support workers as they near retirement age.

²² JobsEQ 2024 Q1. Data Extracted from the United States Census Bureau, 2018-2022 American Community Survey 5-Year Estimates (2024).

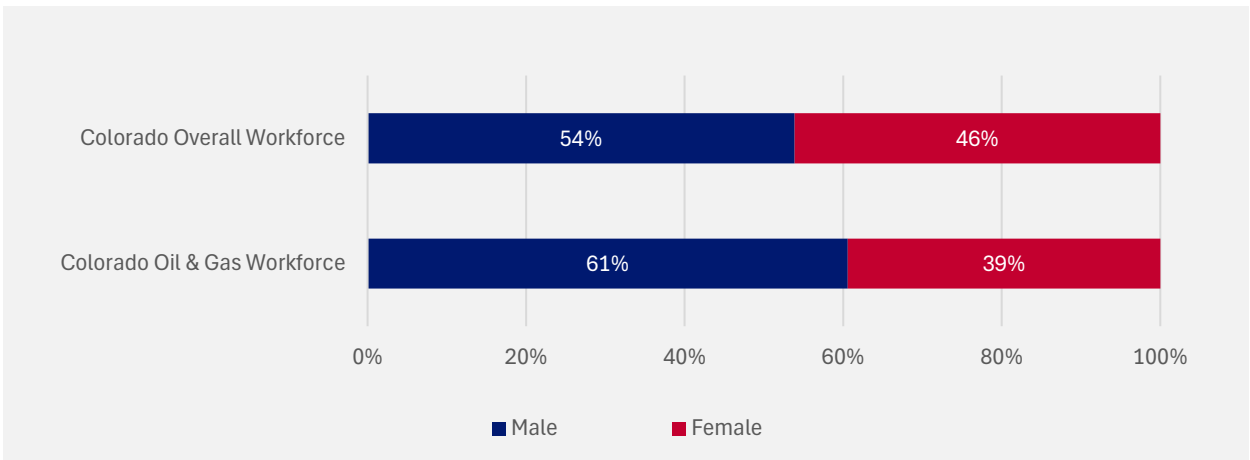
Figure 14: Age Demographics of Oil and Gas Sector Occupations²³



Gender

Male workers make up a greater proportion of relevant oil and gas occupations than in the overall workforce. Sixty-one percent of workers in the relevant oil and gas occupations are male, compared to 54 percent in the overall workforce (Figure 14).

Figure 15: Gender Demographics of Oil and Gas Sector Occupations²⁴



²³ JobsEQ 2024 Q1. Data Extracted from the United States Census Bureau, 2018-2022 American Community Survey 5-Year Estimates (2024).

²⁴ JobsEQ 2024 Q1. Data Extracted from the United States Census Bureau, 2018-2022 American Community Survey 5-Year Estimates (2024).

Race and Ethnicity

Race and ethnicity demographics are similar between the relevant oil and gas occupations and overall workforce. The workers within the relevant oil and gas occupations are slightly less diverse with three percent more white workers and two percent less Hispanic identifying workers.

Table 5: Race Demographics of Oil and Gas Sector Occupations²⁵

	WHITE	BLACK	AMERICAN INDIAN	ASIAN	PACIFIC ISLANDER	TWO OR MORE RACES	HISPANIC
Colorado Oil and Gas	84%	3%	1%	3%	0%	9%	19%
Colorado Overall	81%	4%	1%	4%	0%	10%	21%

Characteristics of Current Oil and Gas Jobs

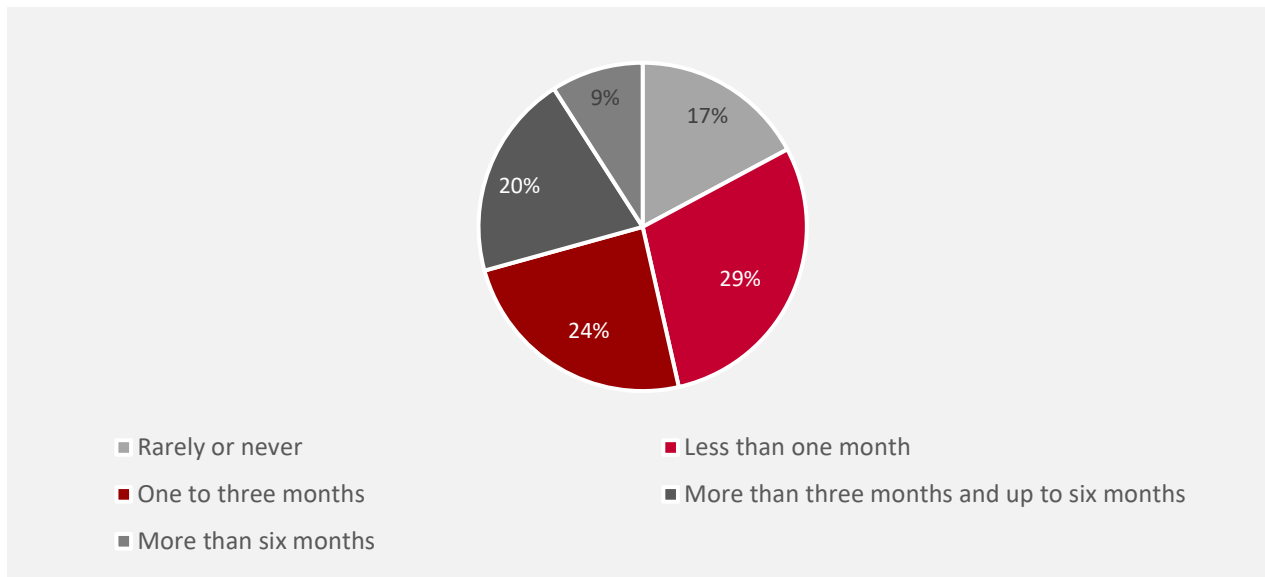
This section of the report highlights characteristics of oil and gas jobs in Colorado. The research team surveyed nearly 100 oil and gas workers in Colorado to develop these findings. The research team also reached out to various oil and gas employers and industry associations to try to get additional input through surveys and interviews, though none of those companies or organizations reflected a willingness to talk with the research team within the time frame available for this study. In the absence of this engagement, the research team sought to speak with organizations familiar with the oil and gas industry, and to obtain feedback anonymously through surveys. This means that the information gathered is by no means exhaustive, though it still provides an initial set of insights and lays the foundation for future engagement. For more information about the survey, please see the appendix section beginning on page 81.

Travel

More than half (54%) of Colorado oil and gas workers surveyed work more than one hour away from home for at least one month out of the year. Nearly one-third (29%) spend at least three months out of the year working more than one hour from home, 9% of whom spend more than six months out of the year working more than an hour away from home (Figure 15). Notably, 71% of respondents who worked non-office jobs within the industry reported working away from home more than one month out of the year compared to only 32% of those in office jobs.

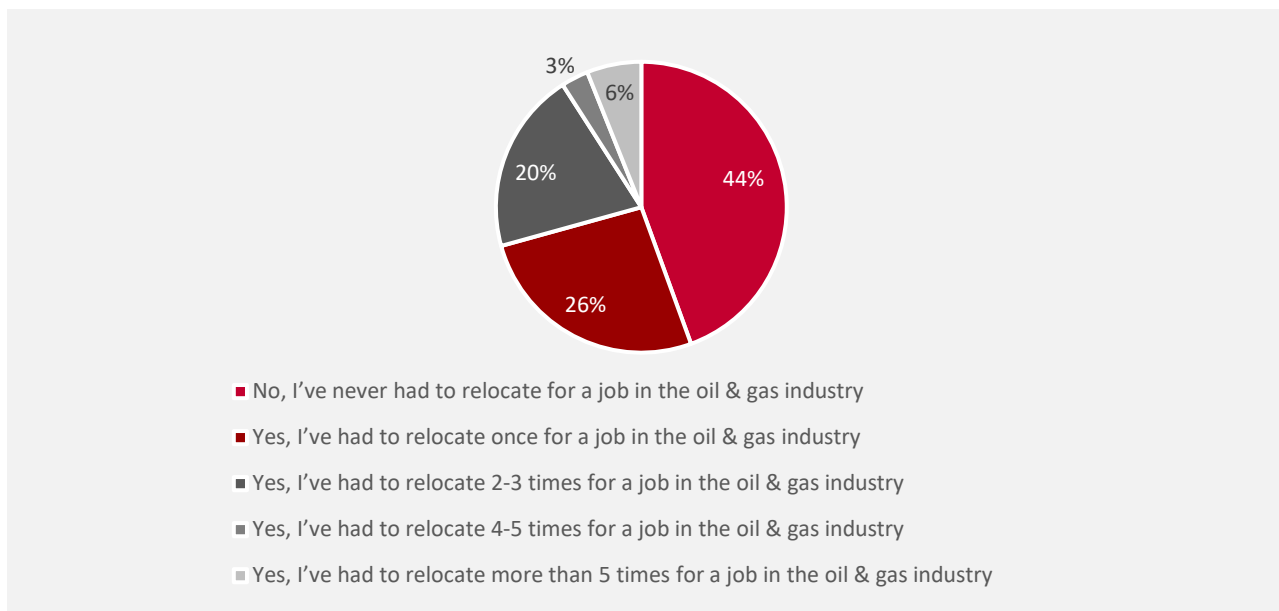
²⁵ JobsEQ 2024 Q1. Data Extracted from the United States Census Bureau, 2018-2022 American Community Survey 5-Year Estimates (2024).

Figure 16. How often do you work more than one hour away from home for your job?



In addition to working far from home, Colorado oil and gas workers often have to relocate for work. Over the course of their oil and gas careers, 56% of survey respondents had to relocate at least once for their oil and gas job. Nearly one-in-ten (9%) have relocated at least four times for their oil and gas career (Figure 16). It is also worth noting that 69% of non-office workers had relocated at least once for work, compared to only 39% of those with office jobs.

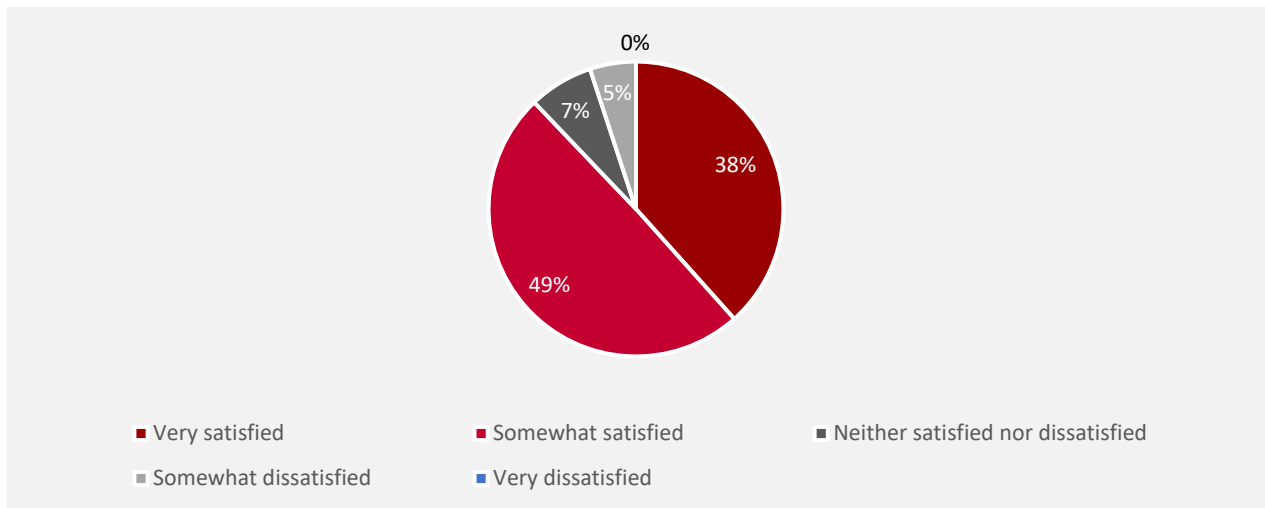
Figure 17. Have you ever had to relocate for a job in the oil and gas industry?



Career Satisfaction

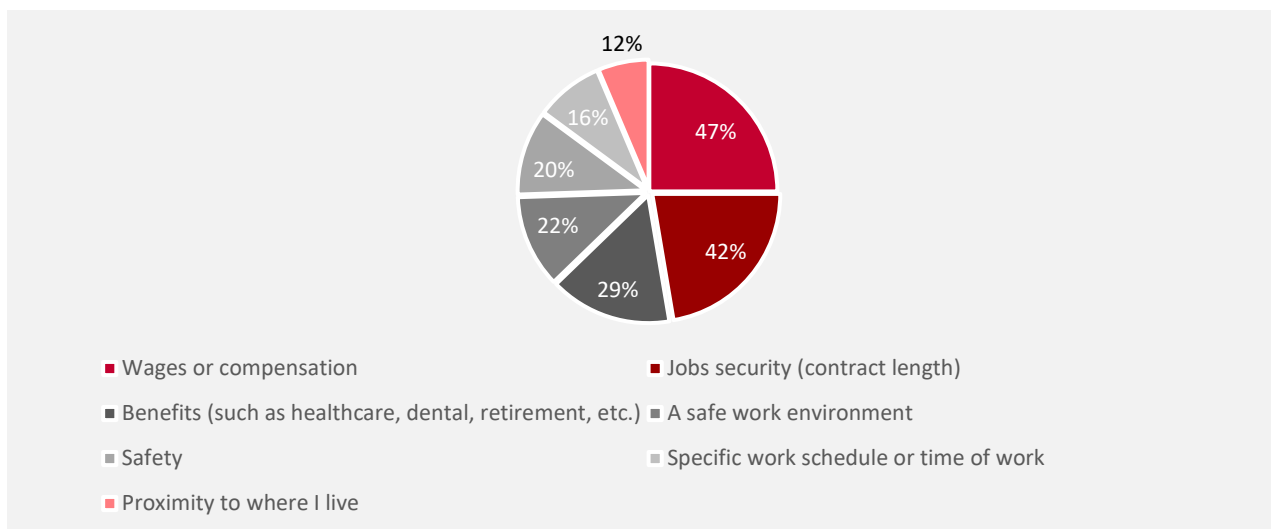
Oil and gas workers tend to be quite happy with their jobs. Nearly nine-in-ten (88%) reported that they were at least somewhat satisfied with their job, including 38% that reported being “very satisfied” with their job (Figure 17).

Figure 18. Career satisfaction for current oil and gas workers



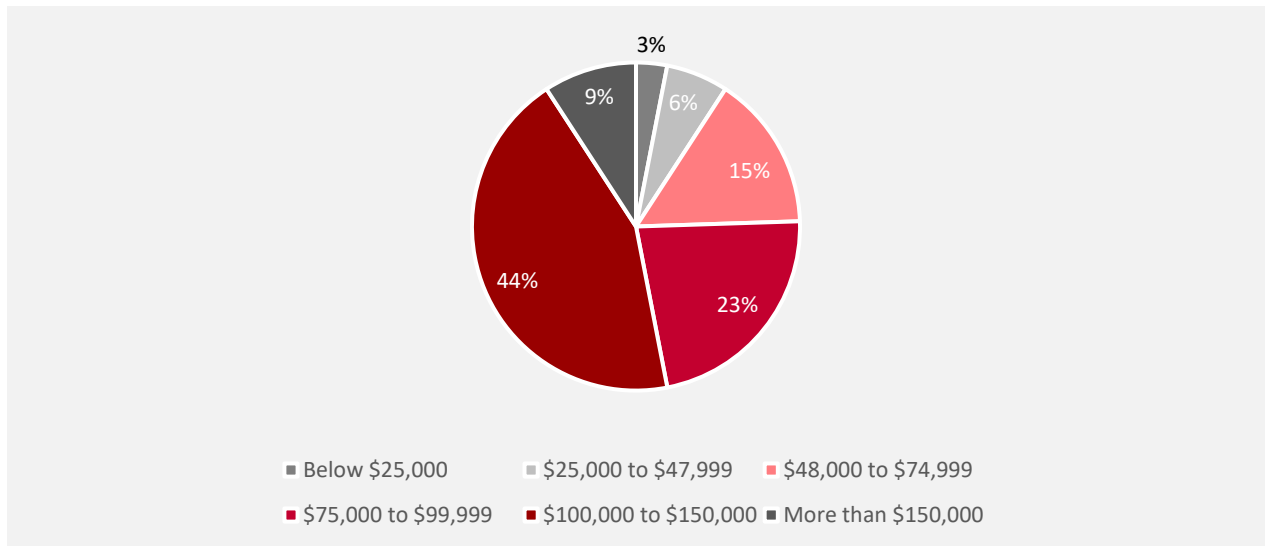
Surveyed oil and gas workers most frequently (47%) reported wages or compensation as the most important characteristic of their job. Job security, or the length of their contract, was the second-most cited important characteristic of their job (42%).

Figure 19. Which two characteristics are most important to you when it comes to your job?



Surveyed Colorado oil and gas workers tended to have slightly higher household incomes than the statewide median. The statewide median household income in Colorado in 2023 was \$96,640²⁶ while 53% of survey respondents reported household incomes of \$100,000 or higher (Figure 19).

Figure 20. Household income of surveyed oil and gas workers

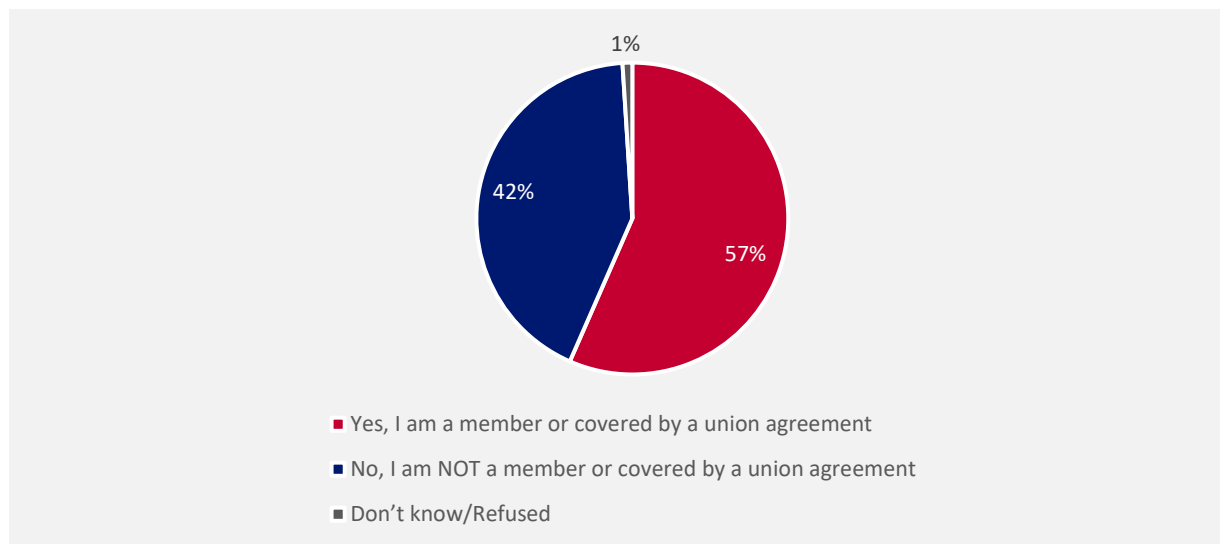


Surveyed oil and gas workers are members or covered under union agreements at a high rate. More than half (57%) reported being members or covered under a union agreement (Figure 20). This rate is substantially higher than Colorado’s economywide union coverage rate of 8.6%.²⁷

²⁶ “Median Household Income in Colorado,” Federal Reserve Economic Data, Federal Reserve Bank of St. Louis, <https://fred.stlouisfed.org/series/MEHOINUSCOA646N>.

²⁷ “Union Membership, Coverage, Density, and Employment by State and Sector,” Union Stats, <https://www.unionstats.com/>.

Figure 21. Union membership or coverage among surveyed Colorado oil and gas workers





OPPORTUNITIES IN EXISTING AND EMERGING INDUSTRIES

Key Industries of Opportunity

There are ten different industries and technologies that have high growth potential in the near and long-term future, and also require knowledge and skillsets that are similar to many current oil and gas workers. In fact, interviews and other research suggest these many of these industries are already common career transition opportunities for oil and gas workers.²⁸ For example, Oxy has several efforts involving carbon mitigation technologies, including a Direct Air Capture carbon removal project²⁹ and Chevron is investing \$10 billion in CCUS, hydrogen, geothermal, and other lower carbon technologies between 2021 and 2028.³⁰

It should be noted that none of these industries offer a one-for-one transition opportunity for oil and gas workers. Energy efficiency in buildings, electric power transmission and distribution, and electric power generation all offer jobs at scale, though the wages and skillsets tend to be less aligned with some of the occupations with more specific oil and gas knowledge and skills. Other technologies—including CCUS, biofuels, hydrogen, and geothermal—offer more direct skills and occupation transferability, but these industries will achieve only a fraction of the scale of the oil and gas industry in the near term. Well plugging and remediation activities are also stronger transition opportunities in terms of knowledge and skillsets, though the scale of these activities is also likely to be lower. None of these technologies will offer the entirety of transition opportunities that would be needed in a large-scale transition of oil and gas workers, but together these technologies can present a more attainable transition for a broader range of workers.

These industries of opportunity fall into two distinct categories. The first category is general infrastructure projects, which include things like heavy civil construction of bridges, roads, and other large-scale infrastructure, as well as water treatment and infrastructure. The second category of industries is energy-related and contains eight different technologies that are related to current or developing energy or energy-adjacent technologies. The eight technologies and industries are:

²⁸ Ian Baran and Virginia Parks, “Fossil Fuel Layoff: The economic and employment effects of a refinery closure on workers in the Bay Area,” *UC Berkeley Labor Center*, April 2023, <https://laborcenter.berkeley.edu/fossil-fuel-layoff/>.

²⁹ “Projects and Ventures,” Oxy, <https://www.oxy.com/operations/carbon-innovation/project-ventures/>.

³⁰ “Chevron New Energies,” Chevron, <https://www.chevron.com/what-we-do/energy/new-energies>.

- Biofuels
- Energy Efficiency in Buildings
- Electric Power Transmission and Distribution
- Carbon Capture, Utilization, and Storage (CCUS)
- Hydrogen
- Electric Power Generation
- Geothermal
- Well Plugging and Remediation

Transportation and Internet Infrastructure

The Bipartisan Infrastructure Law unleashed a substantial amount of federal funding towards infrastructure projects, ranging from the construction and maintenance of bridges and roads to the expansion of high-speed internet throughout the country. Colorado is eligible for more than \$826 million in federal grants for internet access alone under a federal program known as Broadband Equity, Access, and Deployment (BEAD).³¹

Water Infrastructure

This sector includes activities around installing and maintaining water infrastructure in Colorado, including activities such as construction of new water treatment facilities, pipeline infrastructure to support the transportation of potable and waste water, and the operations of these facilities.

Biofuels

The biofuels sector includes activities such as the production, transportation, or sale of fuels made from biologic feedstocks, including fuels such as renewable diesel and ethanol. The state of Colorado had 365 workers involved in biofuels in 2023.³² Many biofuels workers are already involved in the oil and gas industry, as biofuels are often blended with fossil fuels and utilize much of the same infrastructure, meaning that transitions for these workers would be relatively easy.

Energy Efficiency in Buildings

Energy efficiency within the building sector includes activities such as adding insulation to buildings, installing more efficient heating and cooling systems in buildings, and electrifying homes. In 2023 there were 35,847 workers involved in energy efficiency in the state.³³

³¹ “Biden-Harris Administration Approves Colorado and New Hampshire’s “Internet for All” Initial Proposals,” *National Telecommunications and Information Administration*, June 2024, <https://www.ntia.gov/press-release/2024/biden-harris-administration-approves-colorado-and-new-hampshire-s-internet-all-initial-proposals>.

³² “Clean Jobs Colorado,” *E2*, October 2023, <https://e2.org/wp-content/uploads/2023/10/E2-Clean-Jobs-Colorado-2023.pdf>.

³³ *Ibid.*

Electric Power Transmission and Distribution

Electric power transmission and distribution includes activities like construction of new transmission lines, maintenance of the existing electric power grid, and utility-scale electricity storage projects. In 2023, there were 3,240 workers in the state involved in these activities.³⁴

Carbon Capture, Utilization, and Storage (CCUS)

Carbon capture, utilization, and storage (CCUS) includes a range of technologies including biotechnology with carbon capture and storage (BECCS), point-source carbon capture (including the use of ‘scrubbers’ on existing power plants), and direct air capture where carbon dioxide is captured from ambient air. While there are no exact estimates for the number of workers currently working on this nascent technology, there are already several projects underway³⁵ in the state and the state has great potential resources for carbon storage.³⁶ Research by the Rhodium group found that there are 25 facilities within Colorado which could support point-source carbon capture technology, which would create between 1,500 and 2,200 jobs annually during construction and 900 to 1,300 jobs through ongoing operations.^{37 38}

Hydrogen

Hydrogen is identified as a potentially vital alternative fuel to help decarbonize a range of harder-to-decarbonize industries, ranging from long term energy storage, heavy duty transportation, and industrial processes. Colorado recently worked with the neighboring states of New Mexico, Utah, and Wyoming to develop the Western Inter-States Hydrogen Hub (WISHH) proposal for the Department of Energy’s regional hydrogen hubs program.³⁹ Although the proposal was not selected, the extensive planning and collaboration among relevant stakeholders may pave the way for future opportunities in hydrogen within the state. Existing oil and gas workers already have much of the general knowledge and abilities needed for hydrogen production and transportation, though increased safety training will be necessary to understand hydrogen’s unique properties.⁴⁰

Electric Power Generation

Colorado will require a greater amount of energy to power its future, and electricity is an increasingly large share of that energy. A report commissioned by the Colorado Energy Office estimates that total

³⁴ Ibid.

³⁵ “Cleaner ethanol, Greener economy,” *Carbon America*, <https://www.carbonamerica.com/yuma>.

³⁶ “Colorado: Implementing Carbon Capture and Storage Technology,” *Great Plains Institute*, August 2020, https://carboncaptureready.betterenergy.org/wp-content/uploads/2020/09/CO_8_26_2020.pdf.

³⁷ “Carbon Capture and Storage Workforce Development: State-by-State,” Rhodium Group, December 2023, <https://rhg.com/research/carbon-capture-and-storage-workforce-development-state-by-state/>.

³⁸ The research developed later in this report conducts a different analysis by modeling state and federal funding eligible for CCUS activity rather than a facility-level feasibility approach as utilized by Rhodium Group.

³⁹ “Western Inter-States Hydrogen Hub,” Colorado Energy Office, <https://energyoffice.colorado.gov/climate-energy/western-inter-states-hydrogen-hub>.

⁴⁰ Pat Hufnagel-Smith, “Assessing the Workforce Required to Advance Canada’s Hydrogen Economy,” *Transition Accelerator Reports* 4, no. 4 (2022), <https://transitionaccelerator.ca/reports/assessing-the-workforce-required-to-advance-canadas-hydrogen-economy/>.

annual electricity demand will go from about 60 terawatt hours (TWh) to nearly 100 TWh by 2050, roughly a 66% increase. This will require a substantial buildout of electric power generation resources, including wind and solar.

Geothermal

Geothermal has the potential to generate a substantial amount of consistent baseload electricity within Colorado, and there is a range of potential geothermal resources located predominantly in the western half of the state.⁴¹ Many of the occupations that are instrumental in geothermal are also key occupations within the oil and gas sector.⁴²

Well Plugging and Remediation

Colorado has received \$50 million in funds from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) for well site plugging, remediation, and restoration.⁴³ While some of remediation activities involve environmental remediation specialists, the actions of plugging the wells themselves often requires knowledge of wells and use of relevant tools that oil and gas workers likely already have. There are more than 35,000 abandoned oil wells in the State of Colorado, and they are located throughout the eastern and western portions of the state.⁴⁴

Perceptions of Alternative Opportunities

The research team surveyed workers involved in the oil and gas industry as well as managers and decision makers within the industry to gauge their awareness and interest in emerging technologies. As with any survey, there are some considerations with these findings. First, there may be a response bias as the kind of employee that responded to this survey may already be more open-minded about new business opportunities. Another consideration is that managers and decision makers surveyed were not speaking on behalf of their companies in an official capacity. While there are inherent challenges to collecting such sensitive information, this data can provide an early foundation of understanding that can be built upon through further research. For more information about how this data was collected, please see the methodology section on page 84.

Most of the alternative technologies and opportunities discussed above face little direct opposition among workers. Fewer than 10% of respondents said they would not consider working with the technologies listed, while between 65% and 77% reported they would at least consider working with the

⁴¹ “Geothermal Resources Data, Tools, and Maps,” National Renewable Energy Laboratory, February 2018, <https://www.nrel.gov/gis/geothermal.html>.

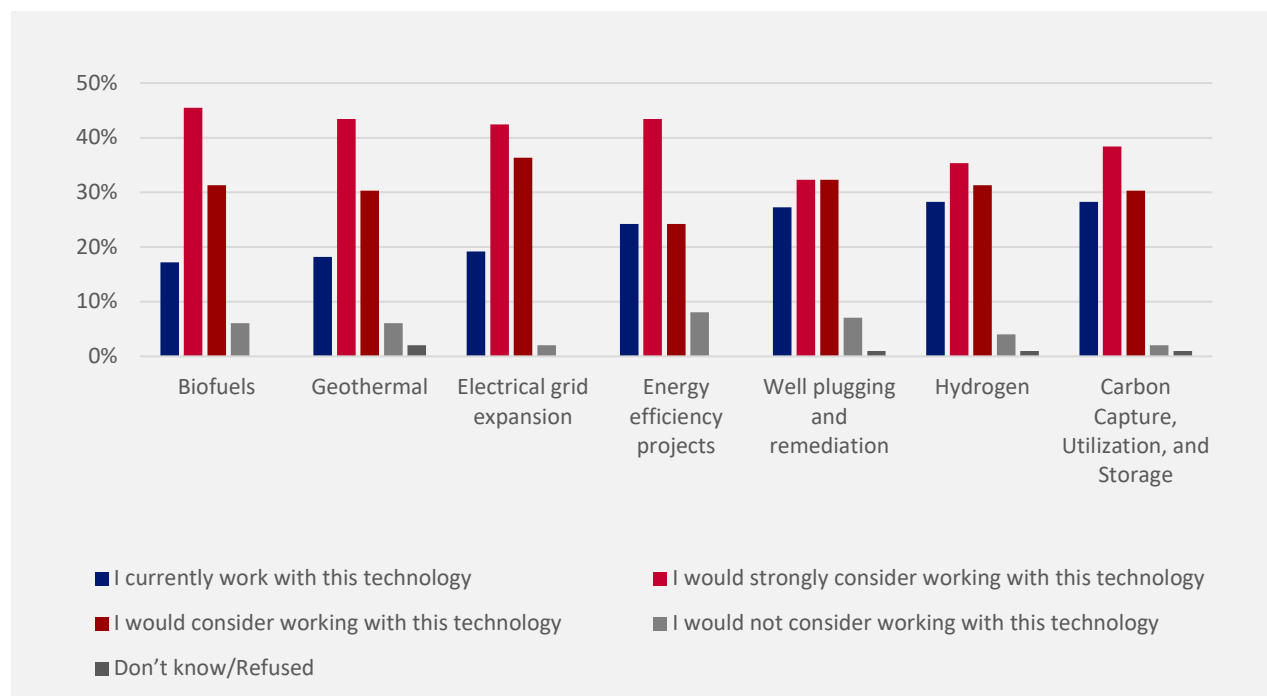
⁴² Drew Liming, “Careers in Geothermal Energy,” *United States Bureau of Labor Statistics*, n.d., https://www.bls.gov/green/geothermal_energy/geothermal_energy.htm.

⁴³ “Orphaned Well Site Plugging, Remediation, and Restoration: \$50,000,000,” Colorado Forward, n.d., <https://coforward.colorado.gov/orphaned-well-site-plugging-remediation-and-restoration>.

⁴⁴ “Colorado Oil and Gas Wells,” Denver Post Data, n.d., https://denverpostd_ata.carto.com/viz/3ec962a6-2c6b-11e7-b3d3-0ee66e2c9693/embed_map.

technologies. Between 17% and 28% reported already working with these technologies in some form (Figure 21).⁴⁵ These findings showcase that the technologies themselves have little direct opposition.

Figure 22. [Current oil and gas workers] Would you consider working with these technologies?

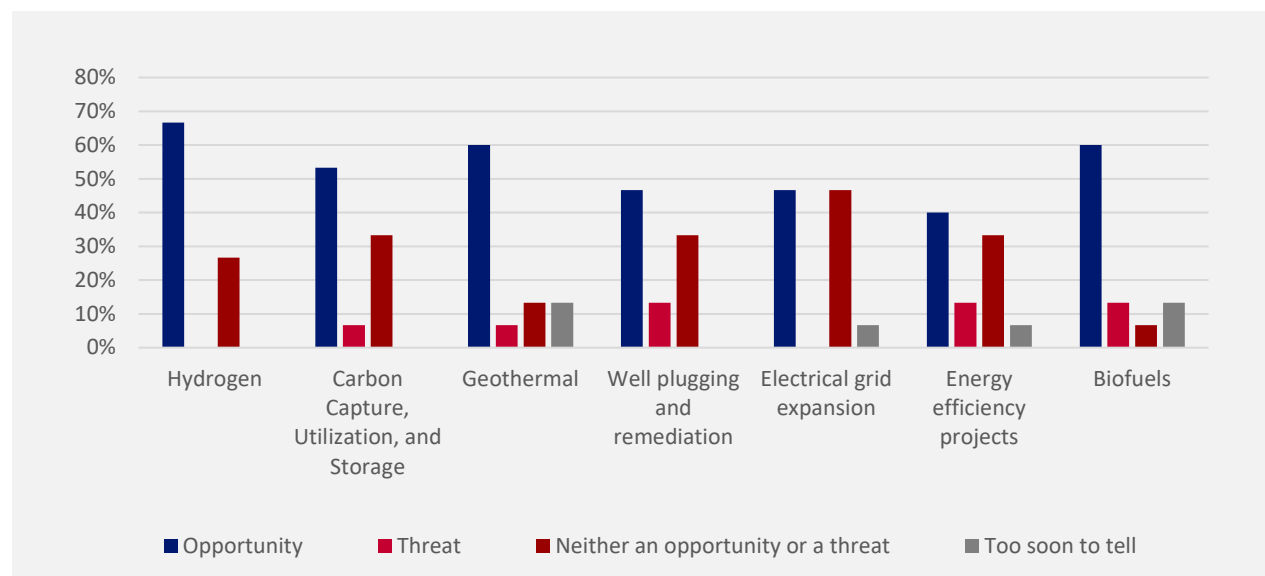


Similarly, surveyed oil and gas employers stated that these technologies were an “opportunity” for their business between 40% and 67% of the time, and fewer than one-in-six reported any of the technologies as a threat (Figure 22). Among those who said they did not plan on working with a technology, the most commonly cited reasons were

- Current business is steady or growing sufficiently for the firm
- A lack of capital or funds to invest in product lines involving these technologies
- These technologies are not as profitable as oil and gas or do not present enough of a financial return

⁴⁵ The survey question did not ask current workers to what extent they had worked with these technologies. This means that a worker at a natural gas well that uses technology to trap or capture escaping methane or carbon dioxide may state that they have worked with carbon capture technologies.

Figure 23. [Current oil and gas employers] Is the following technology an opportunity or threat to your business?

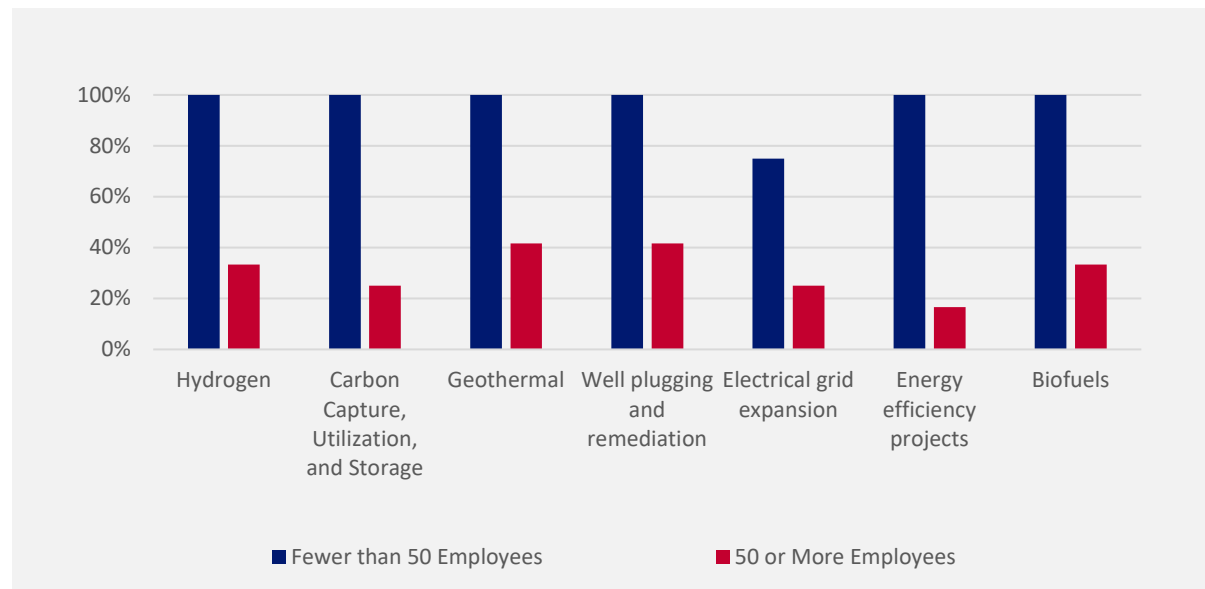


While the alternative technologies themselves do not face direct opposition from stakeholders in the oil and gas industry, the picture painted through conversations with stakeholders provided more nuance. These new and expanding technologies are seen as a positive force within an “all of the above” energy strategy. Many of these new technologies—namely hydrogen, geothermal, and carbon capture—were identified as either too costly, still under technological development, or lacking regulation and oversight to serve as substitutes for natural gas at this time.

Differences in Employer Perspectives by Company Size

There is also a significant difference in interest in these emerging technologies depending upon the size of employers. **Oil and gas employers with fewer than 50 employees were between three and six times more likely to say they were not pursuing opportunities in emerging technologies than larger employers with 50 or more employees (Figure 24).** For example, smaller employers were four and three times more likely to not have plans to pursue CCUS and Hydrogen projects, respectively. This phenomenon may be due to several factors including capital or resource constraints of smaller companies, greater degrees of specialization, or general lack of interest.

Figure 24. Share of Employers That Do Not Have Plans to Work with Emerging Technologies by Employer Size



Quantifying Opportunity in These Industries

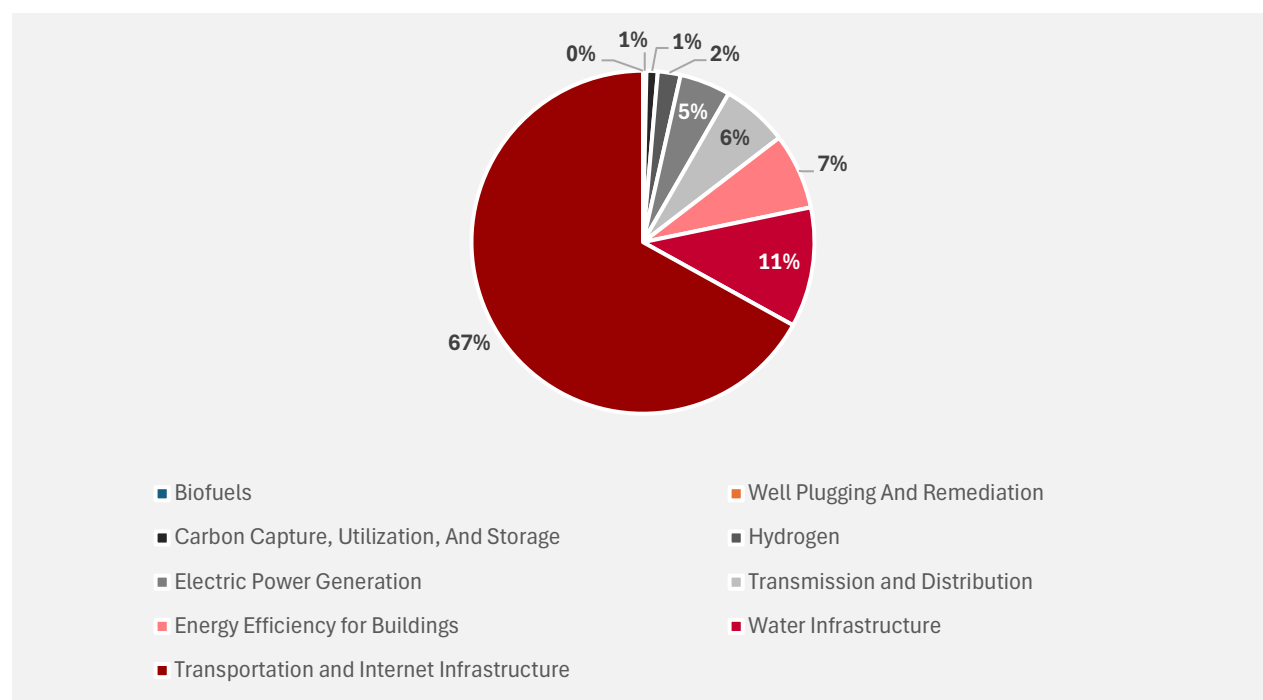
In an effort to quantify the potential opportunity that these alternative industries and emerging technologies present, the research team first developed a comprehensive database of federal and state funds that drive demand for these opportunities or directly support workforce development for relevant occupations. Much of the funding identified was from the Bipartisan Infrastructure Law and the Inflation Reduction Act. Since this legislation has passed, much of this funding has already been allocated, but some funding opportunities are still accessible to grantees. Given the dynamic nature of this funding, and the potential for some of the funding to diminish under a new federal executive administration and legislative body beginning in 2025, it is best to view this funding as an example of the scale and types of investments that could offset a decline in Colorado's oil and gas industry.

This funding was classified by relevant technology, and then custom input-output economic impact models were developed for each industry, which provided a high-level quantification of employment outputs for each industry. The research team then developed custom staffing patterns for each industry based on primary and secondary research and applied the high-level employment outputs from the economic impact model to the respective custom staffing pattern, resulting in granular occupation-level estimates for occupations. For more information about this methodology, please see the appendix section beginning on page 76Error! Bookmark not defined..

Our tracking of federal and state funding for activities relevant to the identified alternative industries and emerging technologies identified more than \$14.7 billion in relevant funding available to Colorado. If all of this money were to be spent on corresponding activities, it would create an estimated 110,600

job years, or about 11,060 jobs sustained over ten years.⁴⁶ Two-thirds (74,050) of those job years would be created through Transportation and Internet Infrastructure activities, and another 12,500 job years would be created through water utility and infrastructure projects. The remainder—all energy-related activities—would create an estimated 24,000 job years, or 2,400 workers sustained for ten years (Figure 23). It should be noted that this funding identified does not include demand-pushing incentives such as tax credits, nor does it include the potential private funding that these public investments are intended to spur.

Figure 25. Share of job years created by adjacent industry or emerging technology



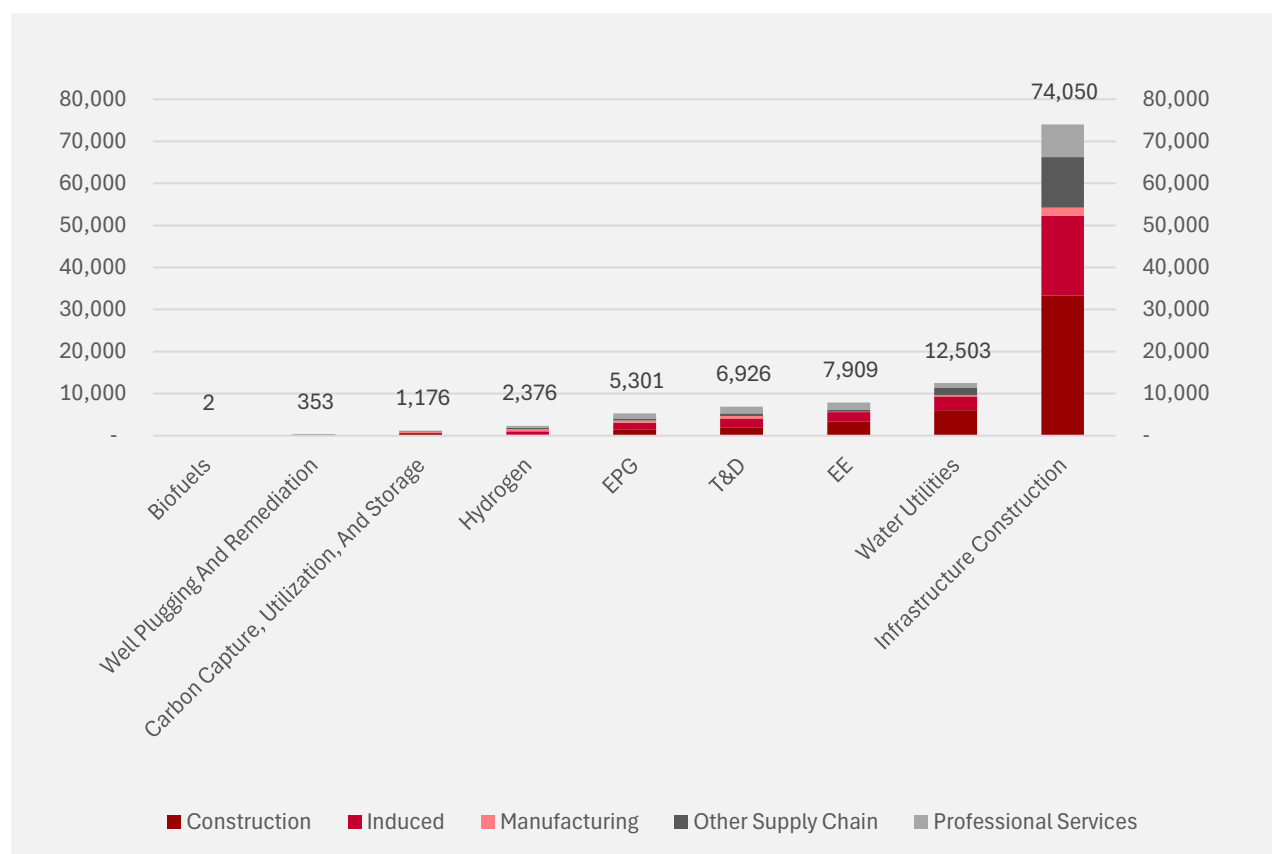
A plurality (42%) of the job years created are in Construction. More than one quarter (27%) of the job years created are through induced⁴⁷ effects, which is when new workers created directly from the additional money being spent now have additional income and spend that income within their communities, creating jobs in other industries like entertainment, healthcare, and restaurants. Nearly 30,000 job years are created within supply chain industries, such as retailers and wholesalers, and professional and business services (Figure 24). The range of occupations created means that just as the

⁴⁶ Job years are used in economic impact models to reflect uncertain timing of employment. If everything occurs in one year, then 3,100 workers are employed for one year. If that activity happens steadily over a five-year period, then an average of 620 workers are employed for five years due to that same activity.

⁴⁷ Induced effects are those generated by the additional spending power of workers who are employed through direct and indirect effects. With this newfound income, workers spend their money in the local economy on restaurants, entertainment, healthcare, education, and other services within the local economy, creating additional demand for workers in those industries.

oil and gas industry stimulates economic activity outside the industry, so too will the additional economic activity within alternative industries and emerging technologies. The high number of construction jobs is also important because—while construction roles are not directly related to the knowledge and skills of the most specialized oil and gas workers—these types of jobs have historically served as alternative opportunities for many oil and gas workers during past downturns in the oil and gas market.

Figure 26. Additional employment through federal and state grant opportunities in alternative industries and emerging technologies



Modeling Considerations

There are a few considerations that are worth calling explicit attention to when discussing the modeled employment impacts highlighted in this report.

Timing of Impacts

Timing of impacts is the single most important aspect of any discussion of worker transition. If there are abundant opportunities, but they only appear one or more years after severe downturns have hit

the incumbent industry, then the worst effects of a transition will not have been avoided. Conversely, if the peak impact of new economic activity occurs while the incumbent industry is still in full force, it is possible to end up with a shortage of workers in the short term during the height of demand through both industries and then a glut of workers once the peak demand for both incumbent and upcoming industries have occurred. The ‘goldilocks’ scenario for employment is that a transition is gradual and additive so that there are net-additional employment opportunities in the beginning so that the incumbent industry can taper with the support of other industries until the incumbent industry reaches a new equilibrium.

Fortunately, the current state of policy and technologies seem to point Colorado towards this third ‘goldilocks’ scenario. Emerging technologies such as hydrogen can go through the prototyping and scaling stage while the incumbent industries continue to provide reliable energy. Simultaneously, CCUS and well plugging and remediation can offer fully additive employment that mitigates the environmental harms of the incumbent industries, allowing workers to leverage their existing skillsets while also gaining relevant skills in new technologies. Policies that promote this third ‘goldilocks’ transition scenario are likely to leave workers in all industries better off by mitigating sudden volatility in the energy and labor markets.

Modeling Inputs and Impacts

The research team utilized the total amount of federal and state funding earmarked for activities relevant to alternative industries and emerging technologies to simulate additional demand for these activities. On one hand, this methodology likely overestimates the impact of state and federal funds, as Colorado may be unable to secure all 100% of the funds available. Alternatively, the estimates produced are almost certainly underestimates of the true scale of investment, as public dollars are often used as a catalyst to spur or de-risk private investment, and this subsequent additional private investment remains unquantified in our model. Despite these stipulations, the modeled scenario still provides a useful sense of the scale of the opportunity that is available to Coloradans if this public funding can be secured.

Role of Emerging Technologies

It is worth noting that about four percent of the total job years created are within emerging technologies that present the strongest direct transition opportunities for oil and gas workers that are heavily specialized within the industry and may have the most challenge transitioning outside of oil and gas. CCUS, hydrogen, geothermal, and well plugging and remediation collectively require many of the same knowledge and skills: surveying appropriate geologic locations, safely constructing and managing construction of large industrial facilities, operating drilling machines safely, and transporting combustible substances under pressure safely. The next section of this report dives deeper into oil and gas workers’ specific skills and abilities—and their transferability—to the occupations created within alternative industries and emerging technologies.



TRANSFERABILITY OF OIL AND GAS WORKERS TO ALTERNATIVE INDUSTRIES AND EMERGING TECHNOLOGIES

There are a range of factors to consider whether—and how—workers can transition from one role to another. These factors include:

- The number of workers interested in transitioning from one occupation to another
- Relative level of difficulty of transition, which is driven heavily by a worker's specialization in industry and technology
- The differences in wages from one occupation to another
- Alignment of knowledge, skills and ability
- Geography of employment transition opportunities

This section of the report addresses each of these factors. Identifying the total number of workers that could be interested in transitioning is the logical starting point. To determine this figure, the research team developed a waterfall diagram that plots the total number of oil and gas workers and relevant sub-categories until reaching a final population of workers for whom a transition may be most challenging. Below is an outline of this waterfall diagram.

One important consideration is that this waterfall diagram incorporates the offsetting economic activity that would occur through the identified federal and state funding opportunities. This level of funding cannot be anticipated to be available at a future date—nor deployed to coincide with a decline in oil and gas activity—without extensive planning. This waterfall diagram shows that offsetting economic activity and transition opportunities for oil and gas workers *is* possible, but it will require extensive planning and resources.

Table 6. Oil and gas worker transition waterfall diagram

	ADJUSTMENT METRIC	DESCRIPTION	RESULTING WORKER COUNT
1. Oil and Gas Industry Workers	28,005		28,005
2. Workers who will leave to follow the pipeline work	(18%)	Workers who will just leave out of state (as they follow the pipelines already)	23,005
3. Retirements	(24%)	Workers who are 55+ and may retire within 10 or fewer years	17,484
4. Non-specialists that can easily transition (lawyers, truck drivers, etc.)	(77%)		4,040
5. Specialized workers	(4%)	These are workers who can transition to the same occupations within new emerging techs	3,882
6. Workers who can likely transition to adjacent occupations	(54%)	The remaining 1,788 workers are most likely to struggle finding new equivalent employment	1,788

1. The first step in the waterfall diagram is total oil and gas employment in the state, which was just over 28,000 workers in Q1 of 2024.
2. The second step accounts for the 5,000 workers that are likely to leave the state in order to stay in the same occupation regardless of other local economic opportunities. Highly mobile workers are predominantly in two industries: 1) Drilling Oil and Gas Wells Oil and 2) Gas Pipeline and Related Structures Construction. While there are additional workers outside of these two industries that are likely to similarly migrate where their skills are required, we consider this 5,000 worker-figure to be a conservative lower-estimate. No skills-specific transition strategy is necessary—nor would likely be effective—to capture this migratory workforce because these workers would likely seek out oil and gas opportunities in other states. It is worth noting that the construction of significant pipeline networks to transmit hydrogen or carbon dioxide could help attract/retain these workers in the region.
3. The third step attempts to factor in projected retirements. Using demographics data for the 30 most common occupations in the oil and gas industry, we estimate that roughly 5,500 workers are at least 55 years of age or older, and are likely to retire over the course of time when demand for natural gas could systemically decrease. In the event that older workers are displaced earlier than they planned to retire, policy supports could be considered to assist this population.
4. Of the remaining 17,500 oil and gas workers, an estimated 76% work in occupations that are not oil and gas specific. For example, there are an estimated 576 Accountants and Auditors who

work in the oil and gas sector. While oil and gas specific knowledge may be an important part of their job, the core aspects of their job—interpreting and generating financial statements—are in high demand in other industries throughout the overall Colorado economy. This methodology is deployed in other similar studies^{48 49} of worker transitions and is further supported by our demand modeling for alternative industries and emerging technologies which shows a net surplus of these types of office and support worker roles created.

5. **Step five in the waterfall diagram has 4,000 remaining workers who are not likely to retire in the next ten years, are not a predominantly transitory workforce by nature, and have jobs that are often specialized in oil and gas activities.** Fortunately, many of these very jobs align closely with the types of jobs found in the identified emerging technologies of hydrogen, CCUS, well plugging and remediation, biofuels, and geothermal, and many large oil and gas companies are already beginning to invest in these types of projects.^{50 51} These technologies demand workers who have experience constructing large infrastructure projects, drilling deep into the earth and knowing how to operate wells, and transporting flammable or pressure materials. Safety is paramount for all of these roles. As several interviewees noted, the very workers who support these emerging technologies are almost always workers with previous oil and gas experience.

Our modeling shows that nearly 160 full-time workers can transition into the exact same roles they currently hold within oil and gas and be sustained for five years through the current public funding available to Colorado for these technologies. Although the number of these perfect-match occupations is low, our model is likely an underestimate of the number of these types of jobs that could be created. For example, the Western Interstate Hydrogen Hub proposal estimated that more than 10,000 jobs would be created through this project alone,⁵² and the Rhodium group estimated that the 25 facilities within Colorado which could support point-source carbon capture technology would create between 1,500 and 2,200 jobs annually during construction and 900 to 1,300 jobs through ongoing operations.⁵³ The more hydrogen, CCUS, well plugging and remediation, and geothermal activity developed within the state, the more direct transition opportunities there will be for specialized oil and gas workers.

6. Most of the occupations making up the remaining 3,882 jobs have a surplus—or workers for whom there is not offsetting demand—of 50 workers or fewer after accounting for the projected demand through alternative industries and emerging technologies. **In fact, there are only 18 occupations (comprising 1,788 workers) that have a surplus supply of more than 50**

⁴⁸ “California’s Oil and Gas Workers: An analysis of the fossil fuel workforce, occupational transition opportunities, and State support for potentially impacted workers,” *Gender Equity Policy Institute*, January 2023, <https://www.jstor.org/stable/resrep52024>.

⁴⁹ Robert Pollin et al., “A Program for Economic Recovery and Clean Energy Transition in California,” *University of Massachusetts-Amherst Department of Economics and Political Economy Research Institute*, June 2021, <https://static1.squarespace.com/static/60b43a18079fdd42c6d01286/t/60c18578a87f6318ff2a5a1a/1623295356282/Pollin+et+al--CA+Economic+Recovery--Clean+Energy+Transition---6-8-21.pdf>.

⁵⁰ “Projects and Ventures,” Oxy, n.d., <https://www.oxy.com/operations/carbon-innovation/project-ventures/>.

⁵¹ “Chevron New Energies,” Chevron, n.d., <https://www.chevron.com/what-we-do/energy/new-energies>.

⁵² “Concept Paper- Regional Clean Hydrogen Hubs Funding Opportunity,” *Western Interstate Hub LLC*, November 2022, <https://wyoenergy.org/wp-content/uploads/2022/12/concept-paper.pdf>.

⁵³ “Carbon Capture and Storage Workforce Development: State-by-State,” Rhodium Group, December 2023, <https://rhg.com/research/carbon-capture-and-storage-workforce-development-state-by-state/>.

workers. With such a small difference between projected supply and demand, workers are not likely to need systemic support separate from the existing workforce system. The following section digs deeper into the occupations that are most similar and offer the easiest transition opportunities, the key skills of these occupations, and high growth occupations within alternative industries and emerging technologies that are most similar, and the training and education required to transition those workers.

Transferability of Skills for Workers Likely to Have the Most Difficult Time Transitioning to New Industries

The Research Team identified 18 oil and gas occupations with the greatest number of workers without corresponding direct employment opportunities. These occupations are henceforth labeled as “priority occupations” as they are likely to have the most challenges finding new employment as the energy sector changes. **Priority occupations were identified by comparing the current number of workers in the state to the jobs gained from our modeling efforts in new industry growth. When looking at occupations with the highest deficits, only 18 jobs directly related to oil and gas have a deficit of 50 job years or more.**

Table 7. Priority Occupations

SOC	OCCUPATION TITLE
47-5013	Service Unit Operators, Oil and Gas
47-5071	Roustabouts, Oil and Gas
17-2171	Petroleum Engineers
53-7073	Wellhead Pumpers
47-5011	Derrick Operators, Oil and Gas
19-2042	Geoscientists, Except Hydrologists and Geographers
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers
49-9041	Industrial Machinery Mechanics
47-5012	Rotary Drill Operators, Oil and Gas
51-8092	Gas Plant Operators
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment
19-4043	Geological Technicians, Except Hydrologic Technicians
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other
53-7072	Pump Operators, Except Wellhead Pumpers
51-8013	Power Plant Operators
47-5099	Extraction Workers, All Other
53-7071	Gas Compressor and Gas Pumping Station Operators

Transition Occupations

The U.S. Department of Labor's O*NET database provides a Career Changers Matrix tool,⁵⁴ which provides 10 related occupations, based on skills and experience, that a worker can transition to from a given SOC code. For each of these 18 occupations, the research team identified the 10 related occupations for transition. When analyzing the 180 occupations from the Career Changers Matrix related to these jobs, and eliminating those included in the priority 18 occupations, along with de-duplicating those occupations related to multiple priority occupations, 74 unique occupations remain (Appendix B-1: Potential Transition Occupations for Oil and Gas Workers). Our modeling efforts show 23,737 job years added to the economy within these related occupations.

The wages of potential transition occupations were compared to those of the existing oil and gas worker wage in Colorado. Of the 180 initial transition occupations, 99 transition occupations (55 percent) have an annual wage that is higher than, or no more than 10% lower than, the corresponding oil and gas job.

Most Relevant and Transferrable Skills

The description of occupations, along with five of their common tasks from O*NET was compared from the five current oil and gas occupations with the largest occupation deficits (Appendix B-2: Description and Tasks of Priority Occupations) to the 11 most common transferable occupations of this study (Appendix B-3: Description and Tasks of Most Common Transition Occupations), which all represent a transferable occupation for at least 5 of the priority occupations.

The following are the most common types of tasks that are transferable from oil and gas positions:

- Operation of various types of equipment. This includes large equipment such as driving machines and riggers, along with engine compressors and even hand tools.
- Maintenance, inspection, and repair of equipment. Workers need to understand how their equipment works and make repairs when necessary.
- Understanding of safety and regulations necessary for the occupation.
- The ability to identify faults and errors in equipment, along with the systems being worked on. Can locate when things are not working properly in systems like pipelines or rail tracks.
- Monitoring equipment and systems. Able to operate control systems when needed.
- Analyzing patterns and data to develop a plan.

While systems and equipment may vary between different industries, the skills of oil and gas workers to analyze and fix equipment and systems will make transitioning to another industry easier, given their experience in similar situations.

⁵⁴ O*Net, Career Changers Matrix, https://www.onetcenter.org/dictionary/20.3/excel/career_changers_matrix.html.

Opportunities for “Hardest” Transition Occupations

Of the 18 priority occupations, only six occupations have fewer than five potential transition occupations with wages that are no less than 10% of the current corresponding oil and gas occupation. These six priority occupations with less than five transition occupations without low wages are as follows and are considered harder to transition from the other oil and gas occupations: Petroleum Engineers; Rotary Drill Operators, Oil and Gas; Power Plant Operators; Gas Plant Operators; Petroleum Pump System Operators, Refinery Operator, and Gaugers; and Wellhead Pumpers.

Petroleum Engineers

The annual wage of Petroleum Engineers in Colorado is \$164,000, 124 percent higher than the average wage of all occupations in the state. These workers are highly educated; 92.7 percent of workers have a four-year degree or greater. It is not expected for these workers to struggle finding work given their education and skills, however attaining wages similar to their current occupation outside of oil and gas will be difficult.

There are a range of engineering occupations created through the identified funding, though none of these occupations are an exact match for Petroleum Engineers in terms of wages and skills. Geoscientists and Mining and Geological Engineers are among the most similar occupations, offering annual wages of \$132,600 and \$128,400 per year, respectively, and the most directly-transferable skillset. Other engineering occupations include Industrial Engineers and Electrical Engineers, which earn average wages of \$110,800 and \$120,500 per year, respectively, though the switch to this type of engineering would require more extensive reskilling.

Key skills and activities that are transferable between these three occupations include:

- The use of subsurface, geological and geophysical data
- Conducting field studies and sample collection
- Use of computer software to analyze data
- Addressing operational challenges and optimizing extraction techniques

Rotary Drill Operators, Oil and Gas

While the Career Changer’s Matrix was unable to provide transferable occupations with similar wages given workers current skill sets and education, there are various occupations that Rotary Drill Operators can use their current skills in and transfer to with just basic retraining and earn similar wages.

Wind Turbine Service Technicians have an average annual salary of \$69,000, an 11.5 percent difference from the \$78,000 Rotary Drill Operators receive on average. The profession is expected to increase in workers by 45.45% from 2023 to 2033.⁵⁵ The educational makeup of these occupations is similar, with 13.8 percent of Rotary Drill Operators having a four-year degree or greater, compared to 16.7 percent

⁵⁵ Colorado Department of Labor and Employment, Occupational Employment Projections- Long Term, <https://www.colmigateway.com/vosnet/analyzer/resultsNew.aspx?enc=L3Rx1LKHF+xq6eiD/TQsJZZmZQCIt7fjphgyF0SSW5Q=>.

of Wind Turbine Service Technicians. This position usually only requires some sort of training program, of which many are offered within the state, as well as virtually online.

Key skills and activities that are transferable between these two occupations include:

- Operations and control of machinery.
- Ability to troubleshoot and repair mechanical, hydraulic and electrical equipment.
- Monitoring of equipment for safety and effectiveness.
- Performing routine maintenance.

If transition workers are interested in additional education leading to an associate degree or certification, a role as a Civil Engineering Technician would coincide well with their skills from rotary drilling. This occupation offers an annual wage of \$71,000, less than ten percent away from a Rotary Drill Operators current wage.

Key skills and activities that are transferable between these two occupations include:

- Inspection and evaluation of work sites, include focus on safety.
- Troubleshooting unexpected issues and adjusting.
- Use of specialized tools and equipment.
- Following specifications and procedures.

Power Plant Operators; Gas Plant Operators; Petroleum Pump System Operators, Refinery Operator, and Gaugers

Power Plant Operators, Gas Plant Operators, and Petroleum Pump System Operators all fall within the production value chain, with salaries ranging from \$92,00 to \$98,900 annually in Colorado. The three occupations are similar in the sense that they entail managing, monitoring, and maintaining large-scale energy production processing systems, and therefore the occupations for potential transfer are fairly similar between the occupations.

To maintain a similar salary, these professions can leverage their experience with leadership and management to move into a supervisory position within sectors such as facilities, manufacturing, or construction. This transition will be slightly easier for Power Plant Operators than the other two occupations, as the average worker usually has a higher education, with roughly ten percentage points more workers in this occupation having a four-year degree or greater compared to the other two occupations. Nevertheless, additional education or training will likely be required for most making this transition to management. Key occupations that workers could transition into include Construction Managers, Facilities Managers, and Industrial Production Managers. The average annual salary for these occupations ranges from \$118,100 to \$149,700 in Colorado.

Key skills and activities that are transferable between these three operator positions to the highlighted supervisory occupations include:

- Monitoring and maintenance of equipment, including the ability to troubleshoot malfunctions and keep systems running.
- Knowledge of complex machinery; supervisors and management will likely oversee the use of machinery.
- Experience complying with safety protocols.
- Following process schedules, coordinating flows and communicating with team members.
- Experience compiling data and tracking performance.

In addition, Power Plant Operators specifically have the skills and experience for a relatively simple transition into the nuclear field. Nuclear Power Reactor Operators generally have similar educational attainment as those in Power Plant Operations, although a license is required for Nuclear Power Reactor Operation. Many skills and operations are the same between these two occupations, so Power Plant Operators willing to undergo training and examination will find this position similar in scope to their current work and making more money at an average annual salary of \$132,700.

Key skills and activities that are transferable between these two occupations include:

- Controlling and monitoring equipment for energy generation, including the use of control boards and gauges.
- The ability to make adjustments based on reading gauges and meters to maintain power levels.
- Adherence to safety procedures.
- Strong diagnostic skills.

Wellhead Pumpers

Wellhead Pumpers operate pumps and equipment to produce a flow of oil and gas from fields and can use this technical knowledge to transfer into positions such as Water and Wastewater Treatment Plant and System Operators or Industrial Machinery Mechanics. While Wellhead Pumpers produce a flow of oil or gas, Water and Wastewater Treatment Plant and System Operators operate machines to transfer and treat water.

On the job training is most common for this occupation, and additional training opportunities are present online and throughout the state. While the salary for Water and Wastewater Treatment Plant and System Operators (\$66,700) is lower than that of Wellhead Pumpers (\$76,500), the transfer would likely require little outside training or additional burdens.

Key skills and activities that are transferable between these two occupations include:

- Operation of pumps and control systems
- Monitoring and adjusting system conditions such as flow rates and pressure.
- Maintenance and repair of equipment.
- Recording data such as production metrics or meter readings.

For those Wellhead Pumpers interested in additional education, the Industrial Machinery Mechanics occupation is growing and makes a similar wage of \$73,400 compared to their current position. This occupation usually requires some kind of training certificate or associates degree, however, many of the skills Wellhead Pumpers already have will be useful to this work.

Key skills and activities that are transferable between these two occupations include:

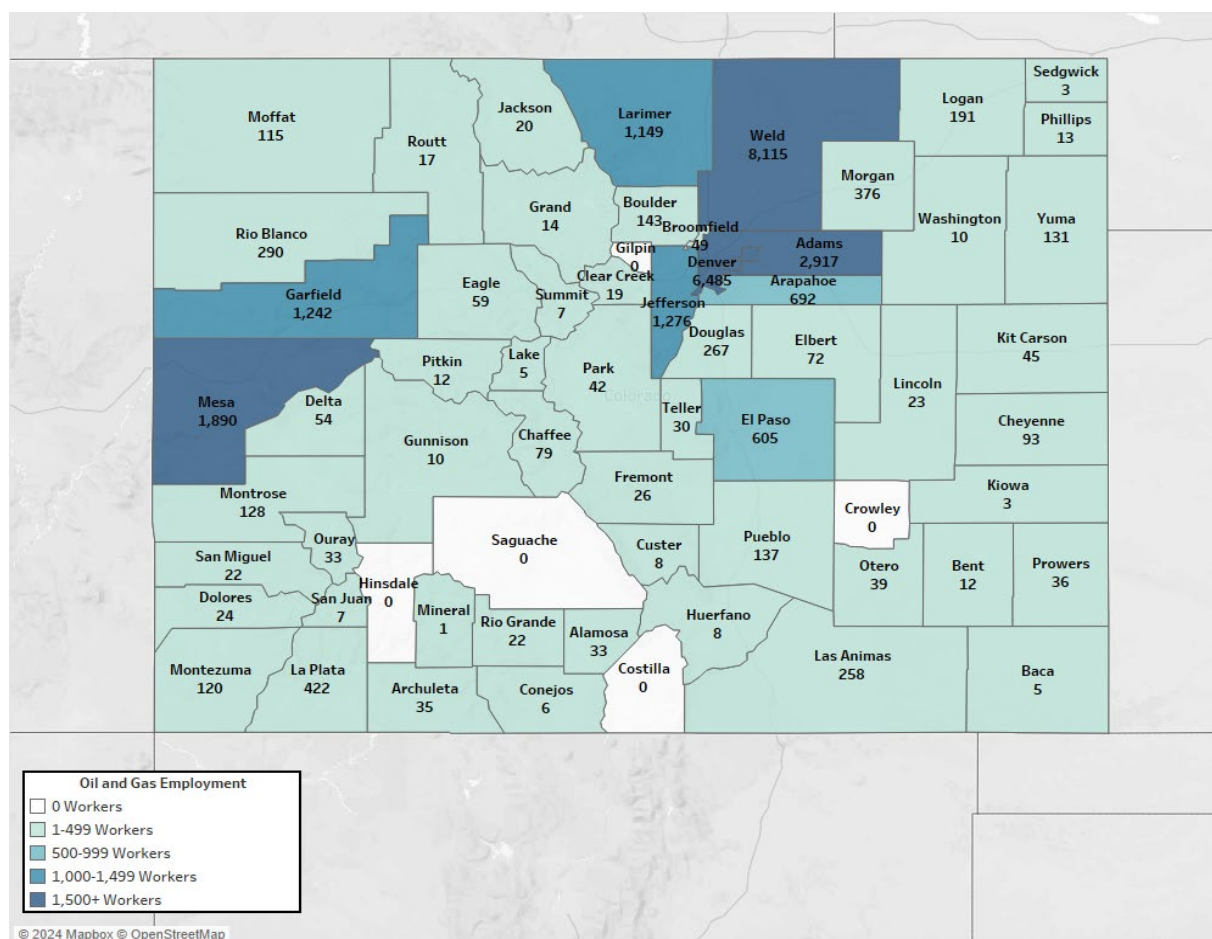
- Operation of industrial equipment.
- Monitoring of equipment performance.
- Repair and adjustments to equipment.
- Knowledge of mechanical systems.
- Hands-on experience disassembling, cleaning and reassembling machinery.

Transferability of Geography

Skills transferability of workers is one important workforce factor, but the geographic location of current jobs and of potential transition employment opportunities is another. To try to address this dilemma, this section of the report examines the correlation between the geographic proximity of the oil and gas workforce and the natural resources that drive much of the location of where emerging technologies such as geothermal, hydrogen, CCUS, and renewable electric power generation can be located.

Most of Colorado’s oil and gas industry is centered around two regions—the central northern portion of the state around Weld, Adams, and Larimer counties, as well as the central eastern portion comprising of Mesa and Garfield counties. These regions will be the primary parts of the state that are emphasized in comparison to the emerging technologies that follow, but it is important to note that oil and gas employment can be found in almost every county in Colorado (Figure 25).

Figure 27. Current Oil and Gas Employment by County in Colorado (2024 Q1)⁵⁶

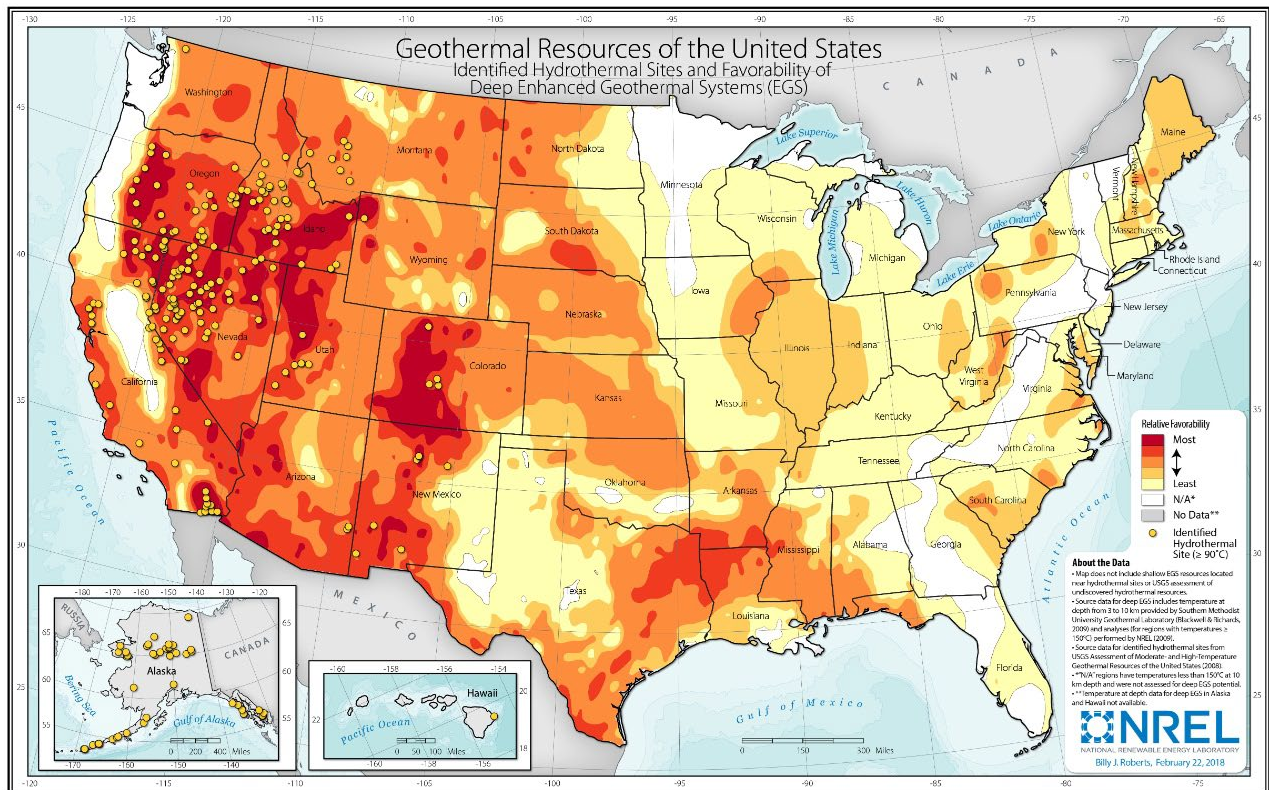


⁵⁶ JobsEQ 2024 Q1. Data Extracted from the United States Bureau of Labor Statistics, Quarterly Census of Employment and Wages (2024).

Geothermal

Most employment in geothermal will be centered around regions that have the greatest geothermal feasibility (one primary factor of which is the depth of the earth's crust at a certain point). Some of the most feasible geothermal resources in the country along the frontline mountain range. Already four different sites identified as strong candidates for renewable electric power generation (Figure 25).

Figure 28. Feasible Geothermal Resources⁵⁷

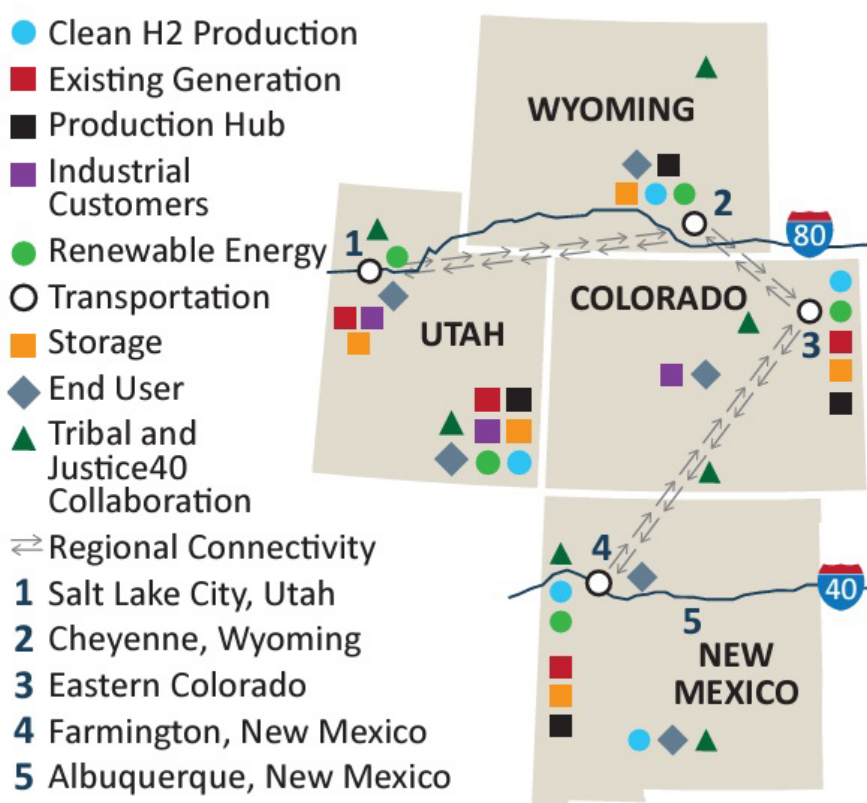


⁵⁷ "Geothermal Resources Data, Tools, and Maps," National Renewable Energy Laboratory, February 2018, <https://www.nrel.gov/gis/geothermal.html>.

Hydrogen

Towards the end of 2022, Colorado, Wyoming, Utah, and New Mexico released their proposal for the Western Interstate Hydrogen Hub project to the Department of Energy. Within this concept paper the proposers had outlined a hydrogen system connecting the four states. The concept paper included clean H₂ production, renewable energy generation facility, a storage facility, and transportation centered in the northeast corner of Colorado and with new purpose-built regional connectivity pipelines extending northwest into Wyoming and Southwest to New Mexico. Customers and end users are primarily centered around Denver. We can use this as a rough estimate for where hydrogen is most feasible according to utilities and developers, and this showcases that a vast majority of the proposed hydrogen activity was located in close proximity to the cluster of current oil and gas employment anchored by Weld County (Figure 27). While the WIH2 project did not receive federal funding, the plans outlined represent some viable future hydrogen projects for the region.

Figure 29. Planned Facilities and Locations for the Western Interstate Hydrogen Hub (WIH2) Proposal for Department of Energy⁵⁸

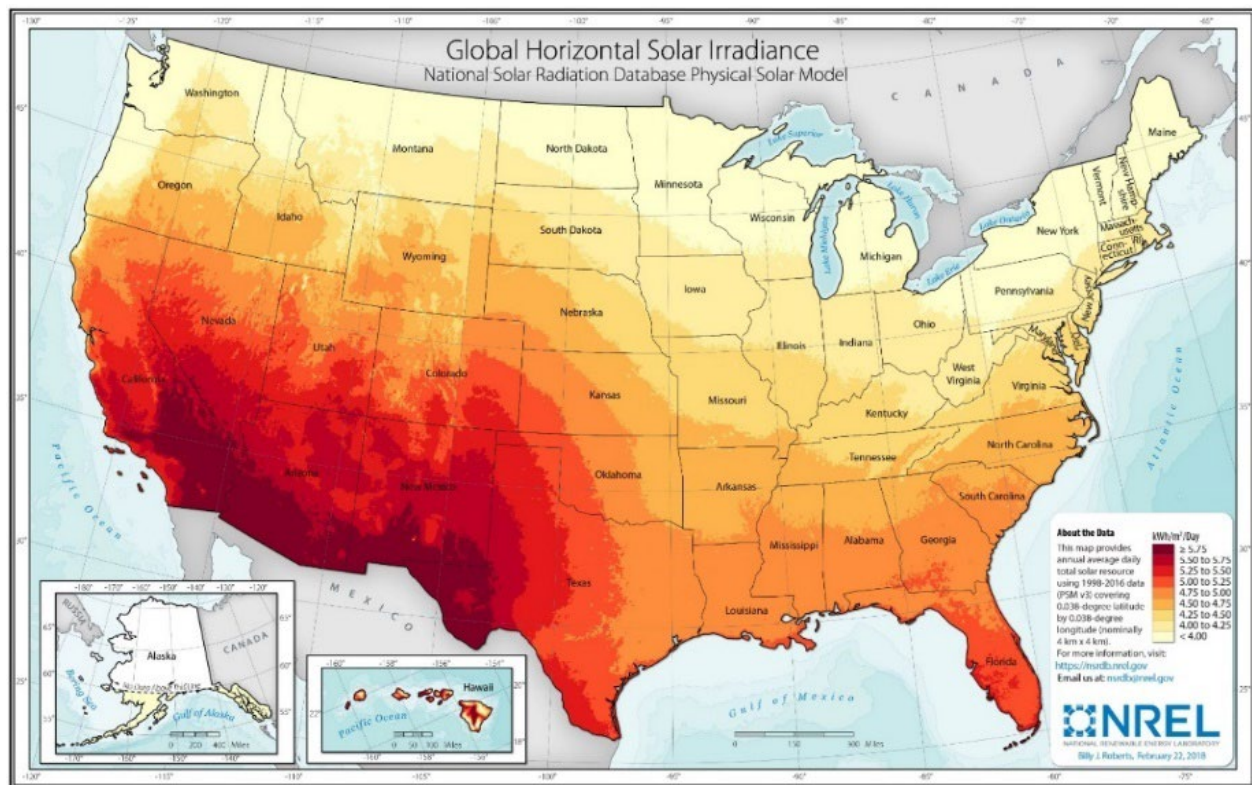


⁵⁸ "Concept Paper- Regional Clean Hydrogen Hubs Funding Opportunity", *Western Interstate Hub LLC*, November 2022, <https://wyoenergy.org/wp-content/uploads/2022/12/concept-paper.pdf>.

Electric Power Generation

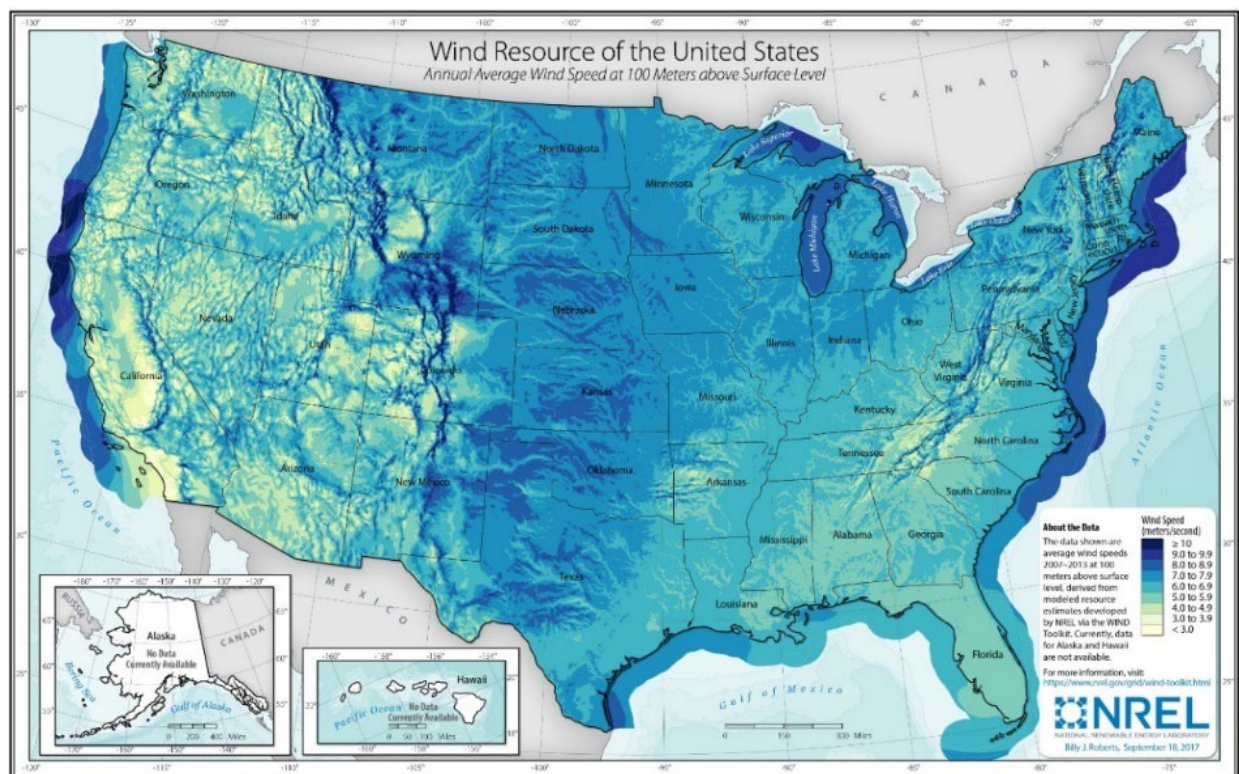
Solar irradiance is concentrated in the southern portion of the state, particularly in the south eastern portion. Wind is most abundant in the front range mountain ridges and the eastern portion of the state. While neither the strongest solar nor wind resources overlap geographically with where current oil and gas activity is concentrated, workers could still travel for the construction of these facilities, especially considering that about half of surveyed oil and gas workers stated they work more than an hour away from home for at least one month out of the year (Figure 15 on page 38).

Figure 30. Solar Resources in the United States⁵⁹



⁵⁹ "Solar Resource Maps and Data," National Renewable Energy Laboratory, February 2018, <https://www.nrel.gov/gis/solar-resource-maps.html>.

Figure 31. Wind Resources in the United States at 100m Above Ground⁶⁰



Carbon Capture, Utilization, and Storage (CCUS)

CCUS presents a substantial opportunity for current oil and gas workers geographically as well as similar skillsets. The Great Plains Institute identified 25 different electrical power generation and industrial facilities that could cost effectively implement carbon capture technologies, and many of these facilities fall within or near the two primary regions of oil and gas employment (Figure 30). The state also has significant potential for geological storage, which is important for storing captured carbon permanently underground. These geologic storage areas correlate very strongly with existing oil and gas activities and would require a very similar workforce (Figure 31).

⁶⁰ “Wind Resource Maps and Data,” National Renewable Energy Laboratory, 2017, <https://www.nrel.gov/gis/wind-resource-maps.html>.

Figure 32. Financially Viable Point Source Carbon Capture Projects on Existing Facilities⁶¹

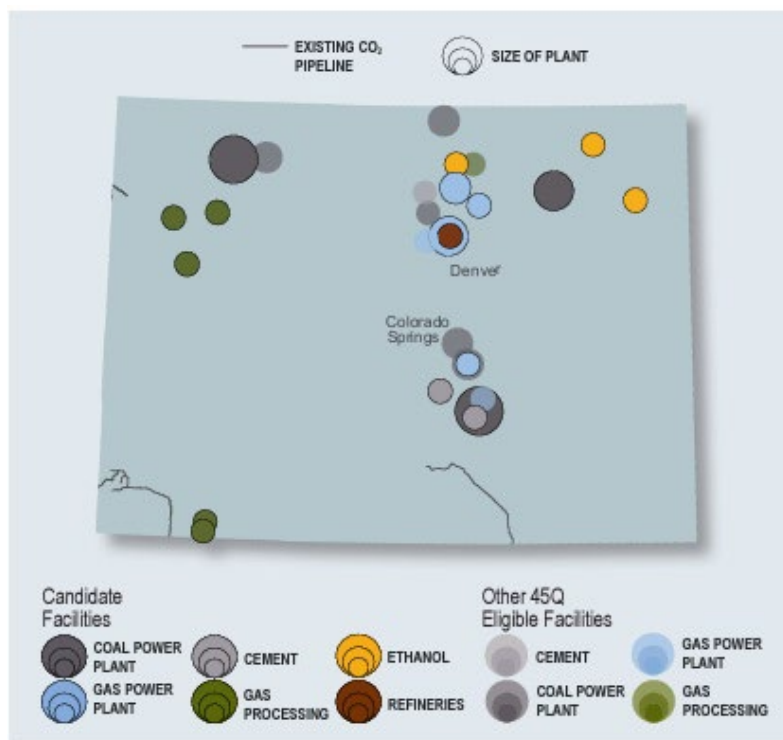
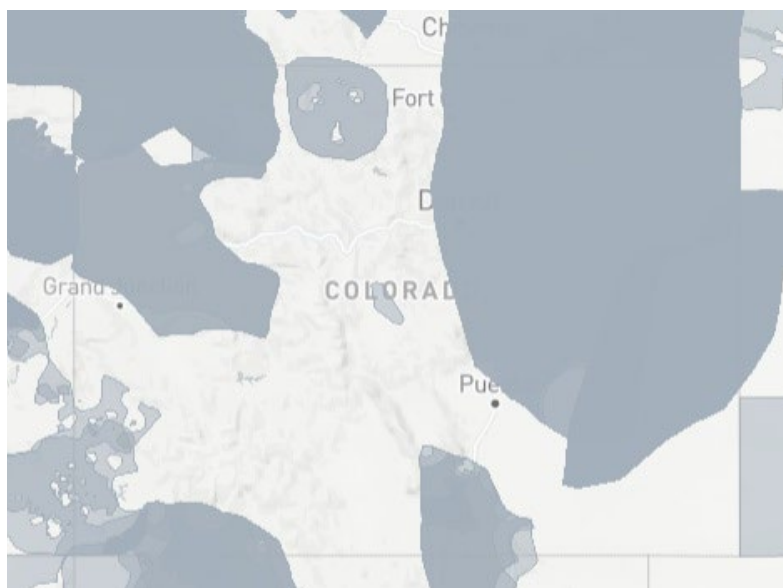


Figure 33. Geological Storage Potential in Colorado (Grey)⁶²



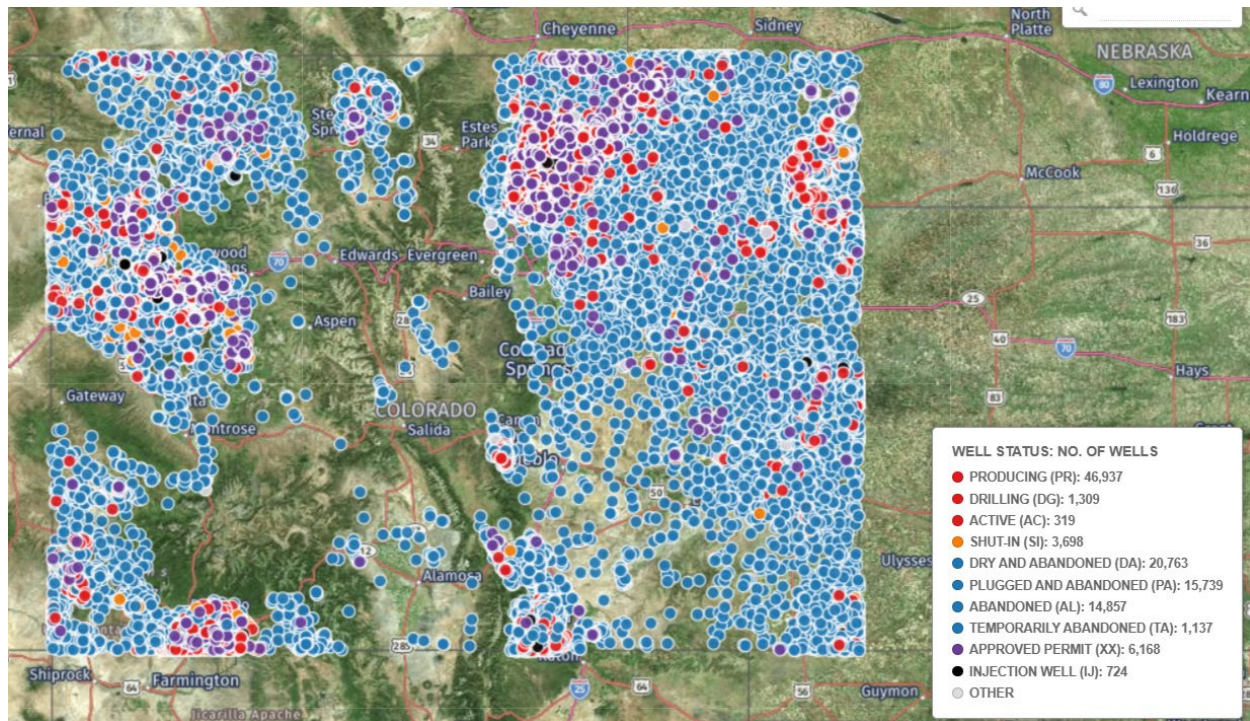
⁶¹ "Colorado: Implementing Carbon Capture and Storage Technology," *Great Plains Institute*, August 2020, https://carboncaptureready.betterenergy.org/wp-content/uploads/2020/09/CO_8_26_2020.pdf.

⁶² "US Carbon Capture Activity and Project Map," Clean Air Task Force, n.d., <https://www.catf.us/ccsmapus/>.

Well Plugging and Remediation

Well plugging and remediation is another activity that offers substantial overlap with existing oil and gas activities in both skills and geographies. By nature of activities, once-active wells need to be plugged, and the surrounding areas need to be remediated. Figure 32 showcases the tens of thousands of wells that are abandoned and require plugging, as well as the tens of thousands of active wells that will someday need to be plugged as well.

Figure 34. Map of Wells in Colorado by Status⁶³



⁶³ "Colorado Oil and Gas Wells," Denver Post Data, n.d., https://denverpostdata.carto.com/viz/3ec962a6-2c6b-11e7-b3d3-0ee66e2c9693/embed_map.



PREPARING TODAY'S WORKFORCE FOR ALTERNATIVE INDUSTRIES AND EMERGING TECHNOLOGIES

The research team identified 586 training and workforce development programs throughout the state, offered by 258 different providers. These programs generally fit into five categories: apprenticeships, certification programs, job-readiness training, degree-granting programs and research opportunities. Apprenticeships were the most common type of training, constituting almost two-thirds of the inventory, followed by certification programs at 20 percent, job readiness programs at 10 percent, five percent in degree-granting programs, and the remaining one percent in research. The abundance of apprenticeship programs is leverageable infrastructure when thinking about challenges of new workers entering the labor market, though these trainings are less likely to be applicable or of-interest for workers looking to transition industries. Instead, transitioning workers would likely utilize certification programs, formal degree programs, or employer-led trainings.

Employer-led trainings were noted during interviews to be nearly ubiquitous throughout the oil and gas industry, as well as the other emerging technologies and adjacent industries. These trainings are often in-house programs that help workers learn company or technology-specific processes and knowledge. While these types of in-house trainings may be effective for workers working within large companies, employees at smaller companies may struggle to attain relevant training that would allow them to more easily transition to new occupations.

Training programs fit into 19 broad industry categorizations. The most common types of training are electrical and construction work, making up over half of training opportunities together with 154 programs in construction and 149 in electrical work. Rounding out the five most common training industries are manufacturing (77 programs), solar (44 programs) and Heating, Air Conditioning, and Refrigeration (32 programs) (Table 8).

The emerging industries of biofuels and hydrogen do not have a robust training infrastructure in the state yet. The hydrogen industry only has two training opportunities identified in the state, both located in Jefferson County. Biofuels also has two training programs; these programs are offered in an online format for any worker in the state to utilize. While these are the only programs identified with a concentrated focus on those industries specifically, many of the degree-granting programs regarding renewables, research and engineering in energy sectors have courses that discuss these industries

embedded in the programming. Opportunities are a bit more abundant in Carbon Capture, Utilization and Sequestration (CCUS), with 8 programs identified. Seven of these programs are online, with the remaining program in Boulder County. Many of the current programs in CCUS are focused on more professional roles such as project developers or engineers.

Unlike the other emerging industries for potential transition, the geothermal industry is a bit more robust with 15 training programs in the state, provided by ten different employers and includes degree, certificate and job-readiness opportunities. Two programs are offered in Jefferson County and one in Routt County, while the rest are online. Programs in the geothermal industry are most commonly for Heating, Air Conditioning and Refrigeration Mechanics/Installers and Engineers. The wastewater industry also has a strong and diverse makeup of 22 programs.

Table 8. Industry Makeup of Training Inventory

INDUSTRY	NUMBER OF PROGRAMS	PERCENT OF PROGRAMS
Construction	154	26%
Electric	149	25%
Manufacturing	77	13%
Solar Electric	44	8%
HVAC	32	5%
Installation, Maintenance, and Repair	22	4%
Water	22	4%
Building and Grounds Cleaning and Maintenance	18	3%
Architecture and Engineering	17	3%
Geothermal	15	3%
Carbon Capture	8	1%
Wind Energy	8	1%
Electric Vehicles	5	1%
Life, Physical, and Social Science Occupations	4	1%
Transportation and Material Moving	4	1%
Biofuels	2	0%
Hydrogen	2	0%
Management	2	0%
Farming, Fishing and Forestry	1	0%

The most common occupational focus of training opportunities is for Electricians, comprising 11 percent of the inventory, or 62 programs. This is followed by training for Electrical Power-Line Installers and Repairers with 56 programs. Both occupations are vital for supporting the energy

efficiency, energy transmission and distribution, and electric power generation workforce. The next highest is Plumbing and Pipefitters with 52 programs, followed by construction work at the laborer level with 47 programs. The fifth greatest is Solar Photovoltaic Installers, with 44 training programs. Solar electric power generation employed 9,017 workers in the state in 2023, growing in employment by 6 percent from 2022.⁶⁴

Table 9. Occupational Focuses of Training Inventory

OCCUPATIONAL FOCUS	NUMBER OF PROGRAMS	PERCENT OF PROGRAMS
Electrician	62	11%
Electrical Power-Line Installers and Repairers	56	10%
Plumber/Pipefitter	52	9%
Construction	47	8%
Solar Photovoltaic Installers	43	7%
Heating, Air Conditioning, and Refrigeration	41	7%
Welding	39	7%
Operating Engineer	22	4%
Scientist	20	3%
Control and Valve Installers and Repairers	18	3%
Electric Technician	16	3%
Machinist	16	3%
Engineering	15	3%
Grounds Maintenance	15	3%
Management	14	2%
Metal/Steel Worker	12	2%
Mechanic	9	2%
Construction Manager	7	1%
Industrial Maintenance Repairer/Mechanic	7	1%
Wind Technician	7	1%
Helpers--Installation, Maintenance, and Repair Workers	5	1%
Industrial Manufacturing Technician	4	1%
Energy Auditor	4	1%
Electrical and Electronics Repairers	4	1%
Power-Plant Operator	4	1%

⁶⁴ “2024 U.S. Energy and Employment Jobs Report,” *United States Department of Energy*, 2024, <https://www.energy.gov/policy/us-energy-employment-jobs-report-useer>.

Drivers	4	1%
Mechanical Drafter/Designer	3	1%
Grounds Maintenance	3	1%
Carpenter	3	1%
Cabinetmaker	3	1%
Assembler	3	1%
Bricklayer	3	1%
Electric Vehicle Technician	3	1%
EV Charging Installation/Repair	3	1%
Biofuel Production Operator	2	0%
Glazier	2	0%
Project Manager	2	0%
Production Technologist	2	0%
Quality Control Inspector	2	0%
Process Technician	2	0%
Calibration technologists and technicians	1	0%
Geomatics Technician	1	0%
Cement Mason	1	0%
Hazardous-Waste Material Technician	1	0%

The training opportunities for transitioning oil and gas workers coincide well with those counties containing the most oil and gas workers. Of the ten counties with the largest number of oil and gas workers, seven of the counties make up the top seven counties with the most training opportunities available. Of the remaining counties with the most oil and gas workers, Mesa and La Plata have 15 and 9 training programs respectively, so while training may be more limited, capacity exists to build on.

Garfield County, which contains the sixth highest number of oil and gas workers in the state only has one identified training program, which is an apprenticeship for Electrical Power-Line Installers. This area may be a priority consideration for training providers and policy makers who hope to assist oil and gas workers transitioning to other industries.

While in-person opportunities may be limited for some counties, there are many online resources for training. Online training opportunities account for 65 programs of the inventory, or 11 percent.

Table 10. County Makeup of Training Inventory

COUNTY	NUMBER OF PROGRAMS	PERCENT OF PROGRAMS
Denver	100	18%
Jefferson	54	10%
El Paso	51	9%
Arapahoe	38	7%
Larimer	34	6%
Weld	34	6%
Adams	26	5%
Boulder	25	5%
Pueblo	20	4%
Douglas	15	3%
Mesa	15	3%
Delta	12	2%
La Plata	9	2%
Crowley	8	1%
Montrose	8	1%
Las Animas	7	1%
Logan	7	1%
Moffat	7	1%
Gunnison	6	1%
Broomfield	5	1%
Morgan	5	1%
Eagle	4	1%
Montezuma	4	1%
Lincoln	3	1%
Alamosa	2	0%
Bent	2	0%
Chaffee	2	0%
Cheyenne	2	0%
Grand	2	0%
Kit Carson	2	0%
Rio Grande	2	0%
Archuleta	1	0%

Garfield	1	0%
Otero	1	0%
Ouray	1	0%
Park	1	0%
Phillips	1	0%
Pitkin	1	0%
Prowers	1	0%
Routt	1	0%
Yuma	1	0%
Online	65	11%



VULNERABILITIES AND SOLUTIONS TO SUPPORT COMMUNITIES AND EMPLOYERS

One crucial consideration is the communities that workers live in. The oil and gas sector generates a lot of benefits to communities beyond direct employment opportunities. One such benefit to communities is through induced⁶⁵ effects, or the benefits of additional economic activity and income in a region that then flows into other unrelated industries, spurring additional demand for non-oil and gas workers. Furthermore, the oil and gas sector provides substantial tax revenue for communities. The Colorado Oil and Gas Association estimates that 10.7% of all assessed property value in the state was from oil and gas.⁶⁶ An erosion of tax revenue of this magnitude will present a substantial challenge for the communities that presently collect the greatest shares of these revenues. Although community-level research, analyses, and discussion largely lie outside the scope of this report, this is a critical component of any economic transition that cannot go unaddressed.

An additional consideration for any transition of the oil and gas sector results from the heterogeneity in the size of firms within the oil and gas industry. Figure 24 on page 48 highlights that smaller employers typically have no intention of entering the markets of emerging technologies, which means that declines in oil and gas activity are much less likely to be offset by other directly translatable economic opportunity for these firms and their workers. While larger employers may be able to increasingly shift more of their business towards emerging technologies to offset any declines in the oil and gas industry, smaller employers and independent contractors are less likely to have the interest or opportunity to explore these alternatives. These smaller employers and independent contractors are also less likely to have resources to support employees during times of volatility, including severance compensation. One final component is that employers with fewer than 100 employees do not have to submit WARN (Worker Adjustment and Retraining Notification Act of 1988) notices, which means that workforce and economic development decision makers will not have a clear understanding of furloughs or layoffs ahead of time, further complicating any mitigation efforts.

⁶⁵ Joe Demski, “Understanding IMPLAN: Direct, Indirect, and Induced Effects,” *IMPLAN BLOG*, October 2024, <https://blog.implan.com/understanding-implan-effects>.

⁶⁶ “COGA Fact Sheet: How Colorado’s Oil and Gas Industry Powers the Economy,” Colorado Oil and Gas Association, August 2024, <https://www.coga.org/factsheets/oil-gas-colorado-economy>.

This data reflects a few imperatives. First is that it will be necessary to develop transition strategies for oil and gas workers *and* communities *and* employers. Many worker-level strategies are discussed throughout this report, and although community-level discussion is outside the scope of this project, it is an imperative piece of any discussion of an energy transition. Similarly, thinking about a transition through the lens of various employers will help devise strategies that most effectively support small businesses as well as workers employed at companies of any size. This is a key area of future research and engagement that must occur before a transition of any form begins to take shape.

APPENDIX A:

RESEARCH METHODOLOGY

Economic Impact Modeling

BW Research developed employment forecasts in existing and emerging sectors across Colorado to identify the state's potential workforce needs, opportunities for transferability, and changes in the occupational landscape. This section details the modeling process, inputs, and assumptions used to estimate employment creation in Colorado.

Employment forecasts seek to provide a quantitative view of employment needs in Colorado by industry and occupation in sectors oil and gas workers can transition into. The modeling of employment projections used custom IMPLAN Input-Output models in the following sectors expected to grow from federal and state policies:

- Biofuels
- Carbon Capture, Utilization and Storage (CCUS)
- Electric Power Generation
- Energy Efficiency for Buildings
- Geothermal Systems (allocated to EPG)
- Hydrogen Generation
- Infrastructure Construction
- Machinery Manufacturing
- Rural (allocated to energy efficiency for buildings)
- Electric Power Transmission and Distribution
- Water Utilities
- Well Plugging and Remediation

BW Research built custom models using Colorado industry multipliers for each of the abovementioned sectors to capture the nuances of different sectors and how an initial investment into them flows through the state economy.

Modeling Structure: Initial Employment Outputs (IEO)

The initial process for modeling these employment impacts required developing a robust inventory of federal and state investments in each sector to be used as model inputs. Federal investments were then proportioned to Colorado using current employment in the relevant mix of industries⁶⁷ for each sector. The

⁶⁷ Relevant industries for each sector were defined using 5- or 6-digit North American Industry Classification System (NAICS) codes.

total investment into these sectors within Colorado was estimated to be \$14,717 million spread across the alternative industries and emerging technologies presented above.

The research team then ran the Colorado-specific investments and the Colorado proportion of federal investments through the custom models to obtain overall employment estimates for the following industry groups:

- Construction
- Manufacturing
- Professional Business Services
- Other Supply Chain⁶⁸

The employment impacts were divided into two types:

- **Direct effects** show the economic change associated with the initial investment. In the employment impacts modeled for this project, direct jobs range from construction workers involved in building and improving manufacturing facilities to installation workers in buildings or workers operating facilities.
- **Indirect effects** include all the backward linkages or the supply chain responses resulting from the initial direct economic activity. An example of an indirect job added to the local economy would be a new worker at a lumber mill hired to handle the increased demand for construction lumber that result from the initial investment.

Modeling Structure: Occupational Estimates, Secondary Employment Outputs (SEO)

Using the employment estimates produced in the IEO process, BW Research estimated the number of jobs created by occupation, delineated by the 832 occupations from the Bureau of Labor Statistics (BLS). The research team used proprietary staffing patterns built using a set of comprehensive national employer surveys, detailed by the sectors of analysis.

The staffing patterns detail the proportions at which employers in each sector staff their firms, looking at occupations.⁶⁹ The research team then applied these proportions to the direct and indirect jobs estimated in the IEO to obtain estimates of the number of jobs created by occupation.

Modeling Methodology: IMPLAN and Industry Multipliers

IMPLAN is a static Input-Output model that analyzes the effects of a specific economic stimulus on a given region using complex models of industry spending patterns, demand for commodities, and industry links at the local level. IMPLAN uses a combination of data sets to build its social accounting matrix, primarily relying on data from the Bureau of Economic Analysis (BEA) and the BLS.

⁶⁸ Includes all other industry groups such as Agriculture, Distribution, and Mining.

⁶⁹ 832 occupations detailed at the 6-digit Standard Occupational Classification (SOC) code level.

The data used for this analysis is Colorado-specific, and the employment estimates for each sector were created using custom models that capture the nuances and industries involved in each sector.

Development of the Funding Database

BW Research and Brendle Group developed and analyzed a database of state and federal funding opportunities and conducted executive interviews to gain insights on the use of funding, perceived funding gaps, and opportunities for collaboration. The funding database includes grants, requests for information, tax incentives, and other financial funding opportunities that support one or more of the following criteria:

- General workforce and economic development opportunities
- Workforce and economic development opportunities specific to industries of interest (e.g. power generation or utilities, fuel production or manufacturing, adjacent or emerging industries, etc.)
- Funding that increases the demand for workers within relevant industries (e.g. research and development funding, tax benefits, etc.)

BW Research utilized available funding data from the following sources:

- National Governors Association, Infrastructure Investment and Jobs Act Implementation Resources
- Grants.gov
- American Cities Climate Challenge
- Colorado Office of Economic Development and International Trade
- U.S. Economic Development Administration

Funding opportunities **not included** in this database include:

- Funding from philanthropy (due to difficulty tracking, lack of clarity on funding objectives)
- Funding opportunities for workers outside of Colorado that may impact workers or industries in Colorado

Survey Research

COLORADO OIL AND GAS EMPLOYER SURVEY

BW Research conducted employer interviews with oil and gas firms, and adjacent industries that share four-digit industry codes (NAICS) with the oil and gas industry (in addition to NAICS 212 (mining) and NAICS 237(Utilities)) that work in Colorado. The survey sample included a compilation of online panel through a third party of relevant businesses, and a sample of firms known to employ the relevant industry codes from DataAxle. The survey instrument was programmed internally by BW Research and each respondent was assigned a unique ID to prevent duplication.

The employer survey was fielded between October 2nd and October 22nd, 2024 and resulted in 77 total completes by firm. The average survey duration was 10 minutes.

COLORADO OIL AND GAS CURRENT WORKER SURVEY

BW Research conducted a survey of current oil and gas workers in Colorado. To qualify for the survey, potential respondents had to be working in Colorado in a job that provides oil or gas products or services. Current worker respondents were recruited through an online panel of employed residents in Colorado. The survey instrument was programmed internally by BW Research and each respondent was assigned a unique ID to prevent duplication.

The current worker survey was fielded between October 2nd and October 21st, 2024 and resulted in 99 total completes. The average survey duration was 14 minutes.

APPENDIX B:

DATA ON WORKER TRANSITIONS

The following appendix sections offer data relevant to the oil and gas occupations that were identified as the most challenging to transition. Data is from [O*NET](#) and the O*NET Career Changers Matrix unless noted otherwise.

Appendix B-1: Potential Transition Occupations for Oil and Gas Workers

TRANSITION OCCUPATION SOC CODE	TRANSITION OCCUPATION TITLE
47-4061	Rail-Track Laying and Maintenance Equipment Operators
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders
37-3013	Tree Trimmers and Pruners
53-4022	Railroad Brake, Signal, and Switch Operators
47-5081	Helpers--Extraction Workers
49-3043	Rail Car Repairers
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic
53-7031	Dredge Operators
47-3011	Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters
49-3093	Tire Repairers and Changers
47-5051	Rock Splitters, Quarry
47-2061	Construction Laborers
47-2071	Paving, Surfacing, and Tamping Equipment Operators
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals
47-5043	Roof Bolters, Mining
49-9045	Refractory Materials Repairers, Except Brickmasons
17-2199	Engineers, All Other
17-2151	Mining and Geological Engineers, Including Mining Safety Engineers
13-1081	Logistics Engineers
17-2112	Industrial Engineers

17-2071	Electrical Engineers
17-2111	Fire-Prevention and Protection Engineers
17-2051	Civil Engineers
49-9043	Maintenance Workers, Machinery
47-2072	Pile-Driver Operators
47-5022	Excavating and Loading Machine and Dragline Operators
51-9193	Cooling and Freezing Equipment Operators and Tenders
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners
45-3031	Fishers and Related Fishing Workers
19-2041	Environmental Scientists and Specialists, Including Health
19-2099	Remote Sensing Scientists and Technologists
15-1299	Geospatial Information Scientists and Technologists
13-1041	Environmental Compliance Inspectors
19-2021	Atmospheric and Space Scientists
51-9011	Chemical Equipment Operators and Tenders
51-8091	Chemical Plant and System Operators
53-7121	Tank Car, Truck, and Ship Loaders
49-2092	Electric Motor, Power Tool, and Related Repairers
49-9071	Maintenance and Repair Workers, General
49-3042	Mobile Heavy Equipment Mechanics, Except Engines
49-3023	Automotive Master Mechanics
51-4041	Machinists
51-8021	Stationary Engineers and Boiler Operators
49-9044	Millwrights
47-5032	Explosives Workers, Ordnance Handling Experts, and Blasters
47-4041	Hazardous Materials Removal Workers
47-2221	Structural Iron and Steel Workers
53-6051	Transportation Vehicle, Equipment and Systems Inspectors, Except Aviation
49-9097	Signal and Track Switch Repairers
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists
49-3051	Motorboat Mechanics and Service Technicians
49-2098	Security and Fire Alarm Systems Installers
49-9021	Heating and Air Conditioning Mechanics and Installers
17-3024	Robotics Technicians

49-2091	Avionics Technicians
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers
17-3027	Mechanical Engineering Technicians
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
17-3023	Electrical Engineering Technicians
17-3025	Environmental Engineering Technicians
19-4099	Precision Agriculture Technicians
17-3031	Mapping Technicians
19-4031	Chemical Technicians
19-4042	Environmental Science and Protection Technicians, Including Health
19-4012	Agricultural Technicians
19-2031	Chemists
17-2141	Mechanical Engineers
51-9162	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders
19-4051	Nuclear Equipment Operation Technicians
47-5049	Mine Cutting and Channeling Machine Operators
53-7041	Hoist and Winch Operators
53-5011	Sailors and Marine Oilers
51-9124	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders

Appendix B-2: Description and Tasks of Priority Occupations

SOC	OCCUPATION/ SKILLS
47-5013	Service Unit Operators, Oil and Gas
Description	Operate equipment to increase oil flow from producing wells or to remove stuck pipe, casing, tools, or other obstructions from drilling wells. Includes fishing-tool technicians.
Tasks	<p>Maintain and perform safety inspections on equipment and tools.</p> <p>Operate controls that raise derricks or level rigs.</p> <p>Listen to engines, rotary chains, or other equipment to detect faulty operations or unusual well conditions.</p> <p>Prepare reports of services rendered, tools used, or time required, for billing purposes.</p> <p>Install pressure-control devices onto wellheads.</p>
47-5071	Roustabouts, Oil and Gas
Description	Assemble or repair oil field equipment using hand and power tools. Perform other tasks as needed.
Tasks	<p>Unscrew or tighten pipes, casing, tubing, and pump rods, using hand and power wrenches and tongs.</p> <p>Dismantle and repair oil field machinery, boilers, and steam engine parts, using hand tools and power tools.</p> <p>Guide cranes to move loads about decks.</p> <p>Walk flow lines to locate leaks, using electronic detectors and by making visual inspections, and repair the leaks.</p> <p>Lay gas and oil pipelines.</p>
17-2171	Petroleum Engineers
Description	Devise methods to improve oil and gas extraction and production and determine the need for new or modified tool designs. Oversee drilling and offer technical advice.
Tasks	<p>Specify and supervise well modification and stimulation programs to maximize oil and gas recovery.</p> <p>Monitor production rates, and plan rework processes to improve production.</p> <p>Maintain records of drilling and production operations.</p> <p>Analyze data to recommend placement of wells and supplementary processes to enhance production.</p> <p>Assist engineering and other personnel to solve operating problems.</p>
53-7073	Wellhead Pumpers
Description	Operate power pumps and auxiliary equipment to produce flow of oil or gas from wells in oil field.
Tasks	<p>Monitor pumps and flow lines for gas and fluid leaks.</p> <p>Gauge oil and gas production.</p> <p>Start compressor engines and divert oil from storage tanks into compressor units and auxiliary equipment to recover natural gas from oil.</p> <p>Monitor control panels during pumping operations to ensure that materials are being pumped at the correct pressure, density, rate, and concentration.</p>

	Operate engines and pumps to shut off wells according to production schedules, and to switch flow of oil into storage tanks.
47-5011	Derrick Operators, Oil and Gas
Description	Rig derrick equipment and operate pumps to circulate mud or fluid through drill hole.
Tasks	Inspect derricks, or order their inspection, prior to being raised or lowered.
	Inspect derricks for flaws, and clean and oil derricks to maintain proper working conditions.
	Control the viscosity and weight of the drilling fluid.
	Repair pumps, mud tanks, and related equipment.
	Set and bolt crown blocks to posts at tops of derricks.
19-2042	Geoscientists, Except Hydrologists and Geographers
Description	Study the composition, structure, and other physical aspects of the Earth. May use geological, physics, and mathematics knowledge in exploration for oil, gas, minerals, or underground water; or in waste disposal, land reclamation, or other environmental problems. May study the Earth's internal composition, atmospheres, and oceans, and its magnetic, electrical, and gravitational forces. Includes mineralogists, paleontologists, stratigraphers, geodesists, and seismologists.
Tasks	Plan or conduct geological, geochemical, or geophysical field studies or surveys, sample collection, or drilling and testing programs used to collect data for research or application.
	Analyze and interpret geological data, using computer software.
	Investigate the composition, structure, or history of the Earth's crust through the collection, examination, measurement, or classification of soils, minerals, rocks, or fossil remains.
	Analyze and interpret geological, geochemical, or geophysical information from sources, such as survey data, well logs, bore holes, or aerial photos.
	Identify risks for natural disasters, such as mudslides, earthquakes, or volcanic eruptions.
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers
Description	Operate or control petroleum refining or processing units. May specialize in controlling manifold and pumping systems, gauging or testing oil in storage tanks, or regulating the flow of oil into pipelines.
Tasks	Signal other workers by telephone or radio to operate pumps, open and close valves, and check temperatures.
	Maintain and repair equipment, or report malfunctioning equipment to supervisors so that repairs can be scheduled.
	Monitor process indicators, instruments, gauges, and meters to detect and report any possible problems.
	Start pumps and open valves or use automated equipment to regulate the flow of oil in pipelines and into and out of tanks.
	Operate control panels to coordinate and regulate process variables such as temperature and pressure, and to direct product flow rate, according to process schedules.
49-9041	Industrial Machinery Mechanics
Description	Repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems. May also install, dismantle, or move machinery and heavy equipment according to plans.
Tasks	Repair or maintain the operating condition of industrial production or processing machinery or equipment.
	Repair or replace broken or malfunctioning components of machinery or equipment.

	Clean, lubricate, or adjust parts, equipment, or machinery.
	Disassemble machinery or equipment to remove parts and make repairs.
	Reassemble equipment after completion of inspections, testing, or repairs.
47-5012	Rotary Drill Operators, Oil and Gas
Description	Set up or operate a variety of drills to remove underground oil and gas, or remove core samples for testing during oil and gas exploration.
Tasks	<p>Train crews, and introduce procedures to make drill work more safe and effective.</p> <p>Observe pressure gauge and move throttles and levers to control the speed of rotary tables, and to regulate pressure of tools at bottoms of boreholes.</p> <p>Count sections of drill rod to determine depths of boreholes.</p> <p>Push levers and brake pedals to control gasoline, diesel, electric, or steam draw works that lower and raise drill pipes and casings in and out of wells.</p> <p>Connect sections of drill pipe, using hand tools and powered wrenches and tongs.</p>
51-8092	Gas Plant Operators
Description	Distribute or process gas for utility companies and others by controlling compressors to maintain specified pressures on main pipelines.
Tasks	<p>Monitor equipment functioning, observe temperature, level, and flow gauges, and perform regular unit checks to ensure that all equipment is operating as it should.</p> <p>Distribute or process gas for utility companies or industrial plants, using panel boards, control boards, and semi-automatic equipment.</p> <p>Control operation of compressors, scrubbers, evaporators, and refrigeration equipment to liquefy, compress, or regasify natural gas.</p> <p>Control equipment to regulate flow and pressure of gas to feedlines of boilers, furnaces, and related steam-generating or heating equipment.</p> <p>Record, review, and compile operations records, test results, and gauge readings such as temperatures, pressures, concentrations, and flows.</p>
49-9012	Control and Valve Installers and Repairers, Except Mechanical Door
Description	Install, repair, and maintain mechanical regulating and controlling devices, such as electric meters, gas regulators, thermostats, safety and flow valves, and other mechanical governors.
Tasks	<p>Record maintenance information, including test results, material usage, and repairs made.</p> <p>Disassemble and repair mechanical control devices or valves, such as regulators, thermostats, or hydrants, using power tools, hand tools, and cutting torches.</p> <p>Lubricate wearing surfaces of mechanical parts, using oils or other lubricants.</p> <p>Calibrate instrumentation, such as meters, gauges, and regulators, for pressure, temperature, flow, and level.</p> <p>Install, inspect and test electric meters, relays, and power sources to detect causes of malfunctions and inaccuracies, using hand tools and testing equipment.</p>
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment
Description	Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.
Tasks	<p>Test faulty equipment to diagnose malfunctions, using test equipment or software, and applying knowledge of the functional operation of electronic units and systems.</p> <p>Maintain equipment logs that record performance problems, repairs, calibrations, or tests.</p> <p>Set up and test industrial equipment to ensure that it functions properly.</p>

	Inspect components of industrial equipment for accurate assembly and installation or for defects, such as loose connections or frayed wires.
	Install repaired equipment in various settings, such as industrial or military establishments.
19-4043	Geological Technicians, Except Hydrologic Technicians
Description	Assist scientists or engineers in the use of electronic, sonic, or nuclear measuring instruments in laboratory, exploration, and production activities to obtain data indicating resources such as metallic ore, minerals, gas, coal, or petroleum. Analyze mud and drill cuttings. Chart pressure, temperature, and other characteristics of wells or bore holes.
Tasks	<p>Test and analyze samples to determine their content and characteristics, using laboratory apparatus or testing equipment.</p> <p>Collect or prepare solid or fluid samples for analysis.</p> <p>Compile, log, or record testing or operational data for review and further analysis.</p> <p>Prepare notes, sketches, geological maps, or cross-sections.</p> <p>Participate in geological, geophysical, geochemical, hydrographic, or oceanographic surveys, prospecting field trips, exploratory drilling, well logging, or underground mine survey programs.</p>
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other
Description	Test the safety of structures, vehicles, or vessels using x-ray, ultrasound, fiber optic or related equipment.
Tasks	<p>Interpret the results of all methods of non-destructive testing (NDT), such as acoustic emission, electromagnetic, leak, liquid penetrant, magnetic particle, neutron radiographic, radiographic, thermal or infrared, ultrasonic, vibration analysis, and visual testing.</p> <p>Interpret or evaluate test results in accordance with applicable codes, standards, specifications, or procedures.</p> <p>Identify defects in solid materials, using ultrasonic testing techniques.</p> <p>Make radiographic images to detect flaws in objects while leaving objects intact.</p> <p>Prepare reports on non-destructive testing results.</p>
53-7072	Pump Operators, Except Wellhead Pumpers
Description	Tend, control, or operate power-driven, stationary, or portable pumps and manifold systems to transfer gases, oil, other liquids, slurries, or powdered materials to and from various vessels and processes.
Tasks	<p>Monitor gauges and flowmeters and inspect equipment to ensure that tank levels, temperatures, chemical amounts, and pressures are at specified levels, reporting abnormalities as necessary.</p> <p>Record operating data such as products and quantities pumped, stocks used, gauging results, and operating times.</p> <p>Plan movement of products through lines to processing, storage, and shipping units, using knowledge of interconnections and capacities of pipelines, valve manifolds, pumps, and tankage.</p> <p>Turn valves and start pumps to start or regulate flows of substances such as gases, liquids, slurries, or powdered materials.</p> <p>Communicate with other workers, using signals, radios, or telephones, to start and stop flows of materials or substances.</p>
51-8013	Power Plant Operators
Description	Control, operate, or maintain machinery to generate electric power. Includes auxiliary equipment operators.

Tasks	Control generator output to match the phase, frequency, or voltage of electricity supplied to panels.
	Take regulatory action, based on readings from charts, meters and gauges, at established intervals.
	Control power generating equipment, including boilers, turbines, generators, or reactors, using control boards or semi-automatic equipment.
	Start or stop generators, auxiliary pumping equipment, turbines, or other power plant equipment as necessary.
	Monitor power plant equipment and indicators to detect evidence of operating problems.
47-5099	Extraction Workers, All Other
Description	Help extraction craft workers, such as earth drillers, blasters and explosives workers, derrick operators, and mining machine operators, by performing duties requiring less skill. Duties include supplying equipment or cleaning work area.
Tasks	Assist skilled construction or extraction personnel.
	Monitor extraction operations.
	Drive trucks or truck-mounted equipment.
	Load or unload materials used in construction or extraction.
	Operate mining equipment.
53-7071	Gas Compressor and Gas Pumping Station Operators
Description	Operate steam-, gas-, electric motor-, or internal combustion-engine driven compressors. Transmit, compress, or recover gases, such as butane, nitrogen, hydrogen, and natural gas.
Tasks	Monitor meters and pressure gauges to determine consumption rate variations, temperatures, and pressures.
	Respond to problems by adjusting control room equipment or instructing other personnel to adjust equipment at problem locations or in other control areas.
	Record instrument readings and operational changes in operating logs.
	Adjust valves and equipment to obtain specified performance.
	Move controls and turn valves to start compressor engines, pumps, and auxiliary equipment.

Appendix B-3: Description and Tasks of Most Common Transition Occupations

Transition Occupation SOC	Transition Occupation Title
53-7071	GAS COMPRESSOR AND GAS PUMPING STATION OPERATORS
Description	Operate steam-, gas-, electric motor-, or internal combustion-engine driven compressors. Transmit, compress, or recover gases, such as butane, nitrogen, hydrogen, and natural gas.
Tasks	<p>Monitor meters and pressure gauges to determine consumption rate variations, temperatures, and pressures.</p> <p>Respond to problems by adjusting control room equipment or instructing other personnel to adjust equipment at problem locations or in other control areas.</p> <p>Record instrument readings and operational changes in operating logs.</p> <p>Adjust valves and equipment to obtain specified performance.</p> <p>Move controls and turn valves to start compressor engines, pumps, and auxiliary equipment.</p>
47-4061	RAIL-TRACK LAYING AND MAINTENANCE EQUIPMENT OPERATORS
Description	Lay, repair, and maintain track for standard or narrow-gauge railroad equipment used in regular railroad service or in plant yards, quarries, sand and gravel pits, and mines. Includes ballast cleaning machine operators and railroad bed tamping machine operators.
Tasks	<p>Patrol assigned track sections so that damaged or broken track can be located and reported.</p> <p>Repair or adjust track switches, using wrenches and replacement parts.</p> <p>Weld sections of track together, such as switch points and frogs</p> <p>Observe leveling indicator arms to verify levelness and alignment of tracks.</p> <p>Operate single- or multiple-head spike driving machines to drive spikes into ties and secure rails.</p>
47-5013	SERVICE UNIT OPERATORS, OIL, GAS, AND MINING
Description	Operate equipment to increase oil flow from producing wells or to remove stuck pipe, casing, tools, or other obstructions from drilling wells. Includes fishing-tool technicians.
Tasks	<p>Maintain and perform safety inspections on equipment and tools.</p> <p>Operate controls that raise derricks or level rigs.</p> <p>Listen to engines, rotary chains, or other equipment to detect faulty operations or unusual well conditions.</p> <p>Prepare reports of services rendered, tools used, or time required, for billing purposes.</p> <p>Install pressure-control devices onto wellheads.</p>
51-8021	STATIONARY ENGINEERS AND BOILER OPERATORS
Description	Operate or maintain stationary engines, boilers, or other mechanical equipment to provide utilities for buildings or industrial processes. Operate equipment such as steam engines, generators, motors, turbines, and steam boilers.

Tasks	Operate or tend stationary engines, boilers, and auxiliary equipment, such as pumps, compressors, or air-conditioning equipment, to supply and maintain steam or heat for buildings, marine vessels, or pneumatic tools.
	Activate valves to maintain required amounts of water in boilers, to adjust supplies of combustion air, and to control the flow of fuel into burners.
	Monitor boiler water, chemical, and fuel levels, and make adjustments to maintain required levels.
	Analyze problems and take appropriate action to ensure continuous and reliable operation of equipment and systems.
	Observe and interpret readings on gauges, meters, and charts registering various aspects of boiler operation to ensure that boilers are operating properly.
51-9012	SEPARATING, FILTERING, CLARIFYING, PRECIPITATING, AND STILL MACHINE SETTERS, OPERATORS, AND TENDERS
Description	Set up, operate, or tend continuous flow or vat-type equipment; filter presses; shaker screens; centrifuges; condenser tubes; precipitating, fermenting, or evaporating tanks; scrubbing towers; or batch stills. These machines extract, sort, or separate liquids, gases, or solids from other materials to recover a refined product. Includes dairy processing equipment operators.
Tasks	Dump, pour, or load specified amounts of refined or unrefined materials into equipment or containers for further processing or storage.
	Operate machines to process materials in compliance with applicable safety, energy, or environmental regulations.
	Monitor material flow or instruments, such as temperature or pressure gauges, indicators, or meters, to ensure optimal processing conditions.
	Turn valves or move controls to admit, drain, separate, filter, clarify, mix, or transfer materials.
	Set up or adjust machine controls to regulate conditions such as material flow, temperature, or pressure.
17-2199	ENGINEERS, ALL OTHER
Description	Design, develop, or evaluate energy-related projects or programs to reduce energy costs or improve energy efficiency during the designing, building, or remodeling stages of construction. May specialize in electrical systems; heating, ventilation, and air-conditioning (HVAC) systems; green buildings; lighting; air quality; or energy procurement.
Tasks	Identify and recommend energy savings strategies to achieve more energy-efficient operation.
	Conduct energy audits to evaluate energy use and to identify conservation and cost reduction measures.
	Monitor and analyze energy consumption.
	Monitor energy related design or construction issues, such as energy engineering, energy management, or sustainable design.
	Inspect or monitor energy systems, including heating, ventilating, and air conditioning (HVAC) or daylighting systems to determine energy use or potential energy savings.
17-3029	ENGINEERING TECHNOLOGISTS AND TECHNICIANS, EXCEPT DRAFTERS, ALL OTHER
Description	Test the safety of structures, vehicles, or vessels using x-ray, ultrasound, fiber optic or related equipment.

Tasks	Interpret the results of all methods of non-destructive testing (NDT), such as acoustic emission, electromagnetic, leak, liquid penetrant, magnetic particle, neutron radiographic, radiographic, thermal or infrared, ultrasonic, vibration analysis, and visual testing.
	Interpret or evaluate test results in accordance with applicable codes, standards, specifications, or procedures.
	Identify defects in solid materials, using ultrasonic testing techniques.
	Make radiographic images to detect flaws in objects while leaving objects intact.
	Prepare reports on non-destructive testing results.
51-8092	GAS PLANT OPERATORS
Description	Distribute or process gas for utility companies and others by controlling compressors to maintain specified pressures on main pipelines.
Tasks	Monitor equipment functioning, observe temperature, level, and flow gauges, and perform regular unit checks to ensure that all equipment is operating as it should.
	Distribute or process gas for utility companies or industrial plants, using panel boards, control boards, and semi-automatic equipment.
	Control operation of compressors, scrubbers, evaporators, and refrigeration equipment to liquefy, compress, or regasify natural gas.
	Control equipment to regulate flow and pressure of gas to feedlines of boilers, furnaces, and related steam-generating or heating equipment.
	Record, review, and compile operations records, test results, and gauge readings such as temperatures, pressures, concentrations, and flows.
51-8093	PETROLEUM PUMP SYSTEM OPERATORS, REFINERY OPERATORS, AND GAUGERS
Description	Operate or control petroleum refining or processing units. May specialize in controlling manifold and pumping systems, gauging or testing oil in storage tanks, or regulating the flow of oil into pipelines.
Tasks	Signal other workers by telephone or radio to operate pumps, open and close valves, and check temperatures.
	Maintain and repair equipment, or report malfunctioning equipment to supervisors so that repairs can be scheduled.
	Monitor process indicators, instruments, gauges, and meters to detect and report any possible problems.
	Start pumps and open valves or use automated equipment to regulate the flow of oil in pipelines and into and out of tanks.
	Operate control panels to coordinate and regulate process variables such as temperature and pressure, and to direct product flow rate, according to process schedules.
53-7072	PUMP OPERATORS, EXCEPT WELLHEAD PUMPERS
Description	Tend, control, or operate power-driven, stationary, or portable pumps and manifold systems to transfer gases, oil, other liquids, slurries, or powdered materials to and from various vessels and processes.
Tasks	Monitor gauges and flowmeters and inspect equipment to ensure that tank levels, temperatures, chemical amounts, and pressures are at specified levels, reporting abnormalities as necessary.
	Record operating data such as products and quantities pumped, stocks used, gauging results, and operating times.

	Plan movement of products through lines to processing, storage, and shipping units, using knowledge of interconnections and capacities of pipelines, valve manifolds, pumps, and tankage.
	Turn valves and start pumps to start or regulate flows of substances such as gases, liquids, slurries, or powdered materials.
	Communicate with other workers, using signals, radios, or telephones, to start and stop flows of materials or substances.
53-7121	TANK CAR, TRUCK, AND SHIP LOADERS
Description	Load and unload chemicals and bulk solids, such as coal, sand, and grain, into or from tank cars, trucks, or ships, using material moving equipment. May perform a variety of other tasks relating to shipment of products. May gauge or sample shipping tanks and test them for leaks.
Tasks	Seal outlet valves on tank cars, barges, and trucks.
	Verify tank car, barge, or truck load numbers to ensure car placement accuracy based on written or verbal instructions.
	Start pumps and adjust valves or cables to regulate the flow of products to vessels, using knowledge of loading procedures.
	Check conditions and weights of vessels to ensure cleanliness and compliance with loading procedures.
	Observe positions of cars passing loading spouts, and swing spouts into the correct positions at the appropriate times.

APPENDIX C: EXECUTIVE INTERVIEW SUMMARY

BW Research and Brendle Group conducted 20 executive interviews with a range of stakeholders, including employers, training providers, state and local government officials, industry associations, and organized labor, among others to gain insights on the use of funding, perceived funding gaps, the oil and gas workforce, and emerging opportunities in the energy sector. Below are the themes from these interviews with accompanying relevant quotes from the conversations held to illustrate the themes.

Challenging Start to the Energy Transition Conversation

The conversation about oil and gas to switching to other sources of energy (and industries) has been difficult across the state, viewed by key oil and gas players as a forced and artificially accelerated conversation. They may view a transition as a matter of time, but don't believe it to be a function of the markets, instead regulatory and policy driven. The governor and environmental groups were the two primary stakeholders associated with championing this risk of shutdown from the perspective of the interviewees.

"There's a push from enviros to shut down oil and gas immediately."

"No one can tell exactly where the industry is headed but looking at carbon reduction goals, the industry will ultimately be challenged significantly."

"Some workers do not believe in climate change and think Jared Polis' administration is putting them out of office."

"Some people say oil and gas could become unfeasible due to new rules."

"Politically it can be challenging with the perception of the renewable energy transition being a threat."

"If you talked reality, conversation would slow down a bit."

At the community level, this has been a contentious conversation as well, however depending on the historical perspective, communities can be more resigned to the outcome. More rural areas with more economic dependence on oil and gas are not only affected by job loss, but worried about loss of

property taxes. These communities, like Weld county, require different supports from more urban spaces like Denver and Boulder.

“Weld county is different from other Colorado counties; we are not Boulder or Denver county.”

“Have to support communities outside Denver and Boulder - you can help support others.”

“A lot of a community's value system is tied up in industries such as oil and gas or coal. Families have worked in industries for generations.”

“These communities were the energy communities of the future. ‘You can still be the energy community of the future—you already have the skillset’ but that’s challenging because they see the clean energy transition as the reason why they’re losing jobs.”

“There are communities and workers who have built their careers and lives around these industries - do these people just get back in line and deal with it or is there an obligation to help move this transition along?”

“Taxes are a bigger deal than the jobs for the transition.”

“Communities that lose major economic drivers such as mines and power plants will lose huge amounts of property tax. For some communities, they could lose half their tax base.”

“If you go to places that have been declining or declined in the past - it’s easier to imagine.”

“In Western Colorado - to a surprising degree, people expect the industry is not going to come back. Been declining for decades for geological and technological. Had the biggest booms and busts - oil shale Black Friday. Created a deep scar.”

This is leading to challenges building the cross-sector partnerships and trust needed to develop long-term strategies and policies. This difficulty is further compounded by a lack of connectivity between oil and gas and other energy industries and sectors.

“Success is dependent on relationships with employers and communities. It is dependent on who wants to collaborate.”

“Oil and Gas industry is a hard one for Colorado Energy Office, not too many touching points.”

The discussion about transition to specific alternative energy or decarbonization solutions also continues to be hampered by uncertainty connected to timing of transition, and the government’s role.

“There’s a scale consideration: We are drilling 100s of wells a year for oil and gas; it is going to take alternative technologies a long time to catch up to that scale of production; there will probably be a mismatch in timing and there is a lot of uncertainty.”

“The goal should be to start thinking process now about a transition, which will happen in 20 years.”

“Government is good at ‘FEMA’ showing up after an emergency. Office of Just transition is trying to get ahead of it and lower or eliminate challenges when plants close.”

“OJT is a great example, unique for government to get ahead of things.”

“Our perspective is that as long as people use fossil fuels, we want CO to produce it. It’s a demand erosion strategy. Tension between big operators doing big market-insensitive projects that will operate into the 2030s vs ‘when will this happen.’”

“Smaller operations, they wouldn’t even know if they’re about to need layoffs.”

An All of the Above Approach is a Foundational Starting Point

The most effective entry point into energy transition conversations remains pursuing an “all of the above” approach that isn’t wedded to any specific technology or timeline. There is room for multiple opportunities and growth in various industries and technologies.

“All of the above is a big opportunity.”

“Opposition is not against development, just against mandates that make you develop before the technology and markets are ready.”

“Lot of conversations over the next decade—you can feel some people want to just move away from oil and gas, but there’s the technical feasibility question.”

“There’s no energy source that’s off the table. Question is always the economics of it.”

“Seen as both opportunity and pipedream. Business managers think that this can revitalize whole bench with new technologies. But then you go into a meeting with utilities and they say ‘we can’t pay for that.’”

“Do not sound evangelical and try to convert workforce to renewables. We have to build trust. Take the approach of engagement and explaining about diversification.”

“Everyone wants to build back to industrial age and grow and thrive. These projects would do just that.”

Many technologies have their individual proponents, and when aggregated, the enthusiasm for one or more alternative energy options is significant. Much of the support does not fall into direct renewables opportunities, but options like hydrogen, CCUS/carbon management, and geothermal are well-supported. Demonstrating that these technologies, beyond pilot projects, have market growth potential will be an important step to maintain enthusiasm.

Building electrification is one of the alternative energy projects that presents opportunities for electrical workers and is expected to experience increasing growth in the next few years.

“Electrification is getting there. Contractors are doing a lot of that work, but a lot of the building code is being written right now. Probably two years out from a big boom. But contractors are already in it.”

“Clean building technologies can fit into this too for electrical workers.”

Much attention is being paid to the potential of nuclear technology for both the coal industry, as well as oil and gas.

“We are looking towards nuclear, and Craig and Pueblo are also looking at nuclear. That’s what they’ve been based on. Modular nuclear looks interesting.”

“Nuclear is another thing that is on our radar now.”

Colorado has a lot of potential for renewable power generation, and stakeholders generally see a positive relationship between work in renewables and oil and gas.

“Renewables are seen as the other side of the coin rather than enemies.”

“There is a lot of wind and sun in the northeast and much talk in rural counties, with the Cherokee and crate powerhouse closing down.”

Well-plugging has already experienced funding and expansion in the state and is expected to continue growth and generate job opportunities.

“In next 5 - 10 years well plugging opportunities will increase and expand; which will consequently generate jobs shutting down wells and generating jobs as well.”

“Well plugging, remediation, safely dismantling old structures, new needs for methane and air monitoring verification, data center construction and energy maintenance are all expected to create jobs.”

“We are seeing significantly higher demand for things like well plugging. The state is just finishing a \$25 million dollar grant and is starting another under IIJA to plug wells. That means there will be many workers who will be working on shutting those wells down.”

Many stakeholders are excited about the exploration and potential of geothermal. This industry is expected to create employment opportunities and serve as a natural transition for oil and gas workers due to the many overlapping skills.

“Lot of excitement around geothermal. In process for contracting for advanced clean energy opportunities in Colorado. Craig and Montrose and southeast Colorado. These are energy transition areas.”

“Geothermal is identified as a promising area for skill transfer, particularly with roles in deep drilling and drilling technologies; Enhanced geothermal projects, like a 22,000-foot drilling pilot outside Pueblo, could employ skills from the oil and gas workforce.”

“ECMC just developed standardized rules around geothermal; will see a high number of science wells over the next few years to explore geothermal.”

“There is a huge workforce opportunity for deep and shallow geothermal resources. Similar technologies with fracking. 33,000 miles of gas distribution pipelines in Colorado and the goal is to decarbonize all of this by 2040s - these pipelines would be similar for geothermal. 17 geothermal projects have been funded to date, and more anticipated from Xcel Energy. I think we will see a very quick adoption of the geothermal industry.”

“Ground source loops and ground source heat pumps - Same plastic piping, same fusing, same skills with transferability.”

Carbon Capture, Utilization, Storage/Carbon Management (CCUS) is still in early stages of development but is expected to expand pipelines and bolster a growing workforce.

“CCUS landscape is in Colorado. It looks like a few projects underway but very much early pilot stage. Carbon management tech would offer opportunities for workers at risk because technology can retrofit technologies. We can keep some plants operational and avoid closures. Retrofits are opportunities for construction, maintenance, and operations.”

“CCUS has significant mid-to-long-term opportunity, with potential for workforce growth in the coming years; carbon capture infrastructure is expected to expand, and regulatory frameworks are being developed to support it, but will probably not be a big part of Colorado economy until mid-century.”

“We are starting to see some movement in carbon capture. Talked with one developer and CO has a gameplan to see.”

“Can large CCUS support the 140 pipeline only workers? The short answer is yes.”

“The transport of CO₂ is a critical component of this. There are 5,000 pipelines that transmit gas or liquid CO₂. Expect 30k to 90k more pipelines.”

The oil and gas industry is nuanced: while the government is pushing for green energy, water scarcity makes this production tough. On the other hand, blue hydrogen from natural gas presents an opportunity for growth, however restrictive policy and infrastructure needs create barriers for the growing industry.

“The Colorado political environment is pushing for green hydrogen, but that needs a lot of water that they don’t have, so that makes tough for the state. They have a lot of blue hydrogen through natural gas, plus adding CCUS could be a big win for the region.”

“Oil and gas is pretty positive about blue hydrogen. Lot of opportunity there, it’s seen as something they could do.”

“Governmental policies have handicapped the hydrogen industry; a lift of those policies would accelerate the industry; Colorado policy is pretty restrictive. There is a big ecosystem around hydrogen in Colorado already to support the industry.”

“There is high interest and complex ‘chicken-and-egg’ problems around hydrogen infrastructure and production. A pipeline from Cheyenne along the Eastern Planes will be set up for hydrogen; requires a lot of pipes and resources; high potential for workforce but not discovered yet.”

“Hydrogen - it’s not a pipe dream - service companies are starting to get ready for it. There is a pretty clear pathway, especially for those on a refinery side, as well as the high-skilled, petroleum engineering, and chemical engineering. Policy and regulations will make a big difference in determining whether or not this meets both climate and energy objectives.”

As regulations are developing, opportunities within the short term are expected to rise in biogas and are expected to have overlap with oil and gas worker skills.

“Short-term opportunities exist for methane capture and renewable natural gas, especially as new regulations on methane capture for landfills are finalized. Oil and gas skills may be relevant, but there is uncertainty about the scale and specific workforce overlap.”

Some communities are starting to realize that decarbonization or alternative energy technologies can be beneficial. Alternative energy is not necessarily seen as an enemy in oil and gas communities, and communities are taking steps to participate in emerging energy technologies.

“There is a realization that this isn’t that different from other rural transformations.”

“Weld county has taken initiatives on alternative energy.”

“Generally no people in Weld county who are opposed to hydrogen development. Let’s develop it and see what it does.”

“Hooter Valley REA has a lot of coal. They’re making a switch in energy transition and they’re trying to help.”

“Larimer and Weld counties are really favorable for carbon management. Mesa and delta counties also have favorable geology for long-term storage.”

“Pueblo and Alamosa counties have steel and industrial legacy and some oil and gas. Good opportunity for hydrogen production sector.”

The Ongoing Evolution of the Colorado Oil And Gas Sector

As it has in the past, the oil and gas industry continues evolving rapidly. Historic boom and busts are a regular feature of this industry, and driven by factors outside Colorado’s control. When times are good they are very good, but when they are bad, communities suffer and workers leave the state. In general, predicting how the oil and gas industry will respond to changes, and if it is in growth or decline mode is impossible.

“Oil and gas industry had been decimated in the 80’s and recently due to shale boom in early 2010s oil and gas was expanded in Colorado; we are currently near peak development, and now post pandemic has fallen a little.”

“2020 and 2021 was bit of depression. 2014 era was another downturn.”

“Oil and gas industry has already shrunk quite a lot already. Automation is also affecting them in addition to global decarbonization goals.”

“Most refineries have moved out. Lots of people putting piping in to ship it out of state. Easier to do this regulation wise.”

“Maybe once pipeline is put in, could be bust.”

“When it goes well, they never need help filling those jobs.”

“It is a pretty tight labor market currently which gives the ability to look at alternate employment or alternate talent. Justice-involved folks and requirements around that.”

“There is a lot of uncertainty about the oil and gas future in Colorado; producers are very productive but regulatory regime has changed significantly in the last 5 years. Many new policies like new fees, new insurance requirements and more. Looking at carbon reduction goals, the industry will ultimately be decimated significantly. Productive wells but regulatory regime has really shifted from fostering industry to regulating it.”

“Might make it harder to operate in Colorado and could become uneconomical to produce in Colorado—but cleaner resources could also give them a competitive advantage. We don’t know what the future is.”

One recent development in Colorado is the consolidation of small and mid-sized oil and gas companies, acquired by much larger multi-nationals. This can have workforce benefits in terms of resources and training, but also leave Colorado more vulnerable if those companies move headquarters or leave the state.

“Mid-size oil and gas companies are disappearing and now there are large companies only; those companies have the capabilities to train their workforce appropriately and serve as their own workforce funnel; big engines of training.”

“In addition to volatility, there’s concentration in industry. Smaller actors chasing market prices have been. One actor in Colorado has shifted to focus on long-term projects regardless of prices. They’ll follow rigs around, but the work they’re doing now is less volatile now than in the past.”

“Oil and gas will be around for awhile. Whether it stays in Colorado, I don’t know.”

Larger companies may also be more willing to invest long-term in alternative energy and decarbonization opportunities. These players do not only act in Colorado, and as decarbonization becomes a priority nationally and globally, it may be easier for large corporations to focus on alternative energy company wide, regardless of the state they are acting in.

“Larger corporations are investing in long-term projects and new technologies that align with state decarbonization goals.”

“A disconnect between organizations and multinational corporations regarding evolution objectives. Trade associations, with obligations to represent a wide range of industry members, often emphasize short-term needs, whereas multinational corporations are more willing to invest in long-term, decarbonization-focused projects.”

“We talk about ourselves as a carbon management company. “

“We try and engage with those big corporations who have a vision for a clean future rather than focus on the ‘smaller players’ who think short and mid-term.”

“Upstream folks are the people that will lead the conversation.”

“Oil and gas industry will hopefully be a big partner in that transition, because they most likely will get involved in emerging industries over the next years.”

From a workforce perspective, larger companies are likely to be more effective partners. Training directly from employers is a very effective practice for workforce development, and larger companies have the resources to perform employee retraining that smaller companies do not.

“Some companies are looking to redeploy existing oil and gas skills toward decarbonization efforts, signaling a corporate commitment to transition.”

“Big multinationals would say that they have this covered. Smaller oil and gas might need support for training.”

“Smaller guys say ‘we’re going to keep drilling and operating, but there’s no overhead for retraining for those organizations.’”

“Employer led training and learning is a powerful tool in the oil and gas industry.”

The Role of Key Players in the Colorado Workforce System Ecosystem

The Colorado workforce system is quite organized but overall not focused on clean energy. The long-standing concern between the difference in resources and opportunities between rural and urbanized areas is found here as well.

“Colorado’s system is decentralized, with local workforce centers governed by local boards, higher education institutions with autonomous governing boards, and local-level decision-making in K-12 education.”

“The state figured out that workforce couldn’t operate in isolation and they went through a massive reorganization. Brought together the Office of Economic Development, Education, and Workforce. “Now it’s just a given that all of those entities are playing together. Sector partnerships is a concept that came out of that, industry-led. Targeted nursing and manufacturing and now heat pumps and beneficial electrification.”

“Makes ecosystem more complex but also more effective. Impressed with how more mature the workforce centers are now.”

“The relationship between Colorado Energy Office and Colorado Workforce Development Council has been a good working relationship for years.”

“The Colorado Talent Pipeline report affects what curriculum is developed every year... If these types of jobs aren’t in the report, then it won’t be a top priority for folks.”

“There should be an office that provides training, workforce development, community development, grant writing support. There is a lot of money for energy dependent communities for economic development, but they need help applying for and managing the funds.”

“Avoid creating a new agency but rather leverage existing offices (such as the Colorado Energy Office) to support these initiatives.”

There is limited conversation and engagement on transition issues, and decarbonization and alternative energy technologies with educational institutions, such as area technical colleges, career and technical education programs, community colleges, and four year universities. Key challenges depend on the institution, but generally the college system moves more slowly than the pace of change within industry and are not developing effective industry partnerships that connect students to the necessary skills and employment opportunities after they graduate.

“Things move a lot quicker within industry. Curriculum can’t be changed very quickly.”

“What is the community college landscape? Doesn’t seem like they know. Working with community colleges to develop training pathways into energy efficiency.”

“When funding goes to community college or other providers, they’ve tried to develop industry partnerships - but it’s difficult.”

There's a good intersection with CTE but there's also more work to be done.

"Operators and local school boards have joint program."

"We give presentations to votech schools to tell them about opportunities in clean energy."

"Pipefitters accredited their apprenticeship program as a stand-alone program at a local college."

Community colleges seem to be the best opportunity for near-term engagement and evolution but struggle with the same issues as across the educational system in connecting to workforce needs and emerging technologies.

"Community college examples, who are pushing for new training include Colorado Northwest Community College (CNCC) in Craig, Fort Lewis Community College in Durango, Colleges on Eastern plains and Technical Training College in Delta."

"Community colleges are getting very hip to the fact that this stuff needs to change."

"Community colleges are a critical partner in these rural towns."

"Develop a curriculum for careers in carbon management and work with community colleges and unions on this."

"Scholarship program was available through the state originally. Impetus to attract students—initially the program was really successful. Once scholarships went away, they had to rebuild the interest. Doesn't pop up as readily on a search now."

"Variable interest in updating their curriculum for heat pumps. It just takes time. Pueblo Community College and Aurora Community College are full throttle developing programs and throwing lots of money into that."

Despite increasing interest overall, renewable energy has not been a source of union interest or growth.

“We have a lot of non-union construction for a number of years.”

“Colorado doesn’t have a lot of union density, less than 7 percent.”

“Other trades like glaziers and tile layers have much smaller locals and not a whole lot of market share. Makes an ‘all union’ project much more difficult than a project in Minnesota or California.”

“Most union work is not oil and gas or renewable energy. Have not executed a project labor agreement around renewable energy to date either. There have been union who help set up blades but never had a steelworker or ironworker who set up a tower.”

However, individual crafts believe they could thrive within an “all of the above” framework, and many locals are very interested about specific alternative technologies or industries.

“Mechanical Electrical plumbing trades are pretty solid; they’re lucky.”

“Transition for IBEW is that they’re in the best place possible, especially electrification.”

“Electrification and stuff will keep pipefitters working.”

“LiUNA has renewable energy campaign going on. Pueblo county is the hotbed of renewables right now. Wind is common, and solar in Pueblo is a big deal. There are some projects being built with IRA funds.”

Apprenticeships are an attractive opportunity for certain locals, but there is a lack of apprenticeship opportunities for newer clean/alternative energy technologies.

“Only thing limiting apprenticeships is how many projects they have every year. 1 to 1 ratio with journey to apprenticeships.”

“Some crafts are struggling to find applicants, but the pipefitters have 3-4 applicants for every apprentice opening.”

“CTE pre-apprenticeship program to be created so that workers at a younger point can be interested in these jobs. New technologies will need new apprenticeship and pre-apprenticeships pathways.”

Workforce Development Strategies for the Oil and Gas Worker

Workforce training and transferability in oil and gas has tended to be concentrated in a few positions in the field that are most sensitive to a boom and bust cycle. Understanding the dynamic between upstream workforce development and downstream will allow for more targeted and effective workforce development and transition opportunities.

“Sometimes help train in other fields, construction predominantly. When times are tough, they do need help.”

“Rig hands are the most affected during downcycle.”

“Support industry are also affected—delivering products, trucking, sand going out to fracking sites.”

“There’s not a dedicated pathway for these guys.”

“Front end of development is very boom and bust and they go to wherever the industry is developing.”

“A separation between professions in the oil and gas industry when it comes to workforce development programs seems like a good idea since they are all really different - different strategies for different professions within the oil and gas industry are needed.”

The skills found in the oil and gas sector are going to be critical to keep in the state, in terms of translating into other technologies, and for larger clean energy and climate goals. Skills like equipment operation and pipeline are especially relevant to various emerging technologies in alternative energy and decarbonization.

“The oil and gas workforce is needed short and medium term, and we will need them long term for the clean energy transition.”

“Steam methane reforming skillset can be used for clean hydrogen, and HVAC installers can install heat pumps.”

“Oil and gas workers have skills like drilling, fluid management, piping that could translate into roles in emerging sectors such as geothermal, hydrogen, and carbon capture.”

“Some transition may happen naturally as workers seek future opportunities independently, given the timeline for decarbonization efforts and that being over the course of 10 to 15 years.”

“Some skills are transferable, like in Delta County they were able to transfer into broadband sector and laying of fiber.”

The most obvious impediment to transition is in matching wages. Oil and gas work is hard and dangerous, and the workers are compensated for this. While occupations are similar in other industries, the wages just don’t compare due to the relative safety.

“The real challenge is to give them new opportunities which are comparable in wage and location.”

“Looked at wage gaps around weatherization and that turned a lot of people away from these things.”

“Mass production is mostly union guys who make good money--\$75/hr full package and work 12hrs day. Heap load of money 150-160k year plus benefits.”

The benefits and wages of unionized labor could also support a transition of workers, although this conversation is not yet happening. In addition to unionizing workers, there are other pathways to maintaining higher wages.

“Conversation around labor portion of projects needs to happen. No point in avoiding elephant in the room.”

“Organized labor could play a role in maintaining workers, transitioning workers that have been affected by transition from oil and gas. Have to help organized labor see the vision. Always have project labor agreements in place around carbon management and project labor agreements should have local and targeted hire provisions.”

“Maybe establish Unions and have union wages; It is one thing to train people but then another thing to find employers to hire people at those wage expectations.”

“The way that Colorado does well plugging; state hires third party contractors. Those contractors work for state as well as the oil and gas sector. So wages should be comparable unless state’s contract squeezes them more. Jobs and skills are the same between working at well and plugging wells.”

Some oil and gas workers, especially in upstream markets, seem destined to leave the state. Colorado may lessen oil and gas production, but the opportunities are likely to continue existence in other parts of the country.

“We’ve seen more people leave the state to follow oil and gas jobs. People often leave the state to go to North Dakota rather than use in-state employment services.”

“So many people just leave the state to go work elsewhere. “

“The workers will follow the work. That’s when you’ll see people leaving the area. Workers follow the work. If they can, they’ll move. If they can’t, then they have to think about a new career in real estate, car sales, etc.”

“Workforce in oil and gas is much more mobile and transient than the coal workforce; oil and gas workers follow the work from location to location throughout the US; it makes workforce development different.”

“The oil and gas industry includes both highly localized roles and jobs that are flexible, allowing workers to move as projects arise.”

“Unless something significantly changes, most people will just move. Helpful to say there’s opportunity in these emerging spaces and the truth is that it’s going to be easier for a current worker doing field work to go to New Mexico rather than figure this out.”

“Western Colorado; there’s a sense that a lot of the workforce was transient. For drilling and fracking - this is definitely true, but operations and maintenance jobs are local. There’s just not a lot of operations and maintenance jobs.”

“Travel lens is super important. [An oil major is] interested in carbon management, hydro, geothermal but uncertain where and when. Even in 2060 this will be a quarter of their employment total now. Their planning suggests in next couple decades a lot of folks will leave Colorado and go elsewhere. Path of least resistance is relocation, not retraining.”

“Oil and gas workers are generally more mobile and accustomed to working across different regions compared to coal workers.”

However, the movement of these workers out of Colorado is not guaranteed. For those workers, stability is important, or, potentially, new opportunities in existing spaces. Many of these workers have entrepreneurial interests that could be fostered.

“Some people say I have had enough volatility and they want to go elsewhere. Not a lot of ‘there’s no work right now, I want to go elsewhere’”

“Even if development doesn’t continue to happen, the existing infrastructure still needs to be maintained. Steady plateau of employment.”

“A surprising number of folks want to start their own businesses. For example, there is large equipment in mines, and they want to start machinery business. Some interest in geothermal startup, and they need training on putting a business plan together.”

“Not sure people would follow the wells out of state—it takes a lot to uproot a family. People installing the wells might travel elsewhere as they already do. But the technical people that are through this program are given a territory and if that work dries up, they could transition.”

“There are a large proportion of workers who may not actually be living in the community where they are working, but might be there temporarily. They may actually have an opportunity to get a job closer to their home community.”

Some existing grants and working taking place, but not organized or coordinated by a shared workforce strategy, or a common entity.

“Colorado Department of Transportation has a staff workforce development program with development grants.”

“Colorado Energy Office has reskilling, training and upskilling in HVAC/heat pump space.”

“Colorado State University was awarded a grant from the Department of Transportation for 3 hydrogen fueling stations.”

“Energy efficiency business coalition if we’re so inclined. They got a big NSF grant to work with University of Denver to develop workforce tools.”

There is lots of funding overall at the federal level, as well as funding that sits at the state level and funding that sits with large employers. These funds are easier for state agencies to manage, but less so for communities, who can struggle with capacity issues

“There is a lot of funding from state and federally.”

“Might be some specific funding streams that are more available now than previously.”

“The Colorado Workforce Development Council has tremendous resources and is deploying them effectively.”

“Federal has a lot of funds but hard to get at these funds. Very appreciative of it but hard to obtain. Philanthropy is too small. Federal is not end-all be-all.”

“Small towns who have not enough staff members may not have interest in managing federal grants; those have too many requirements to be managed effectively for them. The biggest barrier for small communities is the human factory - having time to apply and manage federal resources. Human and capacity piece is missing.”

“For communities and employees, employers are a potential funder. Xcel Energy and Tri-State are funders and have already committed funding.”

“We do not anticipate more tax credits and incentives over coming years; the state budget may be more tight. The current funding round for geothermal may be the last one for the time being.”

Learning and Understanding is Paramount

Overall, there remains a dearth of understanding, strategy and research understanding how these skills are going to translate into alternative energy industries or decarbonization, and what those best practices look like.

“Decommissioning oil and gas wells and transitioning extraction workers to decommissioning - no one has done this analysis. A lot of the skills would be transferable from rigs, drilling new wells, to decommissioning wells. Is it really the oil and gas workers who are doing the plugging jobs, or is a different set of skills?”

“Need to develop statewide retention strategy to retain those affected workers. Specifically focused on carbon management.”

“Nobody knows in the energy transition context. Nothing in terms of best practice: You can look to the coal experience, but it’s not transferable. Closing coal plants can transfer, can’t do that in oil and gas except maybe in oil refineries.”

“Geothermal workforce survey is not aligned. It’s too early to tell and feels like a gamble for some people. Who knows if this is a technology that sticks around. Potential optimism.”

“Before you even establish resourcing, we need better visibility into the demand side of the forthcoming volume of work that is directly transferrable, and what time frame, and is there a better way for us to have access to workers themselves.”

“Many emerging technologies are still in early stages and dependent on regulations; it is too early to say whether the workforce will be willing to do the transfer; people will need to see what technologies will ‘stick around.’”

There remains a considerable misunderstanding about what oil and gas workers are interested in and want to do. Some of this connects to wages, or the desire to stay close to their current job. Other is about the nature of the job.

“People are not leaving oil and gas to go to carbon. Carbon is not going to oil and gas either. Don’t think it pays as well. Looking more for developers. The carbon industry is looking more for manufacturer.”

“Oil and gas is inherently dangerous so they have to pay more. Newer jobs aren’t as demanding or physically dangerous.”

“We’re very aware that an HVAC job is not the same as an oil and gas job. It has very different skills and wages and benefits and we don’t want to assume that energy efficiency jobs are attractive to those communities—instead of just assuming that there’s just a pool of labor you can tap because they were in ‘energy’ jobs.”

“Crafts are very proud of work they do. Gas welder requires different set of skills and mindset. Wages, work, type of work, craft isn’t the same. Pipefitter isn’t going to do solar work.”

“‘Oh these guys can do home to hydro or solar panels’ - the jobs just aren’t the same. It’s offensive.”

“They’re resilient people—they don’t work across the street; they’re often leaving the county. They’re hard workers. Leave family 4-5 days out of the week. Spouse needs help and daycare. Tough folks with good family backgrounds.”

The bottom line is that workers need agency in the process, and much more attention needs to be paid in learning about their interests and needs. A humanistic approach is paramount to developing strategies and opportunities for these workers and means making their interests and ideas a priority. The workers do have valuable skills and should be aware and told of their unique skills and how they can be important to other parts of the economy.

“For oil and gas workers, it is important to be really respectful and keep in mind that it is not only about finding ‘some job in the same zip code,’ but more about giving opportunity and knowledge.”

“Resiliency office funded a strategic plan for how they were going to create transition jobs and found that the human element really matters. It needs boots on the ground to talk with existing workforce, find out what they are interested in and then match them with new opportunities.”

“Give them all the information about how transferable their skills are, what the job demand looks like in their area and then let them choose; give opportunity rather than direction.”

“It is critical to approach communities and ask them what they are interested in instead of general assumption that everyone on oil and gas or coal wants to transition to a different energy job.”

Also, there is a need to also engage directly with the communities in the same process of exploration and hear how they want to participate in any transition. Similarly, the needs of each community will be different and should be catered to the local communities’ values and interests.

“It is critical to approach communities and ask them what they are interested in instead of general assumption that everyone on oil and gas or coal wants to transition to a different energy job.”

“Energy communities will need to be empowered and perceived as experts when it comes to where to transition to.”

“A lot of outreach needs to happen; are communities, who will be affected by a transition, interested in having that conversation?”

“Engage them in thinking about disruptions they are susceptible to including both short- and long-term disruptions; then ask how they would act on these through the lens of their own values; that way of approaching communities has to be empowered and grounded based on what local communities care about. We can't force a narrative on a community.”

“If we come with a generic playbook with how communities can diversify, they're not going to buy-in and they'll even be more resistant. You can touch climate and drought because they see it but framed in what they know.”

“One of the biggest challenges is helping people re-envision what their community could look like.”

“Need to overcome the inertia of the feeling that the transition is happening to them.”

“Engage them to discuss values and understand how new industries align with their existing values.”

APPENDIX D: TRAINING INVENTORY

The research team compiled an extensive inventory of 586 publicly accessible training and credentialing programs designed to prepare workers for key roles in energy transition industries that are based in Colorado. These programs encompass apprenticeships, degree-granting courses, certification opportunities, and job-readiness initiatives, which, while not credential-focused, equip participants with foundational knowledge and career development skills. Additionally, the inventory includes select research opportunities, primarily targeted at students pursuing four-year or advanced degrees.

To identify these programs, researchers utilized Colorado's Registered Apprenticeship Directory and separately examined offerings from community colleges, technical schools, universities, labor unions, and other local training and education organizations, including non-profits and for-profit businesses. The team also conducted desktop research, particularly to locate programs in niche and emerging technologies such as biofuels and hydrogen. Priority was given to occupations within the energy sector projected to experience significant growth in Colorado.

All programs included were publicly accessible at the time of research. Collected information covers details such as industry, program name, provider, program type, occupational focus, location (zip code, city, county), and source links. The provided table lists industry, program name, provider, program type, occupational focus, and county for all identified training programs. Some programs are offered online, with most online options originating from Colorado-based providers. However, for emerging fields like biofuels, hydrogen, carbon capture and storage (CCUS), and geothermal energy, online training options available to Colorado residents—regardless of the provider's location—were also included.

While some programs cater to multiple career pathways, the report identifies the most likely occupation to benefit as the primary focus. For instance, introductory geothermal courses might serve heating, ventilation, and air conditioning (HVAC) technicians, engineers, and business professionals interested in investing in the field.

Table 10 in the report presents the distribution of identified programs by county. However, no programs were identified in the following counties: Baca, Clear Creek, Conejos, Costilla, Custer, Dolores, Elbert, Fremont, Gilpin, Hinsdale, Huerfano, Jackson, Lake, Mineral, Rio Blanco, San Juan, San Miguel, Saguache, Sedgwick, Summit, Teller, and Washington.

Training Inventory of Colorado-based Training Programs Related to Energy Transition Occupations

INDUSTRY: ARCHITECTURE AND ENGINEERING				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Engineering Science	Aims Community College	Associate degree	Engineering	Weld
Engineering Technology: Computer Aided Drafting	Aims Community College	Associate degree	Engineering	Weld
Civil CAD Certificate	Aims Community College	Certificate	Mechanical Drafter/Designer	Weld
Engineering Technician	Front Range Community College	Job readiness	Engineering	Online
Mechatronics	Front Range Community College	Job readiness	Electric Technician	Online
Industrial Engineering Technician	Boulder Chamber of Commerce	Apprenticeship	Engineering	Boulder
Machine Maintenance Technician	Boulder Chamber of Commerce	Apprenticeship	Mechanic	Boulder
Industrial Manufacturing Technician	Mikron Corporation Denver	Apprenticeship	Industrial Manufacturing Technician	Arapahoe
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	Colorado Contractors Association, Inc.	Apprenticeship	Operating Engineer	Arapahoe
Drafter, Mechanical	Careerwise Colorado	Apprenticeship	Mechanical Drafter/Designer	Denver
Industrial Manufacturing Technician	Careerwise Colorado	Apprenticeship	Industrial Manufacturing Technician	Denver
Electronics Technician	Tri-State G&T Association Inc. JATC Transmission (West)	Apprenticeship	Electric Technician	Weld
Calibration Laboratory Technician	Coors Tek (Global Headquarters)	Apprenticeship	Calibration technologists and technicians	Jefferson
Industrial Manufacturing Technician	Coors Tek (Global Headquarters)	Apprenticeship	Industrial Manufacturing Technician	Jefferson
CAD Design Technician	Merrick and Company	Apprenticeship	Mechanical Drafter/Designer	Arapahoe
Geomatics Technician	Surveying and Mapping LLC	Apprenticeship	Geomatics Technician	Arapahoe
Electronics Technician	Crowley County Correctional Facility	Apprenticeship	Electric Technician	Crowley

INDUSTRY: BIOFUELS				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Biofuel Production Operations	Front Range Community College	Job readiness	Biofuel Production Operator	Online
Biofuel Production Operations	Colorado State University	Certificate	Biofuel Production Operator	Online

INDUSTRY: BUILDING AND GROUNDS CLEANING AND MAINTENANCE				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Arborist	City of Aurora Forestry Division	Apprenticeship	Grounds Maintenance	Arapahoe
Tree Trimmer (Line Clearer)	City of Aurora Forestry Division	Apprenticeship	Grounds Maintenance	Arapahoe
Arborist	Taddiken Tree Care Company	Apprenticeship	Grounds Maintenance	Boulder
Arborist	Altitude Arborist	Apprenticeship	Grounds Maintenance	Broomfield
Arborist	Arbortec Tree Service	Apprenticeship	Grounds Maintenance	Broomfield
Arborist	Johnny Apple Tree Care	Apprenticeship	Grounds Maintenance	Gunnison
Arborist	ArborScapes, Inc.	Apprenticeship	Grounds Maintenance	Denver
Arborist	SavATree	Apprenticeship	Grounds Maintenance	Denver
Tree Trimmer (Line Clearer)	SavATree	Apprenticeship	Grounds Maintenance	Denver
Arborist	Old Growth Tree Service	Apprenticeship	Grounds Maintenance	Eagle
Arborist	Affordable Tree Service	Apprenticeship	Grounds Maintenance	Boulder
Arborist	Summit Tree Care	Apprenticeship	Grounds Maintenance	Boulder
Arborist	Patriot Tree Company	Apprenticeship	Grounds Maintenance	Boulder
Arborist	We Love Trees	Apprenticeship	Grounds Maintenance	Boulder
Arborist	Don's Tree Service	Apprenticeship	Grounds Maintenance	Archuleta
Tree Trimmer (Line Clearer)	Lind Legacy Tree Service	Apprenticeship	Grounds Maintenance	El Paso
Arborist	Forrest Tree Service, LLC	Apprenticeship	Grounds Maintenance	Pueblo
Arborist	Tree Top Inc.	Apprenticeship	Grounds Maintenance	Larimer

INDUSTRY: CARBON CAPTURE				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Research Experiences in Carbon Sequestration	RECS	Research	Scientist	Boulder
Carbon Capture, Utilization and Storage	Colorado School of Mines	Certificate	Engineering	Online
Carbon Capture, Utilization and Storage (CCUS) Essentials for Energy Leaders	EvaluteEnergy	Job readiness	Management	Online
Carbon Capture and Storage Basic Training	Smart Electric Power Alliance	Job readiness	Management	Online
Carbon Capture in Practice: Technical Considerations and Cost Analysis	EvaluteEnergy	Job readiness	Management	Online
Carbon Capture Utilization and Storage	All Star Training	Certificate	Engineering	Online
Carbon Capture, Utilization, and Storage	PetroSkills	Job readiness	Management	Online
CCUS 101: Carbon Capture, Sequestration, Utilization & Storage	EUCI	Job readiness	Management	Online

INDUSTRY: CONSTRUCTION				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Elevator Constructor (Alternate Title: Elevator Constructor Mechanic)	Peak Elevator Performance Group	Apprenticeship	Construction	Jefferson
Composite Plastic Fabricator (Existing Title: Insulation Worker)	Heat and Frost Insulators JATC	Apprenticeship	Construction	Arapahoe
Construction Craft Laborer	Primoris Renewable Energy	Apprenticeship	Construction	Arapahoe
Construction Management	Community College of Aurora	Associate degree	Construction Manager	Arapahoe
Construction Superintendent Cert	Community College of Aurora	Certificate	Construction Manager	Arapahoe
Electrician (alternate title: Interior Electrician)	Blue Sky Solar and Roofing	Apprenticeship	Electrician	Arapahoe
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	Ames Construction	Apprenticeship	Operating Engineer	Arapahoe
Operator	Primoris Renewable Energy	Apprenticeship	Operating Engineer	Arapahoe

Plumber	Denver Plumbers JATC	Apprenticeship	Plumber/Pipefitter	Arapahoe
Cement Mason	TIC - The Industrial Company	Apprenticeship	Cement Mason	Adams
Construction Craft Laborer	TIC - The Industrial Company	Apprenticeship	Construction	Adams
Pipefitter (Construction)	TIC - The Industrial Company	Apprenticeship	Plumber/Pipefitter	Adams
Structural Steel Worker (Alternate Titles: Ironworker or Structural Ironworker)	TIC - The Industrial Company	Apprenticeship	Metal/Steel Worker	Adams
Chimney Repair	Chimney Doctors LLC	Apprenticeship	Construction	Park
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	IUOE Local No. 9 Apprenticeship and Training Committee	Apprenticeship	Operating Engineer	Adams
Painter (Construction)	Brighten Up Painting and Restoration, LLC	Apprenticeship	Construction	Denver
Plumber	Bernie's Plumbing and Heating Co.	Apprenticeship	Plumber/Pipefitter	Boulder
Construction Craft Laborer	Colorado Laborers and Contractors JATC	Apprenticeship	Construction	Adams
Renewable Energy Construction Laborer	GPT Renewables	Apprenticeship	Construction	Douglas
Carpenter	Colorado Contractors Association, Inc.	Apprenticeship	Carpenter	Arapahoe
Cement Mason	Colorado Contractors Association, Inc.	Apprenticeship	Construction	Arapahoe
Construction Craft Laborer	Colorado Contractors Association, Inc.	Apprenticeship	Construction	Arapahoe
Operating Engineer	Interstate Power Systems Inc	Apprenticeship	Operating Engineer	Arapahoe
Plumber	C and B Plumbing Inc. Apprenticeship Program	Apprenticeship	Plumber/Pipefitter	Larimer
Cabinetmaker	Keating Woodworks	Apprenticeship	Cabinetmaker	El Paso
Glazier	GNJ Pikes Peak Glass Inc. and City Glass Company	Apprenticeship	Glazier	El Paso
Roofer	Southern Colorado Roofers JATC	Apprenticeship	Construction	El Paso
Building and Construction Technology with an Electrical Emphasis	Pikes Peak State College	Associate degree	Construction	El Paso
Electrical Advanced Applications	Pikes Peak State College	Certificate	Electrician	El Paso

Electrical Fundamentals	Pikes Peak State College	Certificate	Electrician	El Paso
Pipefitter (Construction)	Colorado Springs Plumbers/Pipefitters JATC	Apprenticeship	Plumber/Pipefitter	El Paso
Plumber	Colorado Springs Plumbers/Pipefitters JATC	Apprenticeship	Plumber/Pipefitter	El Paso
Lightning Protection Technician (Conventional System)	Peifer Corey Enterprises Inc dba Mr. Lightning	Apprenticeship	Electric Technician	El Paso
Roofer	Jewett Roofing Company	Apprenticeship	Construction	El Paso
Construction Management	Aims Community College	Associate degree	Construction Manager	Weld
Gas-Main Fitter	Colorado Springs Utilities	Apprenticeship	Plumber/Pipefitter	El Paso
Painter (Construction)	A Lyons Painting	Apprenticeship	Construction	El Paso
Pipefitter	Colorado Springs Utilities	Apprenticeship	Plumber/Pipefitter	El Paso
Plumber	SoCo Trade Apprenticeship Programs	Apprenticeship	Plumber/Pipefitter	El Paso
Renewable Energy Technologies	Lamar Community College	Associate degree	Energy Auditor	Prowers
Elevator Constructor	Morning Star Elevator	Apprenticeship	Construction	El Paso
Construction Craft Laborer	RSL Contractors	Apprenticeship	Construction	Adams
Fence Erector	Life Time Fence	Apprenticeship	Construction	Adams
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	GeoStabilization International (GSI)	Apprenticeship	Operating Engineer	Adams
Elevator Constructor (Alternate Title: Elevator Constructor Mechanic)	Elevated Technologies LLC	Apprenticeship	Construction	Moffat
Assembler, Metal Building	Mortenson	Apprenticeship	Assembler	Denver
Construction Craft Laborer	McCarthy Building Companies	Apprenticeship	Construction	Denver
Construction Craft Laborer	Mortenson	Apprenticeship	Construction	Denver
Energy Efficiency Technician	Colorado Energy Office	Apprenticeship	Electric Technician	Denver
Form Builder Carpenter (Existing Title: Form Builder)	Mortenson	Apprenticeship	Construction	Denver
Operating Engineer	McCarthy Building Companies	Apprenticeship	Operating Engineer	Denver

Operating Engineer	Mortenson	Apprenticeship	Operating Engineer	Denver
Building Science Principles	Building Performance Institute	Certificate	Energy Auditor	Online
Plumber	Denver Public Schools	Apprenticeship	Plumber/Pipefitter	Denver
Healthy Housing Principles	Building Performance Institute	Certificate	Energy Auditor	Online
Leadership in Energy and Environmental Design (LEED)	Front Range Community College	Job readiness	Construction Manager	Online
Renewable Energy Specialization	University of Colorado - Boulder	Certificate	Construction Manager	Online
Site Supervisor Certificate	Building Performance Institute	Certificate	Construction Manager	Online
Total Building Performance Certificate	Building Performance Institute	Certificate	Energy Auditor	Online
Form Builder (Construction)	Construction Education Foundation of Colorado (CEF)	Apprenticeship	Construction	Denver
Highway Maintenance Specialist - Traffic/Safety Speciality	Colorado Department of Transportation	Apprenticeship	Construction	Denver
Highway Maintenance Specialist - Tunnel Speciality	Colorado Department of Transportation	Apprenticeship	Construction	Denver
Construction Craft Laborer	Denverworks	Apprenticeship	Construction	Denver
Bricklayer (Construction)	Colorado S/W Trowel Trades JATC	Apprenticeship	Bricklayer	Denver
Marble Finisher	Colorado S/W Trowel Trades JATC	Apprenticeship	Construction	Denver
Marble Setter	Colorado S/W Trowel Trades JATC	Apprenticeship	Construction	Denver
Terrazzo Finisher	Colorado S/W Trowel Trades JATC	Apprenticeship	Construction	Denver
Terrazzo Worker	Colorado S/W Trowel Trades JATC	Apprenticeship	Construction	Denver
Tile Finisher	Colorado S/W Trowel Trades JATC	Apprenticeship	Construction	Denver
Tile Setter	Colorado S/W Trowel Trades JATC	Apprenticeship	Construction	Denver
Sprinkler Fitter (Existing Title: Pipefitter)	Matrix Fire Protection	Apprenticeship	Plumber/Pipefitter	Denver
Sheet Metal Worker	Colorado Statewide Sheet Metal Workers JATC	Apprenticeship	Metal/Steel Worker	Denver
Cement Mason	Colorado S/W Plaster/Cement Mason JATC	Apprenticeship	Construction	Denver

Plasterer	Colorado S/W Plaster/Cement Mason JATC	Apprenticeship	Construction	Denver
Bricklayer and Mason (Ex. Title: Bricklayer (Brick and Tile) or (Masonry)	Rocky Mountain Masonry Institute	Apprenticeship	Bricklayer	Denver
Cabinetmaker	Colorado Carpenters and Affiliated Trades JATC	Apprenticeship	Cabinetmaker	Denver
Carpenter	Colorado Carpenters and Affiliated Trades JATC	Apprenticeship	Carpenter	Denver
Drywall Applicator (Alternative Title: Drywall Applicator Specialist)	Colorado Carpenters and Affiliated Trades JATC	Apprenticeship	Construction	Denver
Pipefitter - Sprinkler Fitter	American Sprinkler Inc	Apprenticeship	Plumber/Pipefitter	Denver
Pipefitter (Construction)	Denver Pipefitters JATC	Apprenticeship	Plumber/Pipefitter	Denver
Structural Steel Worker (Alternate Titles: Ironworker or Structural Ironworker)	Iron Workers Joint Apprenticeship and Training Trust Fund	Apprenticeship	Metal/Steel Worker	Denver
Floor Layer	Carpet/Linoleum/Til e Layer S/W JATC	Apprenticeship	Construction	Denver
Glazier	Colorado S/W Glaziers/Glass Workers JATC	Apprenticeship	Glazier	Denver
Painter (Construction)	Colorado Area Painting and Decorating JATC	Apprenticeship	Construction	Denver
Painter (Construction)	Shamrock Painting	Apprenticeship	Construction	Denver
Plumber	Foster Plumbing	Apprenticeship	Plumber/Pipefitter	Denver
Taper (Alternative Title: Drywall Finisher)	Colorado Area Painting and Decorating JATC	Apprenticeship	Construction	Denver
Elevator Constructor (Alternate Title: Elevator Constructor Mechanic)	H.E.S. Elevator Services, Inc	Apprenticeship	Construction	Denver
Pipefitter (Construction)	RK Industries	Apprenticeship	Plumber/Pipefitter	Denver
Plumber	RK Industries	Apprenticeship	Plumber/Pipefitter	Denver
Sheet Metal Worker	RK Industries	Apprenticeship	Metal/Steel Worker	Denver
Structural Steel Worker (Alternate Titles: Ironworker or Structural Ironworker)	RK Industries	Apprenticeship	Metal/Steel Worker	Denver

Pipefitter (Construction)	Central Fire Protection Cont., Inc.	Apprenticeship	Plumber/Pipefitter	Denver
Sprinkler Fitter (Existing Title: Pipefitter)	CFS Systems	Apprenticeship	Plumber/Pipefitter	Denver
Electrician, Maintenance	City and County of Denver/Denver International Airport	Apprenticeship	Electrician	Denver
Plumber	City and County of Denver/Denver International Airport	Apprenticeship	Plumber/Pipefitter	Denver
Construction Craft Laborer	Konisto Companies LLC	Apprenticeship	Construction	La Plata
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	Springs Excavation Inc.	Apprenticeship	Operating Engineer	La Plata
Hazardous-Waste Material Technician	ME Training	Apprenticeship	Hazardous-Waste Material Technician	Arapahoe
Pipefitter (Construction)	Diamond Fire Protection Company	Apprenticeship	Plumber/Pipefitter	Arapahoe
Plumber	Garvin's Sewer Service	Apprenticeship	Plumber/Pipefitter	Arapahoe
Solar Technician	E Light Electric Multi-employer Program	Apprenticeship	Solar Technician	Arapahoe
Plumber	Dairy Specialists	Apprenticeship	Plumber/Pipefitter	Weld
Plumber	Independent Plumbing Solutions, Inc.	Apprenticeship	Plumber/Pipefitter	Larimer
Plumber	Mr. Rooter Plumbing	Apprenticeship	Plumber/Pipefitter	Weld
Pipefitter (Construction)	Excel Fire Protection, Inc.	Apprenticeship	Plumber/Pipefitter	Mesa
Pipefitter (Construction)	Bristol Industries	Apprenticeship	Plumber/Pipefitter	Jefferson
Plumber	Cookeys Mechanical, Inc.	Apprenticeship	Plumber/Pipefitter	Mesa
Laborer	Ptero-Pier	Apprenticeship	Construction	Weld
Plumber	Top Notch Plumbing LLC	Apprenticeship	Plumber/Pipefitter	Weld
Plumber	Alpha Mechanical Solutions, LLC	Apprenticeship	Plumber/Pipefitter	Gunnison
Plumber	Viking Co. and Design	Apprenticeship	Plumber/Pipefitter	Lincoln
Construction Craft Laborer	H-2 Enterprises, LLC	Apprenticeship	Construction	Weld
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	H-2 Enterprises, LLC	Apprenticeship	Operating Engineer	Weld

Plumber	UMC, Inc.	Apprenticeship	Plumber/Pipefitter	Jefferson
Sheet Metal Worker	UMC, Inc.	Apprenticeship	Metal/Steel Worker	Jefferson
Sprinkler Fitter (Existing Title: Pipefitter)	Affordable Fire Protection, Inc.	Apprenticeship	Plumber/Pipefitter	Mesa
Construction Craft Laborer	New Energy Structures Company (NESCO)	Apprenticeship	Construction	Boulder
Operating Engineer (Alternate Title: Heavy Construction Equipment Mechanic)	New Energy Structures Company (NESCO)	Apprenticeship	Operating Engineer	Boulder
Pipefitter (Construction)	Design Mechanical	Apprenticeship	Plumber/Pipefitter	Boulder
Plumber	Design Mechanical	Apprenticeship	Plumber/Pipefitter	Boulder
Sheet Metal Worker	Design Mechanical	Apprenticeship	Metal/Steel Worker	Boulder
Operating Engineer	City of Loveland	Apprenticeship	Operating Engineer	Larimer
Structural Steel Worker (Alternate Titles: Ironworker or Structural Ironworker)	LPR Construction (Ironworker)	Apprenticeship	Metal/Steel Worker	Larimer
Sheet Metal Worker	Kuck Mechanical LLC	Apprenticeship	Metal/Steel Worker	Larimer
Operating Engineer	Black Mountain Excavation	Apprenticeship	Operating Engineer	Weld
Sprinkler Fitter (Existing Title: Pipefitter)	Dynamic Fire Protection, Inc.	Apprenticeship	Plumber/Pipefitter	Montrose
Cabinetmaker	Crowley County Correctional Facility	Apprenticeship	Cabinetmaker	Crowley
Electrician, Maintenance	Crowley County Correctional Facility	Apprenticeship	Electrician	Crowley
Painter (Construction)	Crowley County Correctional Facility	Apprenticeship	Construction	Crowley
Sprinkler Fitter (Existing Title: Pipefitter)	Extreme Fire Protection Company	Apprenticeship	Plumber/Pipefitter	Douglas
Plumber	Blue Mountain Mechanical	Apprenticeship	Plumber/Pipefitter	Douglas
Wood Flooring Specialist	Artistic Floors by Design	Apprenticeship	Construction	Douglas
Plumber	Vision Air HVAC Inc	Apprenticeship	Plumber/Pipefitter	Pueblo
Plumber	Flow Right Plumbing, Heating, and Irrigation	Apprenticeship	Plumber/Pipefitter	Pueblo
Elevator Constructor (Alternate Title: Elevator Constructor Mechanic)	IUEC Local 25 JATC	Apprenticeship	Construction	Arapahoe

Structural Steel Worker (Alternate Titles: Ironworker or Structural Ironworker)	Trivent Safety Consulting LLC	Apprenticeship	Metal/Steel Worker	Adams
Bricklayer (Construction)	Construction Industry Training Council	Apprenticeship	Bricklayer	Jefferson
Carpenter	Construction Industry Training Council	Apprenticeship	Carpenter	Jefferson
Pipefitter (Construction)	Construction Industry Training Council	Apprenticeship	Plumber/Pipefitter	Jefferson
Plumber	Construction Industry Training Council	Apprenticeship	Plumber/Pipefitter	Jefferson
Sheet Metal Worker	Construction Industry Training Council	Apprenticeship	Metal/Steel Worker	Jefferson
Construction Technology	Trinidad State College	Job readiness	Construction	Las Animas
Foundations of Plumbing	Front Range Community College	Job readiness	Plumber/Pipefitter	Online
Plumbing Service Certificate	Red Rocks Community College	Certificate	Plumber/Pipefitter	Jefferson
Plumbing Service Certificate	Red Rocks Community College	Certificate	Plumber/Pipefitter	Jefferson
Pipefitting	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	El Paso
Pipefitting	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	Denver
Pipefitting	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	Mesa
Pipefitting	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	Cheyenne
Plumbing	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	El Paso
Plumbing	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	Denver
Plumbing	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	Mesa
Plumbing	Western States College of Construction	Apprenticeship	Plumber/Pipefitter	Cheyenne

INDUSTRY: ELECTRIC				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Street-Light Servicer	Lumin8 Transportation Technologies LLC	Apprenticeship	Electrician	Jefferson
Line Maintainer (Alternate Title: High Voltage Electrician)	City of Aspen Utilities	Apprenticeship	Electrical Power-Line Installers and Repairers	Pitkin
Electrician	Primoris Renewable Energy	Apprenticeship	Electrician	Adams
Telecom Technical School	Fiber Optic Technician	Apprenticeship	Electric Technician	Arapahoe
Electrician (alternate title: Interior Electrician)	TIC - The Industrial Company	Apprenticeship	Electrician	Adams
Substation Line Worker	TIC - The Industrial Company	Apprenticeship	Electrical Power-Line Installers and Repairers	Adams
Transmission Line Worker	TIC - The Industrial Company	Apprenticeship	Electrical Power-Line Installers and Repairers	Adams
Electrician (alternate title: Interior Electrician)	New Electric, Inc.	Apprenticeship	Electrician	Eagle
Electric Meter Repairer	United Power, Inc. JAC	Apprenticeship	Control and Valve Installers and Repairers	Weld
Line Maintainer (Alternate Title: High Voltage Electrician)	United Power, Inc. JAC	Apprenticeship	Electrical Power-Line Installers and Repairers	Weld
Line Repairer	United Power, Inc. JAC	Apprenticeship	Electrical Power-Line Installers and Repairers	Weld
Electrician (alternate title: Interior Electrician)	Timken Motor and Crane	Apprenticeship	Electrician	Broomfield
Electrician-Field Service	Timken Motor and Crane	Apprenticeship	Electrician	Broomfield
Electric Meter Repairer	Sangre de Cristo	Apprenticeship	Control and Valve Installers and Repairers	Chaffee
Line Repairer	Sangre de Cristo	Apprenticeship	Electrical Power-Line Installers and Repairers	Chaffee
Line Maintainer (Alternate Title: High Voltage Electrician)	City of Burlington	Apprenticeship	Electrical Power-Line Installers and Repairers	Kit Carson
Electrician, Substation	Great Southwestern Construction, Inc	Apprenticeship	Electrician	Douglas
Line Maintainer (Alternate Title: High Voltage Electrician)	Great Southwestern Construction, Inc	Apprenticeship	Electrical Power-Line Installers and Repairers	Douglas

Line Repairer	Great Southwestern Construction, Inc	Apprenticeship	Electrical Power-Line Installers and Repairers	Douglas
Electrician (alternate title: Interior Electrician)	Colorado Springs Electric Industry JATC	Apprenticeship	Electrician	El Paso
Installer Technicians	Colorado Springs Electric Industry Telecommunications JATC	Apprenticeship	Electric Technician	El Paso
Electric Meter Repairer	Colorado Springs Utilities	Apprenticeship	Control and Valve Installers and Repairers	El Paso
Electrician (alternate title: Interior Electrician)	IEC Southern Colorado Chapter	Apprenticeship	Electrician	El Paso
Electrician, Powerhouse	Colorado Springs Utilities	Apprenticeship	Electrician	El Paso
Line Erector (Power-Line Distribution Erector)	Colorado Springs Utilities	Apprenticeship	Electrical Power-Line Installers and Repairers	El Paso
Line Maintainer (Alternate Title: High Voltage Electrician)	Colorado Springs Utilities	Apprenticeship	Electrical Power-Line Installers and Repairers	El Paso
Transformer Repairer	Colorado Springs Utilities	Apprenticeship	Electrical and Electronics Repairers	El Paso
Electrician (alternate title: Interior Electrician)	Rayo Electric, Inc.	Apprenticeship	Electrician	Adams
Electromechanical Technician Cb	Neurodiversity Works	Apprenticeship	Electric Technician	Adams
Electrician, Maintenance	Hackett Electric Company, LLC	Apprenticeship	Electrician	Montezuma
Electric Meter Installer I	Empire Electric Association Inc. JATC	Apprenticeship	Control and Valve Installers and Repairers	Montezuma
Electronics Mechanic	Empire Electric Association Inc. JATC	Apprenticeship	Electrical and Electronics Repairers	Montezuma
Line Maintainer (Alternate Title: High Voltage Electrician)	Empire Electric Association Inc. JATC	Apprenticeship	Electrical Power-Line Installers and Repairers	Montezuma
Electrician, Powerhouse	Tri-State G&T JATC Craig	Apprenticeship	Electrician	Moffat
Line Maintainer (Alternate Title: High Voltage Electrician)	City of Delta Registered Apprenticeship Program	Apprenticeship	Electrical Power-Line Installers and Repairers	Delta
Electrician	Mortenson	Apprenticeship	Electrician	Denver

Electrician (alternate title: Interior Electrician)	McCarthy Building Companies	Apprenticeship	Electrician	Denver
Line Maintainer (Alternate Title: High Voltage Electrician)	Mortenson	Apprenticeship	Electrical Power-Line Installers and Repairers	Denver
Electrician Technician	United States Mint, Denver	Apprenticeship	Electric Technician	Denver
Electrical Technician	IntelliTec College	Certificate	Electric Technician	El Paso
Electric Lineworker	Colorado Mesa University	Associate degree	Electrical Power-Line Installers and Repairers	Mesa
Electric Lineworker	Colorado Mesa University	Certificate	Electrical Power-Line Installers and Repairers	Mesa
Electrical Technician	IntelliTec College	Certificate	Electric Technician	Pueblo
Residential Wireman	Energy Advantage Roofing and Solar	Apprenticeship	Electrician	Denver
Electrician (alternate title: Interior Electrician)	African-American Trade Association	Apprenticeship	Electrician	Denver
Electrician (alternate title: Interior Electrician)	Denver Electric JATC- Inside	Apprenticeship	Electrician	Denver
Residential Wireman	Denver Joint Electric ATC - Residential	Apprenticeship	Electrician	Denver
Electrician (alternate title: Interior Electrician)	Choice Electric LLC	Apprenticeship	Electrician	Denver
Line Installer - Repairer	International Power Systems	Apprenticeship	Electrical Power-Line Installers and Repairers	Denver
Electrician (alternate title: Interior Electrician)	RK Industries	Apprenticeship	Electrician	Denver
Residential Wireman	SunTalk Electric	Apprenticeship	Electrician	Denver
Electrician (alternate title: Interior Electrician)	Clay Dean Electric	Apprenticeship	Electrician	Denver
Electrician (alternate title: Interior Electrician)	DES Inc, dba Durango Electric Services and Nice Electric	Apprenticeship	Electrician	Denver
Electrician (alternate title: Interior Electrician)	Shaw Solar Energy Conservation	Apprenticeship	Electrician	La Plata

Electrician	T and D Nichols Electric	Apprenticeship	Electrician	La Plata
Electrician (alternate title: Interior Electrician)	T and D Howard Electric Inc.	Apprenticeship	Electrician	La Plata
Line Repairer	La Plata Electric Association, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	La Plata
Electrician (alternate title: Interior Electrician)	E Light Electric	Apprenticeship	Electrician	Arapahoe
Electrician (alternate title: Interior Electrician)	E Light Electric Multi-employer Program	Apprenticeship	Electrician	Arapahoe
Electrician (alternate title: Interior Electrician)	Expect Excellence Team	Apprenticeship	Electrician	Arapahoe
Lineman	E Light Electric Multi-employer Program	Apprenticeship	Electrical Power-Line Installers and Repairers	Arapahoe
Electric Meter Repairer	Town of Estes Park Light and Power Department	Apprenticeship	Control and Valve Installers and Repairers	Larimer
Line Repairer	Town of Estes Park Light and Power Department	Apprenticeship	Electrical Power-Line Installers and Repairers	Larimer
Line Maintainer (Alternate Title: High Voltage Electrician)	City of Fort Collins Light and Power	Apprenticeship	Electrical Power-Line Installers and Repairers	Larimer
Substation Operator	City of Fort Collins Light and Power	Apprenticeship	Electrical and Electronics Repairers	Larimer
Electrician, Substation	Platte River Power Authority	Apprenticeship	Electrician	Larimer
Line Repairer	Poudre Valley REA JATC	Apprenticeship	Electrical Power-Line Installers and Repairers	Larimer
Electric Meter Repairer	Morgan County Rural Electric Association	Apprenticeship	Control and Valve Installers and Repairers	Morgan
Line Maintainer (Alternate Title: High Voltage Electrician)	Bighorn Utilities Group	Apprenticeship	Electrical Power-Line Installers and Repairers	Morgan
Line Repairer	Morgan County Rural Electric Association	Apprenticeship	Electrical Power-Line Installers and Repairers	Morgan
Electrician (alternate title: Interior Electrician)	John Bowman Inc.	Apprenticeship	Electrician	El Paso
Line Repairer	City of Fountain Electric Department	Apprenticeship	Electrical Power-Line Installers and Repairers	El Paso

Electrician (alternate title: Interior Electrician)	Flintwood Electric, LLC	Apprenticeship	Electrician	Douglas
Electrician, Substation	Foothills Energy Services Inc	Apprenticeship	Electrician	Douglas
Line Maintainer (Alternate Title: High Voltage Electrician)	Foothills Energy Services Inc	Apprenticeship	Electrical Power-Line Installers and Repairers	Douglas
Electric Technician	Tri-State G&T Association Inc. JATC Transmission (West)	Apprenticeship	Electric Technician	Weld
Electrician, Substation	Tri-State G&T Association Inc. JATC Transmission (West)	Apprenticeship	Electrician	Weld
Line Maintainer (Alternate Title: High Voltage Electrician)	Tri-State G&T Association Inc. JATC Transmission (West)	Apprenticeship	Electrical Power-Line Installers and Repairers	Weld
Line-Installer-Repairer	Tri-State G&T Association Inc. JATC Transmission (West)	Apprenticeship	Electrical Power-Line Installers and Repairers	Weld
Substation Operator	Tri-State G&T Association Inc. JATC Transmission (West)	Apprenticeship	Electrical and Electronics Repairers	Weld
Line Installer - Repairer	Holy Cross Energy	Apprenticeship	Electrical Power-Line Installers and Repairers	Garfield
Electrician, Powerhouse	Western Area Power Administration Joint Craft Training Committee	Apprenticeship	Electrician	Jefferson
Electrician, Substation	Western Area Power Administration Joint Craft Training Committee	Apprenticeship	Electrician	Jefferson
Electronics Technician	Western Area Power Administration Joint Craft Training Committee	Apprenticeship	Electric Technician	Jefferson
Line Maintainer (Alternate Title: High Voltage Electrician)	Coors Tek (Global Headquarters)	Apprenticeship	Electrical Power-Line Installers and Repairers	Jefferson
Line Maintainer (Alternate Title: High Voltage Electrician)	Western Area Power Administration Joint Craft Training Committee	Apprenticeship	Electrical Power-Line Installers and Repairers	Jefferson
Power Transformer Field Technician	Electric Technologies	Apprenticeship	Electric Technician	Jefferson

Line Maintainer (Alternate Title: High Voltage Electrician)	Mountain Parks Electric, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Grand
Line Repairer	Mountain Parks Electric, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Grand
Line Repairer	Grand Valley Rural Power Lines, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Mesa
Electrician (alternate title: Interior Electrician)	Adams Electric, LLC	Apprenticeship	Electrician	Mesa
Street-Light Servicer	City of Greeley Traffic Signal Operations	Apprenticeship	Electrician	Weld
Electrician (alternate title: Interior Electrician)	Live Energy LLC	Apprenticeship	Electrician	Weld
Electric Meter Repairer	Gunnison County Electric Association, Inc.	Apprenticeship	Control and Valve Installers and Repairers	Gunnison
Line Installer - Repairer	Gunnison County Electric Association, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Gunnison
Service Planner (Light, Heat)	Gunnison County Electric Association, Inc.	Apprenticeship	Helpers--Installation, Maintenance, and Repair Workers	Gunnison
Line Repairer	Highline Electric Association	Apprenticeship	Electrical Power-Line Installers and Repairers	Phillips
Electrician, Substation	Altitude Energy, LLC	Apprenticeship	Electrician	Weld
Line Maintainer (Alternate Title: High Voltage Electrician)	Altitude Energy, LLC	Apprenticeship	Electrical Power-Line Installers and Repairers	Weld
Line Repairer	Altitude Energy, LLC	Apprenticeship	Electrical Power-Line Installers and Repairers	Weld
Line Repairer	Southeast Colorado Power Association JATC	Apprenticeship	Electrical Power-Line Installers and Repairers	Otero
Residential Wireman	IES Residential Inc.	Apprenticeship	Electrician	Jefferson
Electric Meter Repairer	City of Las Animas Municipal Light and Power	Apprenticeship	Control and Valve Installers and Repairers	Bent
Line Installer-Repairer	City of Las Animas Municipal Light and Power	Apprenticeship	Electrical Power-Line Installers and Repairers	Bent
Electric Meter Repairer	Mountain View Electric Association, Inc.	Apprenticeship	Control and Valve Installers and Repairers	Lincoln

Line Repairer	Mountain View Electric Association, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Lincoln
Electric Meter Repairer	City of Longmont Power and Communications	Apprenticeship	Control and Valve Installers and Repairers	Boulder
Electrician, Substation	City of Longmont Power and Communications	Apprenticeship	Electrician	Boulder
Line Maintainer (Alternate Title: High Voltage Electrician)	City of Longmont Power and Communications	Apprenticeship	Electrical Power-Line Installers and Repairers	Boulder
Electrician (alternate title: Interior Electrician)	New Energy Structures Company (NESCO)	Apprenticeship	Electrician	Boulder
Line Repairer	City of Loveland	Apprenticeship	Electrical Power-Line Installers and Repairers	Larimer
Line Repairer	City of Loveland, Department of Water and Power	Apprenticeship	Electrical Power-Line Installers and Repairers	Larimer
Meter Repairer (Any Industry)	City of Loveland	Apprenticeship	Control and Valve Installers and Repairers	Larimer
Meter Repairer (Any Industry)	City of Loveland, Department of Water and Power	Apprenticeship	Control and Valve Installers and Repairers	Larimer
Traffic Signal Electrician	City of Loveland	Apprenticeship	Electrician	Larimer
Electrician, Substation	Delta-Montrose Electric Association JATC	Apprenticeship	Electrician	Montrose
Line Repairer	Delta-Montrose Electric Association JATC	Apprenticeship	Electrical Power-Line Installers and Repairers	Montrose
Service Planner (Light, Heat)	Delta-Montrose Electric Association JATC	Apprenticeship	Helpers--Installation, Maintenance, and Repair Workers	Montrose
Electrician (alternate title: Interior Electrician)	C.A.M. Electric Inc	Apprenticeship	Electrician	Montrose
Electrician (alternate title: Interior Electrician)	IEC Rocky Mountain	Apprenticeship	Electrician	Adams
Electric Meter Repairer	San Miguel Power Association, Inc.	Apprenticeship	Control and Valve Installers and Repairers	Montrose
Line Repairer	San Miguel Power Association, Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Montrose
Electrician	Parker Water and Sanitation District	Apprenticeship	Electrician	Douglas

Electric Meter Tester	Black Hills Energy - Colorado Electric	Apprenticeship	Control and Valve Installers and Repairers	Pueblo
Electrician, Substation	Black Hills Energy - Colorado Electric	Apprenticeship	Electrician	Pueblo
Environmental Control System Installer/Services	Flow Right Plumbing, Heating, and Irrigation	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Pueblo
Line Repairer	Black Hills Energy - Colorado Electric	Apprenticeship	Electrical Power-Line Installers and Repairers	Pueblo
Relay Technician	Black Hills Energy - Colorado Electric	Apprenticeship	Electric Technician	Pueblo
Electrician, Maintenance	Evraz-Rocky Mountain Steel	Apprenticeship	Electrician	Pueblo
Electrician, Maintenance	GCC of America	Apprenticeship	Electrician	Pueblo
Mechatronics Technician	Pewag Traction Chain Inc	Apprenticeship	Electric Technician	Pueblo
Electrician (alternate title: Interior Electrician)	Pueblo Electric JATC	Apprenticeship	Electrician	Pueblo
Electric Meter Repairer	San Isabel Electric Association JATC	Apprenticeship	Control and Valve Installers and Repairers	Pueblo
Line Repairer	San Isabel Electric Association JATC	Apprenticeship	Electrical Power-Line Installers and Repairers	Pueblo
Electric Meter Repairer	CORE Electric Cooperative	Apprenticeship	Control and Valve Installers and Repairers	Douglas
Electrician, Substation	CORE Electric Cooperative	Apprenticeship	Electrician	Douglas
Line Maintainer (Alternate Title: High Voltage Electrician)	CORE Electric Cooperative	Apprenticeship	Electrical Power-Line Installers and Repairers	Douglas
Line Maintainer (Alternate Title: High Voltage Electrician)	Colorado Powerline Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Douglas
Line Repairer	K.C. Electric Association	Apprenticeship	Electrical Power-Line Installers and Repairers	Kit Carson
Electrician, Maintenance	Vail Resorts	Apprenticeship	Electrician	Eagle
Electrician	American Electric Innovations Ltd.	Apprenticeship	Electrician	Larimer
Electric Meter Repairer	San Luis Valley Rural Electric Cooperative Inc.	Apprenticeship	Control and Valve Installers and Repairers	Rio Grande
Line Installer - Repairer	San Luis Valley Rural Electric Cooperative Inc.	Apprenticeship	Electrical Power-Line Installers and Repairers	Rio Grande

Electrician (alternate title: Interior Electrician)	Construction Industry Training Council	Apprenticeship	Electrician	Jefferson
Line Repairer	City of Wray Electric Department	Apprenticeship	Electrical Power-Line Installers and Repairers	Yuma
Line Technician	Trinidad State College	Associate degree	Electrical Power-Line Installers and Repairers	Las Animas
Line Technician	Trinidad State College	Certificate	Electrical Power-Line Installers and Repairers	Las Animas
Electrical Technology Fundamentals	Trinidad State College	Certificate	Electrical Power-Line Installers and Repairers	Las Animas
Power Construction Supervision	Trinidad State College	Associate degree	Construction Manager	Las Animas

INDUSTRY: ELECTRIC VEHICLES

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Electric Vehicle Safety Training	Community College of Aurora	Certificate	Electric Vehicle Technician	Arapahoe
EVSE Repair Training Program	Women Who Charge	Certificate	EV Charging Installation/Repair	Denver
Electric Vehicle Charging Station Training Program (EVCSTP)	Independent Electrical Contractors	Certificate	EV Charging Installation/Repair	Adams
Electric Vehicle Fundamentals (EVF)	Colorado State University	Certificate	Electric Vehicle Technician	Online
Electric Vehicle Fundamentals (EVF)	Western Colorado University	Certificate	Electric Vehicle Technician	Online

INDUSTRY: FARMING, FISHING AND FORESTRY

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
HORTICULTURIST	Crowley County Correctional Facility	Apprenticeship	Farming	Crowley

INDUSTRY: GEOTHERMAL

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Introduction to Geothermal Energy	CED Engineering	Certificate	Engineering	Online
Geology and Geological Engineering	Colorado School of Mines	Bachelor Degree	Engineering	Jefferson

Entry Level Geothermal Professional Certificate Training	Colorado School of Mines	Certificate	Engineering	Online
Enhanced Geothermal Systems (EGS)	Colorado School of Mines	Job readiness	Scientist	Jefferson
Geothermal Heat Pump Systems	HVACREDU	Certificate	Heating, Air Conditioning, and Refrigeration	Online
Accredited Installer	International Ground Source Heat Pump Association	Certificate	Heating, Air Conditioning, and Refrigeration	Online
Certified GeoExchange Designer	International Ground Source Heat Pump Association	Certificate	Engineering	Online
Certified Geothermal Inspector	International Ground Source Heat Pump Association	Certificate	Heating, Air Conditioning, and Refrigeration	Online
Certified Residential Geothermal Designer	International Ground Source Heat Pump Association	Certificate	Heating, Air Conditioning, and Refrigeration	Online
Fundamental of Geothermal Heating	PDH Online	Certificate	Engineering	Online
Geothermal Heat Pump Installation & Service Training	Energy Efficiency Business Coalition	Job readiness	Heating, Air Conditioning, and Refrigeration	Online
Geothermal Energy Basics: Full Course	Top Energy Training	Job readiness	Engineering	Online
General Installation & Basic Flushing Procedures, HDPE Heat Fusion Procedures, IntelliZone2 & IntelliZone2-24V, Residential Variable Speed Certification, Symphony AWL, Flow Centers Application, Installation & Diagnostics, Advanced Residential Controls (ARC), Air Side Diagnostics, Basic Troubleshooting Geothermal, Air Side Diagnostics	Water Furnace	Certificate	Heating, Air Conditioning, and Refrigeration	Online
Geothermal Heat Pumps	Vector Solutions	Job readiness	Heating, Air Conditioning, and Refrigeration	Online
Geothermal, heat pump & electrification training	Yampa Valley Sustainability Council	Job readiness	Heating, Air Conditioning, and Refrigeration	Route

INDUSTRY: HEATING, VENTILATION, AND AIR CONDITIONING

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Direct Digital Controls	Pikes Peak State College	Certificate	Heating, Air Conditioning, and Refrigeration	El Paso
Heating and Air-Conditioner Installation and Service	Colorado Springs Plumbers/Pipefitters JATC	Apprenticeship	Heating, Air Conditioning, and Refrigeration	El Paso
Heating and Air-Conditioner Installation and Service	AimHigh Education Technologies Registered Apprenticeship Program	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Denver
Air Conditioning Equipment Mechanic	United States Mint, Denver	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Denver
Heating and Air Conditioning Installation/Service	Trane Rocky Mountain District	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Denver
Refrigeration Mechanic (Any Industry)	Hussman Services Corporation - Colorado	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Denver
Heating and Air Conditioning Installation/Service	RK Industries	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Denver
Heating and Air Conditioning Installation/Service	Morgan Community College	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Morgan
Heating, Air Conditioning and Refrigeration Technology	Pikes Peak State College	Associate degree	Heating, Air Conditioning, and Refrigeration	El Paso
Industry Upgrade	Pikes Peak State College	Certificate	Heating, Air Conditioning, and Refrigeration	El Paso
Residential HVAC	Pikes Peak State College	Certificate	Heating, Air Conditioning, and Refrigeration	El Paso
Refrigeration & HVAC Technician	IntelliTec College	Associate degree	Heating, Air Conditioning, and Refrigeration	El Paso
HVAC	Emily Griffith Technical College	Certificate	Heating, Air Conditioning, and Refrigeration	Denver
AAS in HVAC/R	Front Range Community College	Associate degree	Heating, Air Conditioning, and Refrigeration	Larimer

Commercial Refrigeration	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Larimer
Heating, Ventilation, Air Conditioning (Ex: Tit: Heating and Air Condition Installation/Serv)	Haynes Mechanical Registered Apprenticeship Program	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Arapahoe
Heating and Air-Conditioner Installation and Service	Alpha Mechanical Solutions, LLC	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Gunnison
Heating and Air-Conditioner Installation and Service	Cooley's Heating and Cooling	Apprenticeship	Heating, Air Conditioning, and Refrigeration	Delta
HVAC/R Fundamentals	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Larimer
Light Commercial Air Conditioning & Heating	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Larimer
Residential Air Conditioning & Heating	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Larimer
Refrigeration & HVAC Technician	IntelliTec College	Associate degree	Heating, Air Conditioning, and Refrigeration	Mesa
AAS in HVAC/R	Front Range Community College	Associate degree	Heating, Air Conditioning, and Refrigeration	Boulder
Commercial Refrigeration	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Boulder
HVAC/R Fundamentals	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Boulder
Light Commercial Air Conditioning & Heating	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Boulder
Residential Air Conditioning & Heating	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Boulder
AAS in HVAC/R	Front Range Community College	Associate degree	Heating, Air Conditioning, and Refrigeration	Adams
Commercial Refrigeration	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Adams

HVAC/R Fundamentals	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Adams
Light Commercial Air Conditioning & Heating	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Adams
Residential Air Conditioning & Heating	Front Range Community College	Certificate	Heating, Air Conditioning, and Refrigeration	Adams

INDUSTRY: HYDROGEN

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Hydrogen production and energy storage with electroceramics	Colorado School of Mines	Research	Scientist	Jefferson
Hydrogen Safety Training	WHA International	Job readiness	Engineering	Jefferson

INDUSTRY: INSTALLATION, MAINTENANCE, AND REPAIR

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Maintenance Repairer, Build	Pickens Technical College	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Arapahoe
Mechanic Specialist (W)	Colorado Springs Utilities	Apprenticeship	Mechanic	El Paso
Mechanic Specialist (W)	Colorado Springs Utilities	Apprenticeship	Mechanic	El Paso
Powerhouse Mechanic	Colorado Springs Utilities	Apprenticeship	Mechanic	El Paso
Industrial Maintenance Repairer	Tri-State G&T JATC Craig	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Moffat
Industrial Maintenance Repairer	Owens Corning	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Denver
Millwright	Colorado Wyoming Millwright and Machinery Erectors	Apprenticeship	Millwright	Denver
Mechanic, Industrial Truck (Alternate Titles: Diesel Mechanic/Power Generation Equipment Repairman)	La Plata Electric Association, Inc.	Apprenticeship	Mechanic	La Plata

Meter Repairer (Any Industry)	La Plata Electric Association, Inc.	Apprenticeship	Control and Valve Installers and Repairers	La Plata
Service Planner (Light, Heat)	La Plata Electric Association, Inc.	Apprenticeship	Helpers--Installation, Maintenance, and Repair Workers	La Plata
Maintenance Mechanic (Any Industry) (Alternate Title: Industrial Maintenance Mechanic)	Platte River Power Authority	Apprenticeship	Mechanic	Larimer
Service Planner (Light, Heat)	Morgan County Rural Electric Association	Apprenticeship	Helpers--Installation, Maintenance, and Repair Workers	Morgan
Industrial Maintenance Repairer	Coors Tek (Global Headquarters)	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Jefferson
Maintenance Repairer, Building	Camden Development, Inc.	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Jefferson
Industrial Maintenance Certificate	Front Range Community College	Certificate	Machinist	Larimer
Industrial Maintenance Certificate	Front Range Community College	Certificate	Machinist	Boulder
Laundry-Machine Mechanic	Crowley County Correctional Facility	Apprenticeship	Mechanic	Crowley
Maintenance Repairer, Building	Crowley County Correctional Facility	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Crowley
Maintenance Mechanic (Any Industry)(Alternate Title: Industrial Maintenance Mechanic)	Evrast-Rocky Mountain Steel	Apprenticeship	Mechanic	Pueblo
Industrial Maintenance Certificate	Front Range Community College	Certificate	Machinist	Adams
Service Planner (Light, Heat)	San Isabel Electric Association JATC	Apprenticeship	Helpers--Installation, Maintenance, and Repair Workers	Pueblo
Maintenance Mechanic (Any Industry) (Alternate Title: Industrial Maintenance Mechanic)	Vail Resorts	Apprenticeship	Mechanic	Eagle

INDUSTRY: LIFE, PHYSICAL, AND SOCIAL SCIENCE OCCUPATIONS				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Environmental Science	Pikes Peak State College	Associate degree	Scientist	El Paso
Environmental Sustainability Studies	Pikes Peak State College	Associate degree	Scientist	El Paso
Environmental Science	Community College of Denver	Associate degree	Scientist	Denver
Geology and Geological Engineering	Aims Community College	Associate degree	Scientist	Weld

INDUSTRY: MANAGEMENT				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Energy Certificate	Aims Community College	Certificate	Project Manager	Weld
Renewable Energy Management Certificate Pathway	University of Colorado - Denver	Certificate	Management	Online

INDUSTRY: MANUFACTURING				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Machinist	Barber-Nichols	Apprenticeship	Machinist	Jefferson
Production Technologist	Pickens Technical College	Apprenticeship	Production Technologist	Arapahoe
Machine Set-Up Operator	Mikron Corporation Denver	Apprenticeship	Operating Engineer	Arapahoe
Welding 1	Emily Griffith Technical College	Certificate	Welding	Denver
Welding 2	Emily Griffith Technical College	Certificate	Welding	Denver
Machining/Welding Tech	Community College of Denver	Certificate	Welding	Denver
Production Technologist	CAES Pioneering Advanced Electronics	Apprenticeship	Production Technologist	El Paso
Power-Plant Operator	Colorado Springs Utilities	Apprenticeship	Power-Plant Operator	El Paso
Substation Operator	Colorado Springs Utilities	Apprenticeship	Operating Engineer	El Paso

Machinist (Alternative Title: Precision Machinist)	Colorado Department of Corrections	Apprenticeship	Machinist	El Paso
Welder, Combination	Colorado Department of Corrections	Apprenticeship	Welding	El Paso
Mechanic Welder	Tri-State G&T JATC Craig	Apprenticeship	Welding	Moffat
Power-Plant Operator	Tri-State G&T JATC Craig	Apprenticeship	Power-Plant Operator	Moffat
Switchboard Operator (Utility)	Tri-State G&T JATC Craig	Apprenticeship	Operating Engineer	Moffat
Welder, Combination	Tri-State G&T JATC Craig	Apprenticeship	Welding	Moffat
Fabricator-Assembler Metal Production	RK Industries	Apprenticeship	Assembler	Denver
CNC Operator - Milling and Turning	Careerwise Colorado	Apprenticeship	Machinist	Denver
Power-Plant Operator	Platte River Power Authority	Apprenticeship	Power-Plant Operator	Larimer
CNC Set-Up Prog - Milling and Turning	Coors Tek (Global Headquarters)	Apprenticeship	Machinist	Jefferson
Grinder Set-Up Operator, Universal	Coors Tek (Global Headquarters)	Apprenticeship	Operating Engineer	Jefferson
Machinist (Alternative Title: Precision Machinist)	Coors Tek (Global Headquarters)	Apprenticeship	Machinist	Jefferson
Numerical Control Machinist Operator	Coors Tek (Global Headquarters)	Apprenticeship	Machinist	Jefferson
Quality Control Inspector	Coors Tek (Global Headquarters)	Apprenticeship	Quality Control Inspector	Jefferson
Assembler Installer General	Capco LLC	Apprenticeship	Assembler	Mesa
Machine Operator I	Capco LLC	Apprenticeship	Operating Engineer	Mesa
Industrial Manufacturing Technician	Weld County School District 6	Apprenticeship	Industrial Manufacturing Technician	Weld
Machinist	Rocky Mountain Tooling and Machinist Association (RMTMA)	Apprenticeship	Machinist	Arapahoe
Quality Control Inspector	Rocky Mountain Tooling and Machinist Association (RMTMA)	Apprenticeship	Quality Control Inspector	Arapahoe
Substation Operator	San Miguel Power Association, Inc.	Apprenticeship	Operating Engineer	Montrose
Welder, Combination	Crowley County Correctional Facility	Apprenticeship	Welding	Crowley
Metal Fabricator	Bennett Forgeworks Inc	Apprenticeship	Metal/Steel Worker	Ouray
Welder, Combination	CDC Sterling Correctional Facility	Apprenticeship	Welding	Logan

Basic Machining	Community College of Denver	Certificate	Machinist	Denver
Numerical Control Machinist Operator	Front Range Community College	Apprenticeship	Machinist	Adams
CNC Machine Tool Operator	Community College of Denver	Certificate	Machinist	Denver
Industrial Maintenance Mechanic	Vestas Blades Americas	Apprenticeship	Industrial Maintenance Repairer/Mechanic	Weld
CNC Manufacturing	Community College of Denver	Certificate	Machinist	Denver
Industrial Maintenance Technologies	Community College of Denver	Certificate	Machinist	Denver
Intermediate Machining	Community College of Denver	Certificate	Machinist	Denver
Renewable Energy 101	Colorado School of Mines	Certificate	Engineering	Jefferson
Additive Manufacturing Certificate	Aims Community College	Certificate	Engineering	Weld
Industrial Technology	Aims Community College	Associate degree	Project Manager	Weld
Welding Technology	Aims Community College	Associate degree	Welding	Weld
Advanced Maintenance Certificate	Aims Community College	Certificate	Operating Engineer	Weld
Manufacturing Operations Certificate	Aims Community College	Certificate	Process Technician	Weld
Power Plant Operations	Front Range Community College	Certificate	Power-Plant Operator	Online
Process Technician	Front Range Community College	Certificate	Process Technician	Online
Welding Technology	Trinidad State College	Associate degree	Welding	Alamosa
Welding Technology	Trinidad State College	Certificate	Welding	Alamosa
Welding Technology	Trinidad State College	Associate degree	Welding	Las Animas
Welding Technology	Trinidad State College	Certificate	Welding	Las Animas
Welding	Front Range Community College	Associate degree	Welding	Larimer
Metal Fabrication	Front Range Community College	Certificate	Welding	Larimer
Comprehensive Welding	Front Range Community College	Certificate	Welding	Larimer
Creative Metalworking	Front Range Community College	Certificate	Welding	Larimer
Gas Metal Arc Welding	Front Range Community College	Certificate	Welding	Larimer

Gas Tungsten Arc Welding	Front Range Community College	Certificate	Welding	Larimer
Oxyacetylene Welding	Front Range Community College	Certificate	Welding	Larimer
Shielded Metal Arc Welding	Front Range Community College	Certificate	Welding	Larimer
Welding and Fabrication Technology	Lincoln Tech	Diploma	Welding	Denver
Welding and Fabrication Technology with Pipe	Lincoln Tech	Diploma	Welding	Denver
Arc Welder	Community College of Denver	Certificate	Welding	Denver
Basic Welding	Community College of Denver	Certificate	Welding	Denver
Creative Metalworking	Community College of Denver	Certificate	Welding	Denver
Fabrication Welder	Community College of Denver	Associate degree	Welding	Denver
Fabrication Welder Certificate	Community College of Denver	Certificate	Welding	Denver
Intermediate Welding	Community College of Denver	Certificate	Welding	Denver
Welding	Pikes Peak State College	Associate degree	Welding	El Paso
Entry Level Welding	Pikes Peak State College	Certificate	Welding	El Paso
Gas Metal Arc Welding	Pikes Peak State College	Certificate	Welding	El Paso
Gas Tungsten Arc Welding	Pikes Peak State College	Certificate	Welding	El Paso
Pipe Welding	Pikes Peak State College	Certificate	Welding	El Paso
Shielded Metal Arc Welding	Pikes Peak State College	Certificate	Welding	El Paso
Welding Technology	Colorado Mesa University	Associate degree	Welding	Mesa
Basic Welder	Colorado Mesa University	Certificate	Welding	Mesa
Welding Technology	Colorado Mesa University	Certificate	Welding	Mesa
Welding	Pickens Technical College	Certificate	Welding	Arapahoe

INDUSTRY: SOLAR ELECTRIC				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Installation Basics Training Program	GRID Alternatives	Job readiness	Solar Technician	Denver
Installation Basics Training Program 200	GRID Alternatives	Job readiness	Solar Technician	Denver
Installation Training Program	GRID Alternatives	Job readiness	Solar Technician	Denver
CE513: Rooftop PV: What You Need to Know About Roof Systems	Solar Energy International	Job readiness	Solar Technician	Online
CE514: Building and Fire Codes: Rooftop PV Considerations	Solar Energy International	Job readiness	Solar Technician	Online
CE517: Performance Modeling of PV Systems	Solar Energy International	Job readiness	Solar Technician	Online
CE518: Basics of PV Site Analysis	Solar Energy International	Job readiness	Solar Technician	Online
CE519: Off-grid System Considerations	Solar Energy International	Job readiness	Solar Technician	Online
CE520: Introduction to SketchUp PV System Modeling	Solar Energy International	Job readiness	Solar Technician	Online
CE523: Residential/Commercial Roof-Mounted PV Installation Safety	Solar Energy International	Job readiness	Solar Technician	Online
CE524: PVsyst for PV System Production Modeling	Solar Energy International	Job readiness	Solar Technician	Online
CE525: Large-Scale Ground-Mounted PV Installation Safety	Solar Energy International	Job readiness	Solar Technician	Online
Solar Technician	Consulting and Management Services	Apprenticeship	Solar Technician	Boulder
CE526: The 2020 NEC®: PV and Energy Storage Systems	Solar Energy International	Job readiness	Solar Technician	Online
CE529: Hazards of Electrochemical Energy Storage in Solar + Storage Applications	Solar Energy International	Job readiness	Solar Technician	Online
CE532: The Physics of Solar Cells and IV Curves	Solar Energy International	Job readiness	Solar Technician	Online
CE533: Comparing Battery Technologies	Solar Energy International	Job readiness	Solar Technician	Online
CE534: Dive into Diodes: A PV Circuit Perspective	Solar Energy International	Job readiness	Solar Technician	Online
CE539: Electric Vehicle Charging Equipment (EVCE) Preparedness	Solar Energy International	Job readiness	EV Charging Installation/Repair	Online
CE541: Megawatt Scale Design	Solar Energy International	Job readiness	Solar Technician	Online

CE543: NEC 2020 & 2023 Solar + Storage Requirements	Solar Energy International	Job readiness	Solar Technician	Online
CE544: 2023 NFPA 855 and Fire Codes for Energy Storage Systems	Solar Energy International	Job readiness	Solar Technician	Online
PV101: Solar Training - Solar Electric Design and Installation (Grid-Direct)	Solar Energy International	Job readiness	Solar Technician	Delta
PV110: Solar Training - Solar Water Pumping	Solar Energy International	Job readiness	Solar Technician	Delta
PV201L: Solar Training - Solar Electric Lab Week (Grid-Direct)	Solar Energy International	Job readiness	Solar Technician	Delta
PV201LW: Solar Training - Women's Solar Electric Lab Week (Grid-Direct)	Solar Energy International	Job readiness	Solar Technician	Delta
PV202: Solar Training - Advanced PV System Design and the NEC (Grid-Direct)	Solar Energy International	Job readiness	Solar Technician	Delta
PV203: Solar Training - PV System Fundamentals (Battery-Based)	Solar Energy International	Job readiness	Solar Technician	Delta
PV301L: Solar Training - Solar Electric Lab Week (Battery-Based)	Solar Energy International	Job readiness	Solar Technician	Delta
PV303: Solar Training - Advanced PV Multimode and Microgrid Design (Battery-Based)	Solar Energy International	Job readiness	Solar Technician	Delta
PV304: Solar Training - Advanced PV Stand-alone System Design (Battery-Based)	Solar Energy International	Job readiness	Solar Technician	Delta
Photovoltaic Panel Installation	Pueblo Community College	Certificate	Solar Technician	Pueblo
Photovoltaic Panel Installation	Pueblo Community College	Certificate	Solar Technician	Online
Solar Training Academy	GRID Alternatives	Job readiness	Solar Technician	Denver
PV351L: Solar Training - PV Systems - Tools and Techniques for Operations and Maintenance Lab Week (Grid-Direct)	Solar Energy International	Job readiness	Solar Technician	Delta
PVOL101: Solar Training - Solar Electric Design and Installation (Grid-Direct) - Online	Solar Energy International	Job readiness	Solar Technician	Online
PVOL202: Solar Training - Advanced PV System Design and the NEC (Grid-Direct) - Online	Solar Energy International	Job readiness	Solar Technician	Online

PVOL203: Solar Training - PV System Fundamentals (Battery-Based) - Online	Solar Energy International	Job readiness	Solar Technician	Online
PVOL206: Solar Training - Solar Business and Technical Sales - Online	Solar Energy International	Job readiness	Sales	Online
PVOL303: Solar Training - Advanced PV Multimode and Microgrid Design (Battery-Based) - Online	Solar Energy International	Job readiness	Solar Technician	Online
PVOL304: Solar Training - Advanced PV Stand-alone System Design (Battery-Based) - Online	Solar Energy International	Job readiness	Solar Technician	Online
PVOL350: Solar Training - PV Systems - Tools and Techniques for Operations and Maintenance - Online	Solar Energy International	Job readiness	Solar Technician	Online
RE100: Introduction to Renewable Energy	Solar Energy International	Job readiness	Solar Technician	Online
RE101: Fundamental Math for Solar Applications	Solar Energy International	Job readiness	Solar Technician	Online

INDUSTRY: TRANSPORTATION AND MATERIAL MOVING

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
CDL Driver	Fortified Development, LLC	Apprenticeship	Drivers	Arapahoe
Over-The-Road (OTR)	Fortified Development, LLC	Apprenticeship	Drivers	Arapahoe
Heavy and Tractor Trailer Truck Driver	Excel Driver Services, LLC	Apprenticeship	Drivers	Adams
Transportation Clerk (Alternative Title: Transportation Management Coordinator)	Pilatus Business Aircraft Registered Apprenticeship	Apprenticeship	Drivers	Broomfield

INDUSTRY: WATER

PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Wastewater - Treatment - Plant Operator (Alternative Title: Water Treatment Specialist)	Colorado Rural Water Association	Apprenticeship	Operating Engineer	Pueblo

Wastewater Systems Operator	Colorado Rural Water Association	Apprenticeship	Operating Engineer	Pueblo
Distribution and Collection Training	Red Rocks Community College	Certificate	Scientist	Jefferson
Infrastructure Security Professional	Red Rocks Community College	Certificate	Management	Jefferson
Integrated Water Professional	Red Rocks Community College	Certificate	Management	Jefferson
Introduction to Wastewater Treatment	Red Rocks Community College	Certificate	Scientist	Jefferson
Introduction to Water Treatment	Red Rocks Community College	Certificate	Scientist	Jefferson
Laboratory Analysis	Red Rocks Community College	Certificate	Scientist	Jefferson
Mathematics in Water Quality	Red Rocks Community College	Certificate	Scientist	Jefferson
Water Quality Management Technology	Red Rocks Community College	Bachelor Degree	Management	Jefferson
Water Technology Professional	Red Rocks Community College	Certificate	Scientist	Jefferson
Water Quality Management	Emily Griffith Technical College	Certificate	Management	Denver
Distribution and Collection Training	Red Rocks Community College	Certificate	Scientist	Jefferson
Infrastructure Security Professional	Red Rocks Community College	Certificate	Management	Jefferson
Integrated Water Professional	Red Rocks Community College	Certificate	Management	Jefferson
Introduction to Wastewater Treatment	Red Rocks Community College	Certificate	Scientist	Jefferson
Introduction to Water Treatment	Red Rocks Community College	Certificate	Scientist	Jefferson
Laboratory Analysis	Red Rocks Community College	Certificate	Scientist	Jefferson
Mathematics in Water Quality	Red Rocks Community College	Certificate	Scientist	Jefferson
Water Quality Management Technology	Red Rocks Community College	Bachelor Degree	Management	Jefferson
Water Technology Professional	Red Rocks Community College	Certificate	Scientist	Jefferson
Water Resources Graduate Certificate	Colorado State University	Certificate	Management	Online

INDUSTRY: WIND ENERGY				
PROGRAM NAME	PROVIDER NAME	PROGRAM TYPE	OCCUPATIONAL FOCUS	COUNTY
Industrial Automation	Northeastern Junior College	Associate Degree	Wind Technician	Logan
Industrial Control	Northeastern Junior College	Certificate	Wind Technician	Logan
Industrial Electricity	Northeastern Junior College	Certificate	Wind Technician	Logan
Industrial Maintenance	Northeastern Junior College	Certificate	Wind Technician	Logan
Industrial Safety	Northeastern Junior College	Certificate	Wind Technician	Logan
Wind Technician	Northeastern Junior College	Certificate	Wind Technician	Logan
CREW Research Fellowship	Colorado School of Mines	Research	Scientist	Jefferson
Wind Energy Technician	Community College of Aurora	Certificate	Wind Technician	Online