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The Colorado and New Mexico Oil and Gas Workforce: Economic Contributions and Future Options

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January 2021

EXECUTIVE SUMMARY

Oil and gas activities in both Colorado and New Mexico have seen significant growth in recent decades—to the degree that both states are now ranked amongst national leaders in energy production. Therefore, a reduction in oil and gas activity in either Colorado or New Mexico would have negative ramifications on community and state economies, due to the financial and tax revenue contributions from both sectors. As seen in other energy sectors undergoing transition, such as coal, the social and financial dislocation that could befall the oil and gas workforce could be severe. As a result, proactively engaging with this workforce in advance of any potential structural changes in the energy sector would be prudent.

This report examines the size and scope of the oil and gas sector in Colorado and New Mexico and models its economic contribution to regional and state economies. It provides a series of recommendations to support the oil and gas workforce as the sector goes through market changes, in part driven by the current economic downturn. The methods used in this report are conservative and do not rely on input-output models that have been shown to produce biased and inflated results.

What We Found:

- The oil and gas sectors contribute significantly to Colorado and New Mexico's economy. The sectors directly employ over 33,000 workers in Colorado and 28,000 workers in New Mexico. Colorado workers earned over \$4 billion, and New Mexico workers earned over \$2 billion in wages in 2019. The sector also generated severance tax revenues of \$212 million in Colorado and \$555 million in New Mexico in 2019.
- The proportion of wages earned by the oil and gas workforce in both states is higher than its share of the workforce. In other words, oil and gas hits above its weight.
- Job losses in the oil and gas sector may have sizable negative job loss impacts in both the upstream and downstream elements of the supply chain. These types of impacts have already been observed in the coal sector. These impacts would be most pronounced in counties that have significant oil and gas operations, such as Weld County, Colorado, and Lea County and Eddy County, in New Mexico.
- Industries such as steel manufacturing and petroleum refining are part of the oil and gas supply and production chain and would be affected by changes to the oil and gas sector. While in both states they have a smaller presence than oil and gas, they do make substantive contributions to the state economies. These would be negatively impacted by a sustained downturn in oil and gas operations.

What We Recommend:

- Proactively consider employment transitions for the oil and gas workforce.
- Ensure future pandemic stimulus packages provide economic support to workers and families, including oil and gas workers, affected by the economic downturn.

- Support programs and funding that will utilize the unique skills of the oil and gas workforce, such as orphaned well remediation programs and fugitive methane emissions capture.

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INTRODUCTION

The oil and gas sector has seen phenomenal growth in Colorado and New Mexico in recent decades, not to mention nationally. It does, however, face an uncertain future. The combination of market factors—falling oil and gas prices, increasingly affordable renewables, and the increasing shift to electric vehicles—indicate that a downscaling in the size of this sector is likely to occur in the years ahead.

Of course, the oil and gas sector should not be viewed as a disembodied or abstract element of the economy—instead it is made up of a very real workforce. Oil and gas workers throughout the country—and certainly in Colorado and New Mexico—make up a substantive component of the state, regional, and national economies. Reductions in the size of the oil and gas sector would therefore have concomitant negative impacts on oil and gas workers, and on the economies in which they are located.

This report provides an assessment of the scope of the oil and gas sector in Colorado and New Mexico, illustrating the important economic contributions it makes to state and regional economies. It makes the case that the Coronavirus Aid, Relief, and Economic Security (CARES) Act, passed by Congress and signed into law in March of 2020, was not only a lost opportunity to provide structural support to the nation’s energy and manufacturing workforce, but that some of its provisions were directed away from the very workers who needed them. Finally, it outlines numerous policy provisions that could be advanced to support this workforce at the state level.

I. Survey of the Oil and Gas Sectors in Colorado and New Mexico

A. National Trends

The oil and gas sector has been amongst the largest and most influential industrial sectors in the country for over a century. Along with coal, oil and gas have been the foundation of the nation's transportation and energy sectors for decades. This has certainly been the case in recent years as extraction technologies have evolved and allowed for massive expansion of oil and gas production around the country, certainly in Colorado and New Mexico.

As a result of market forces and various regulatory initiatives, the oil and gas sector will likely shrink in the years to come. In addition, the economic fallout from the pandemic has been severe—with major losses in the oil and gas sector. The renewable energy and electric vehicle sectors are envisioned to take on increasingly more market share. In such an eventuality, the oil and gas sector would see fewer earnings, decreased profitability, less economic impact in the states where it is located, and increased layoffs.

The following events are indicative of a mixed trend in the oil and gas sector:

- Early 2021 indicates a mixed future for the oil and gas sector. While oil production and exports are strong, production is expected to decrease later in the year.¹ High numbers of bankruptcies of oil and gas firm took place all through 2020, and some analysts expect these to continue.²
- In August 2020, BP announced it would cut oil production by 40 percent by 2030 and increase its renewable energy-based electricity production by a factor of twenty. In October 2020, ConocoPhillips announced plans to achieve net zero carbon emission targets by 2025.³
- In late 2020, Occidental Petroleum announced that it is planning for a shift in operations whereby carbon capture would ultimately be its primary business line, with oil and gas production serving as an ancillary business function.⁴
- In the second quarter of 2020 alone, the world's five largest oil companies—Chevron, Shell, Total, Exxon Mobil, and BP—lost a collective \$52.9 billion. BP, itself, lost \$16.8 billion—in contrast to a \$1.8 billion profit in the same period in 2019.⁵ The third quarter of 2020 had mixed returns as the global economy entered a slow recovery period. Exxon saw significant losses, while Chevron, Shell, and BP showed minor gains in that quarter.⁶

¹ Anchondo, Carlos. 2021. "U.S. Oil Exports Set 71-year Record." *Energywire*. Jan. 13, 2021.

(<https://www.eenews.net/energywire/2021/01/13/stories/1063722389>)

² Lee, M., and C. Anchondo. 2021. "What to Expect for Oil and Gas in 2021." *Energywire*. Jan. 8, 2021.

(<https://www.eenews.net/energywire/2021/01/08/stories/1063722071>)

³ Lee, Mike. 2020. "BP Speeds Up Energy Transition as Pandemic Hammers Profit." *Greenwire*. Aug. 4, 2020

(<https://www.eenews.net/greenwire/2020/08/04/stories/1063683491>); Anchondo, Carlos. 2020. "Conoco

Becomes First U.S. Oil Major to Set Net-Zero Target." *Energywire*. Oct. 20, 2020

(<https://www.eenews.net/energywire/stories/1063716583>)

⁴ Lee, Mike. 2020. "Oil Major to Become 'Carbon Management Company.'" *Energywire*. Dec. 4, 2020.

(<https://www.eenews.net/energywire/2020/12/04/stories/1063719891>)

⁵ Lee, Mike. 2020. "Pandemic Hammers Oil Earnings as Drillers Brace for More." *Energywire*. Aug. 3, 2020.

(<https://www.eenews.net/energywire/2020/08/03/stories/1063675059>)

⁶ Crowley, Kevin. 2020. "Exxon may write off \$30 billion of shale assets after historic Q3 loss." *World Oil*. Oct. 30, 2020 (<https://www.worldoil.com/news/2020/10/30/exxon-may-write-off-30-billion-of-shale-assets-after-historic-q3-loss>)

- In November 2020, Shell announced the closure of one of its oil refineries in Louisiana, as a result of being unable to find a buyer. This will result in approximately 675 workers losing their jobs.⁷
- Major oil field service businesses are shifting their portfolios to include renewable energy projects.⁸
- Long term price trends are resulting in recent low bids for oil and gas leases on federal public lands.⁹
- Recent financial analyses argue that challenges to pipelines and emissions reduction regulations are anticipated to reduce the use of natural gas over the next twenty to thirty years.¹⁰
- New U.S. wind and solar projects in 2020 are predicted to break previous installation records. The EIA anticipates that renewables will account for most new electricity energy production in 2021.^{11 12}
- ExxonMobil announced layoffs will take place across its North American, Australian, and European operations due to reduced demand and the economic downturn. Cuts of up to 15 percent of the workforce are expected.^{13 14}
- General Motors and Ford, along with Volkswagen, have all made public statements they are rapidly transitioning significant portions of their vehicle fleets from internal combustion to electric power. GM's CEO, Mary Barra, was recently quoted: "We have everything in place to drive mass adoption of EVs."¹⁵

Some elements of the slowdown in the oil and gas sector may be attributed to short-term economic fluctuations as a result of the pandemic. Other indications, however, are a function of long-term forecasts of the structural viability of the sector. For example, public pronouncements of shifts in energy portfolios of some of the globe's largest companies indicate a real movement away from the sector. For example, the conclusions in BP's *Energy Outlook, 2020 Edition*, rest on the following assumptions:

⁷ Lee, Mike. 2020. "Shell Announces Largest U.S. Refinery Closure of 2020." *Energywire*. Nov. 6, 2020 (<https://www.eenews.net/energywire/2020/11/06/stories/1063717925>)

⁸ Lee, Mike. 2020. "Oil Field Service Giants Eye Opportunity in 'New Energy'" *Energywire*. Oct. 20, 2020 (<https://www.eenews.net/stories/1063716587>)

⁹ Richards, Heather. 2020. "Spate of Oil and Gas Lease Sales Underwhelm." *Energywire*. Oct. 2, 2020. (<https://www.eenews.net/energywire/2020/10/02/stories/1063715187>)

¹⁰ Willson, Miranda. 2020. "Pipeline, CO2 Fights Could Cut Gas Use For Decades—Report." *Energywire*. Oct. 2, 2020. (<https://www.eenews.net/stories/1063715329>)

¹¹ Storrow, Benjamin. 2020. "Wind, Solar Smash Records. Analysts Worry It Won't Last." *Energywire*. Oct. 8, 2020. (<https://www.eenews.net/energywire/stories/1063715765>)

¹² EIA. 2021. "Renewables account for most new U.S. electricity generating capacity in 2021." *Today in Energy*. Jan. 11, 2021. (<https://www.eia.gov/todayinenergy/detail.php?id=46416>)

¹³ ExxonMobil. 2020. 'Darren Woods Discusses Future of Industry and Company with Employees.' ExxonMobil Corporate Communication, Oct. 21, 2020. (<https://corporate.exxonmobil.com/News/Newsroom/News-releases/2020/1021-Darren-Woods-discusses-future-of-industry-and-company-with-employees>)

¹⁴ Anchondo, Carlos. 2020. "Exxon Cuts 14k Jobs." *Energywire*. Oct. 30, 2020 (<https://www.eenews.net/energywire/2020/10/30/stories/1063717415>)

¹⁵ Ferris, David. 2020. "GM vs. Ford: What Their EV Split Reveals." *Energywire*. Nov. 20, 2020 (<https://www.eenews.net/energywire/2020/11/20/stories/1063719037>)

That energy markets will undergo lasting change, shifting towards renewable and other forms of zero- or low-carbon energy. That demand for oil and gas will be increasingly challenged.¹⁶

Such announcements are not made flippantly and cannot be easily reversed. In a similar vein, in its World Energy Outlook 2020 report, IEA notes that across all of its modeling scenarios, renewables will grow rapidly. In fact, in its most conservative scenario, IEA forecasts that renewables will “meet 80% of the growth in global electricity demand to 2030.”¹⁷ IEA predicts a structural decline in the demand for coal—to energy mix share levels below that which predate the beginning of the industrial revolution. Future reliance on oil and natural gas are mixed depending on which of IEA’s modeling scenarios is applied. Domestic and international policy changes have large impacts on IEA’s demand scenarios for these sectors. Nevertheless, the dramatic decline in coal use in recent years may presage the future of the oil and gas sectors.

In sum, changes to market supply and demand scenarios, in combination with changing state and federal regulatory regimes regarding carbon emissions and oil and gas extraction are adding very real costs that are not readily reversed.

B. Overview—Colorado & New Mexico

Oil and gas production and development have long histories in Colorado and New Mexico. In recent decades, both states have benefitted from new production technologies. This section provides a brief background on oil and gas development in both states.

1. Colorado and Oil & Gas—History & Overview

Oil and gas production have a long history in Colorado. Commercial oil production first occurred in 1860, in Florence, Colorado. Since then, oil, followed by natural gas, have been important natural resources for the state. Colorado produces nearly four percent of total crude oil in the U.S. and has a similar percentage of national oil reserves.¹⁸ Colorado is ranked seventh in the country for natural gas production and has five percent of the nation’s reserves.¹⁹ Colorado currently has 38 natural gas processing plants and 37,390 natural gas wells.²⁰

2. New Mexico and Oil & Gas—History & Overview

Commercial oil production in New Mexico began later than in Colorado but has resulted in higher dividends. The first commercial well, located near Shiprock, produced oil beginning in 1922. Since then, New Mexico has become a significant oil producer. It is the third-largest oil producing state in the country and has more than seven percent of the nation’s reserves. New Mexico produces

¹⁶ BP. 2020. *Energy Outlook: 2020 Edition*. p.4 (<https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2020.pdf>)

¹⁷ IEA. 2020. *World Energy Outlook 2020*. (<https://www.iea.org/reports/world-energy-outlook-2020>)

¹⁸ U.S. Energy Information Administration (<https://www.eia.gov/state/analysis.php?sid=CO>)

¹⁹ U.S. Energy Information Administration (<https://www.eia.gov/state/analysis.php?sid=CO>)

²⁰ U.S. Energy Information Administration (<https://www.eia.gov/naturalgas/ngqs/#?report=RP9&year1=2017&year2=2017&company=Name;>
https://www.eia.gov/dnav/ng/ng_prod_wells_s1_a.htm)

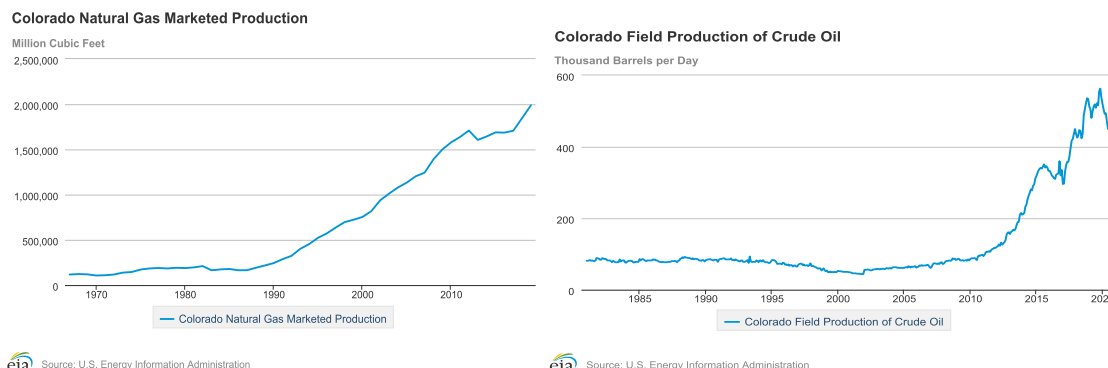
four percent of the nation's natural gas and has five percent of the nation's natural gas reserves.²¹ New Mexico currently has 24 natural gas processing plants and 39,104 producing wells.²²

3. Oil and Gas Production Trends

Oil and gas production in both Colorado and New Mexico was relatively stable for decades. With the advent of new drilling technologies and oil and gas recovery approaches both states have seen significant increases in production in both oil and gas.

In both the natural gas and oil sectors, Colorado has seen marked growth in the past twenty years. Since 2000, natural gas production has increased over 100 percent. Downward natural gas pricing has resulted in both a geographic (within Colorado) and a production shift (to oil and natural gas liquids) in recent years, however.²³ Oil production has seen a massive increase in just the past decade. Since 2010, it has increased over 400 percent. Record production levels were seen in 2019.

Figure 1: Colorado Natural Gas and Oil Production



eia Source: U.S. Energy Information Administration

eia Source: U.S. Energy Information Administration

*Source: U.S. Energy Information Administration

New Mexico has seen significant increases in oil production this decade. Since 2009, oil production has increased by a factor of four, and reached record levels of production per day in October 2019.²⁴ Natural gas production in New Mexico has been variable. Increases in gas production from some formations (e.g., shale) have increased, but have been offset to a degree by decreases in gas production from other formation types (e.g., coalbed methane).²⁵

²¹ U.S. Energy Information Administration (<https://www.eia.gov/state/analysis.php?sid=NM>)

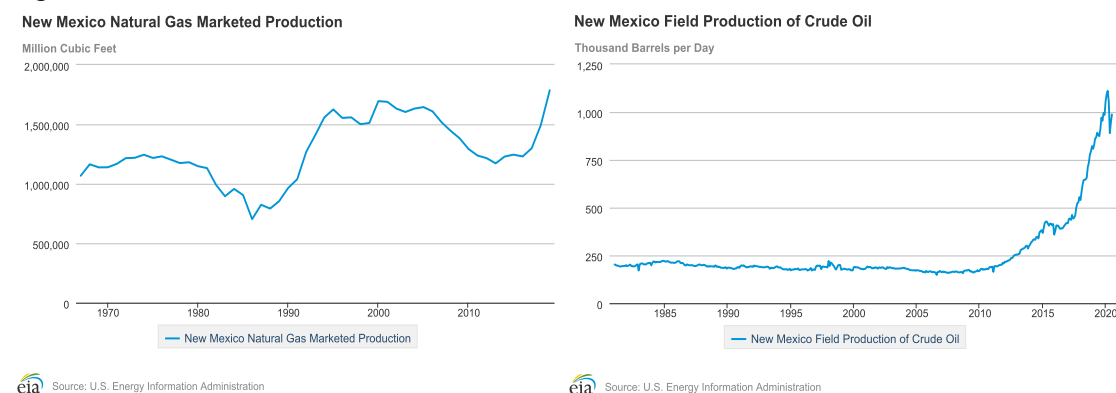
²² U.S. Energy Information Administration (<https://www.eia.gov/naturalgas/ngqs/#?report=RP9&year1=2017&year2=2017&company=Name;> https://www.eia.gov/dnav/ng/ng_prod_wells_s1_a.htm)

²³ U.S. Energy Information Administration (<https://www.eia.gov/state/analysis.php?sid=CO>)

²⁴ U.S. Energy Information Administration (<https://www.eia.gov/state/analysis.php?sid=NM>)

²⁵ U.S. Energy Information Administration (<https://www.eia.gov/state/analysis.php?sid=NM>)

Figure 2: New Mexico Natural Gas and Oil Production



*Source: U.S. Energy Information Administration

C. Size of Workforce

1. Workforce Sectors

Table 1: Industry Categories

NAICS Code Categories	Description
211	Oil and gas extraction
213111	Drilling oil and gas wells
213112	Support activities for oil and gas operations
2212	Natural gas distribution
23712	Oil and gas pipeline construction
333132	Oil and gas field machinery and equipment manufacturing
4861	Natural gas pipeline transportation
4862	Oil pipeline transportation

To measure the size and scope of the oil and gas workforce in Colorado and New Mexico, data was collected and grouped using the North American Industry Classification System (NAICS). The following represents the NAICS industry codes that capture the oil and gas sector, as used in this analysis.^{26 27}

²⁶ Executive Office of the President, Office of Management and Budget. 2017. *North American Industry Classification System: United States, 2017*.

NAICS 211—Oil and Gas Extraction: Industries in this area operate or develop oil and gas field properties. Activities may include exploration, drilling, completing and equipping wells, operating equipment, and the preparation of oil and gas for shipment. Natural gas processing is included in this industrial code.

NAICS 213111—Drilling Oil and Gas Wells: Entities in this sector drill for oil and gas wells, and include spudding in, drilling in, redrilling, and directional drilling.

NAICS 213112—Support Activities for Oil and Gas Operation: Industries in this sector are involved in field exploration, excavation, well surveying, running and pulling casings, and cementing wells, among other activities.

NAICS 2212—Natural Gas Distribution: This consists of establishments engaged in operating gas distribution systems, gas marketers and brokers, and transmitting and distributing gas to final consumers.

NAICS 23712—Oil and Gas Pipeline and Related Structures Construction: This sector consists of entities involved in the construction of oil and gas lines, mains, refineries, and storage tanks.

NAICS 333132—Oil and Gas Field Machinery and Equipment Manufacturing: This sector includes establishments involved in manufacturing oil and gas field machinery and equipment, including oil and gas field derricks.

NAICS 4861—Natural Gas Pipeline Transportation: Industries in this sector use transmission pipelines to transport natural gas.

NAICS 4862—Oil Pipeline Transportation: Industries in this sector use transmission pipelines to transport crude oil.

2. Workforce—Colorado

In 2019, the oil and gas workforce in Colorado consisted of over 33,000 workers. In the ten years since 2010, the workforce that is directly employed in this sector has grown nearly 41 percent— from 23,491 to 33,034 workers. The three largest workforce sectors consist of oil and gas operation support activities, oil and gas extraction activities, and oil and gas pipeline construction. The smallest sector, by far, is the natural gas pipeline transportation sector.

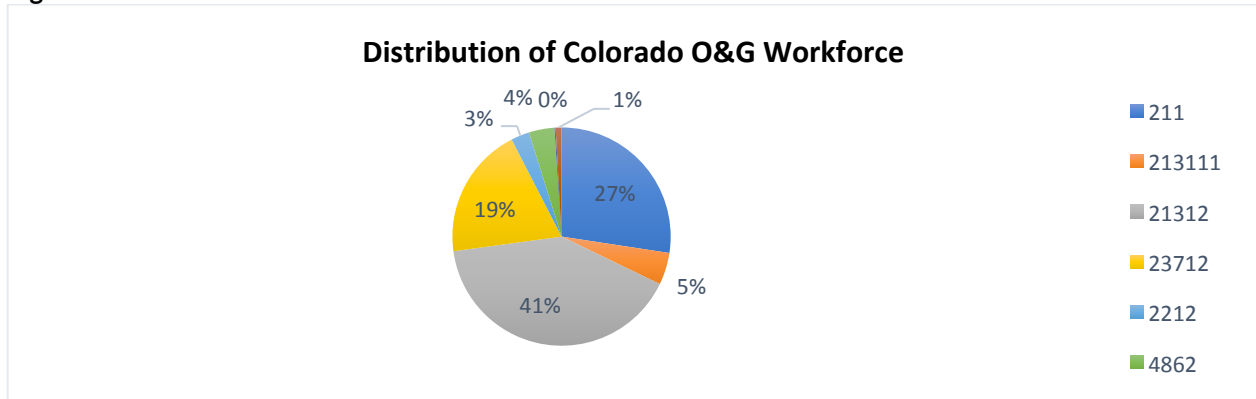
Table 2: Oil and Gas Workforce Count—Colorado

Sector	Total Employees—2019
All Oil & Gas—Colorado	33,034
211—Oil and Gas Extraction	9,053
213111—Drilling oil and gas wells	1,572
213112—Support activities for oil and gas operations	13,441
2212—Natural gas distribution	900
23712—Oil and gas pipeline construction	6,473
333132—Oil and gas field machinery and equipment manufacturing	285
4861—Natural gas pipeline transportation	60

²⁷ Note: The refining and steel manufacturing sectors are discussed in Section III of this report.

4862—Oil pipeline transportation	1,250
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Figure 3: Percent Distribution of Colorado Oil and Gas Workforce



3. Workforce—New Mexico

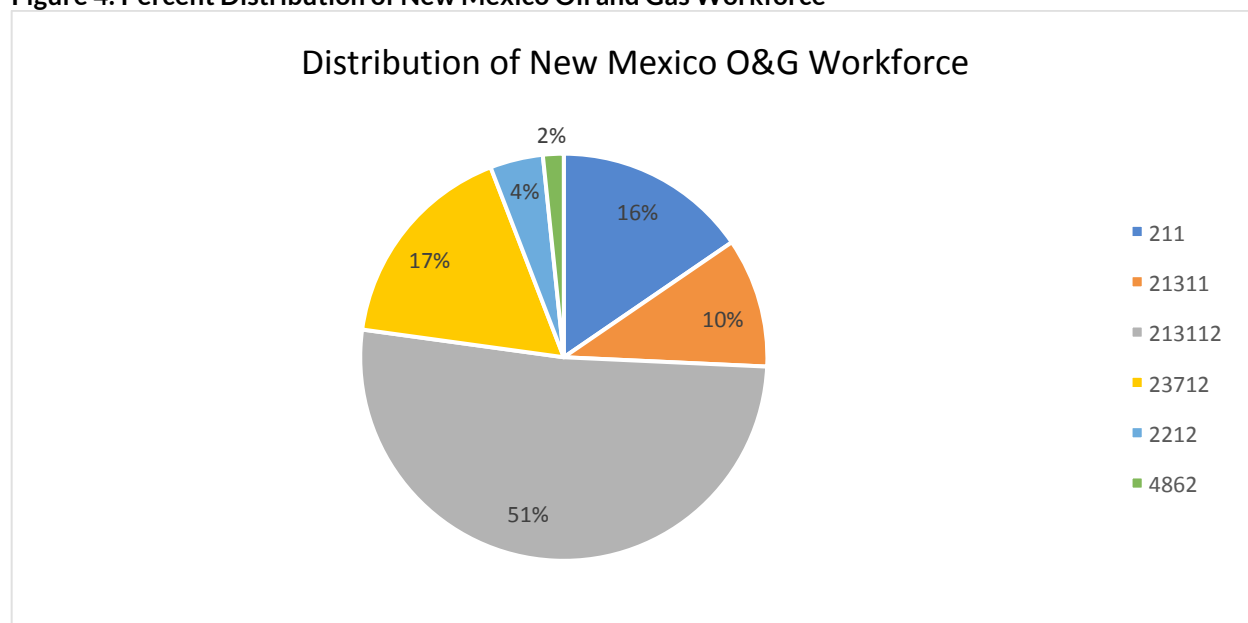
In 2019, the oil and gas workforce in New Mexico consisted of 28,268 workers. In the last ten years, this workforce has grown by over 64 percent—from 17,156 in 2010 to 28,268 last year. The three largest workforce sectors consist of oil and gas operation support activities, oil and gas pipeline construction, and oil and gas extraction activities. The smallest sector is the oil pipeline transportation sector. NAICS recorded no workforce data for 2019 for industry codes 333132 or 4861. Natural gas pipeline transportation workers may have been captured in the oil pipeline transportation code (4862).

Table 3: Oil and Gas Workforce Count—New Mexico

Sector	Total Employees—2019
All Oil & Gas—New Mexico	28,268
211—Oil and Gas Extraction	4,366
213111—Drilling oil and gas wells	2,908
213112—Support activities for oil and gas operations	14,542
2212—Natural gas distribution	1,189
23712—Oil and gas pipeline construction	4,797
333132—Oil and gas field machinery and equipment manufacturing	No data

4861—Natural gas pipeline transportation	No data
4862—Oil pipeline transportation	466

Figure 4: Percent Distribution of New Mexico Oil and Gas Workforce



D. Size of the Oil & Gas Sector

This section assesses the size of the oil and gas sector in Colorado, relative to the rest of the state.²⁸

1. Colorado

In total, 1,595 oil and gas firms are currently located in Colorado. This includes incorporated establishments of all sizes. In 2010, 1,526 firms were located in Colorado. As such, this number has stayed fairly constant. Relative to the total number of establishments (of all types) in Colorado, this sector is fairly small. It consists of only 1.2 percent of all Colorado businesses and entities.

Table 4: Number of Oil and Gas Firms in Colorado

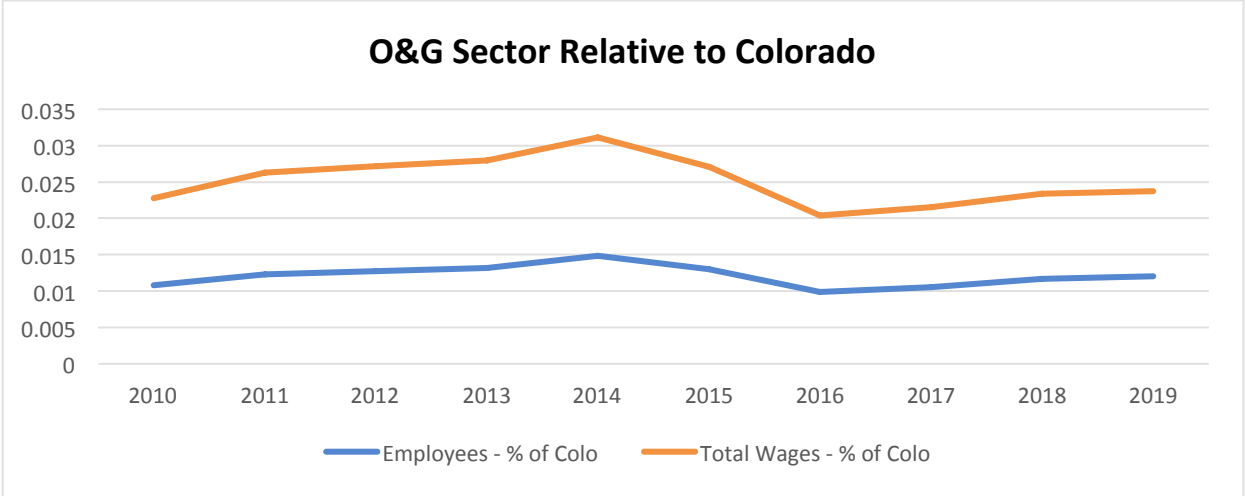
Firms	Total Firms—2019
All Oil & Gas Firms—Colorado	1,595

²⁸ This section provides the size and economic contributions of the oil and gas sector in Colorado and New Mexico. The economic impact of the sector (in terms of employment effects) is assessed in the following section.

As with the number of oil and gas businesses in Colorado relative to all Colorado establishments, the overall size of the oil and gas workforce and its summed wages are relatively modest. In 2019, the total number of oil and gas employees was only 1.2 percent of the entire Colorado workforce. As demonstrated in Figure 5, the trend of the relative workforce share has stayed fairly constant: 1.1 percent in 2010 and 1.2 percent in 2019. Similarly, the total wages of Colorado oil and gas employees is marginal compared to the summed earnings of all Colorado workers. This, too, is fairly consistent over time: 2.3 percent in 2010 and 2.4 percent in 2019. The total earnings of Colorado oil and gas workers in 2019 was \$4.01 billion.

What is notable, however, is the difference in the relative number of employees versus the relative amount of wages. Consistently, over the past ten years, the relative amount of wages has been twice that of the relative size of the workforce. For example, while the oil and gas workforce in 2019 was 1.2 percent that of Colorado, the relative share of total earnings of oil and gas workers was 2.4 percent. This indicates that oil and gas employees have a proportionally greater earning power than their workforce numbers might otherwise anticipate. In other words, Colorado oil and gas employees are disproportionately high earners (at least relative to their numbers.)

Figure 5: Oil and Gas Wages and Employees Relative to Colorado



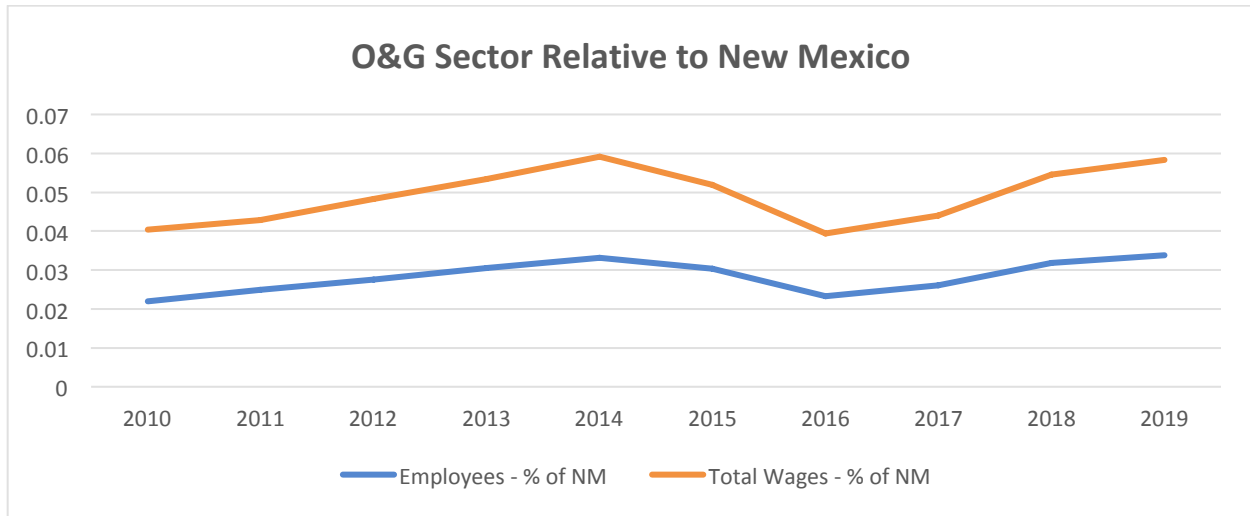
2. New Mexico

In total, 1,303 oil and gas firms are located in New Mexico. This figure includes incorporated establishments of all sizes. Since the beginning of the decade, there has been an increase in the number of oil and gas businesses. In 2010, there were 960, compared to 1,303 in 2019—an increase of 36 percent in ten years. Like Colorado, the total number of oil and gas establishments (of all types) is relatively small. It consists of 2.1 percent of all New Mexico businesses and entities.

Table 5: Number of Oil and Gas Firms in New Mexico

Firms	Total Firms—2019
All Oil & Gas Firms—New Mexico	1,303

Figure 6: Oil and Gas Wages and Employees Relative to New Mexico



Relative to the overall New Mexico workforce and share of the New Mexico economy, New Mexico's oil and gas workforce as well as its summed wages are greater than Colorado's. In addition—albeit still in relatively small terms (compared to the state economy)—the oil and gas economy in New Mexico is not only relatively greater than that in Colorado but is growing over time. In 2019, the total number of oil and gas employees was 3.4 percent of the entire New Mexico workforce. As demonstrated in Figure 6, the trend over the previous ten years shows gradual growth. The relative share of the New Mexico workforce increased by 54 percent between 2010 and 2019. Similarly, the total wages of New Mexico oil and gas employees grew over time: 4 percent in 2010 to 5.8 percent in 2019. This represents a 44.5 percent increase over this time period. The total earnings of New Mexico oil and gas workers in 2019 was \$2.3 billion.

As is the case in Colorado, oil and gas workers in New Mexico are earning at higher rates (relative to all earners in New Mexico) than their workforce numbers would otherwise indicate. For example, in 2019 oil and gas workers represented 3.4 percent of the total New Mexico workforce, while they captured 5.8 percent of total earnings. This approximate differential is consistent throughout the previous decade. Like Colorado, this finding indicates that oil and gas employees have a proportionally greater earning power than their workforce numbers might otherwise anticipate. New Mexico oil and gas employees are disproportionately high earners (at least relative to their numbers.)

E. Wage Analysis

This section assesses the average wage per worker in the oil and gas sector in Colorado and New Mexico, per industry category. It also looks at the economic contribution of oil and gas workers to the states' economies, and the economic impact of oil and gas workers on both states and counties. It is important to recognize that the average wage per worker in both Tables 6 and 7 includes all types of workers in that particular industrial sector. In other words, it includes management occupations, as well as workers in the field. On the one hand, these average income

figures give a broad view of the overall income flows coming into Colorado and New Mexico; on the other, they mask significant wage differences between management and labor.²⁹

1. Colorado

Average wage earnings for overall Colorado oil and gas workers are high. Taking into account all industrial categories considered in this analysis, the average Colorado oil and gas worker earned \$121,439 in 2019. In relative terms, this is nearly twice the average of 2019 earnings for all Colorado workers: \$61,820. Compared to the rest of the Colorado workforce, the average oil and gas worker in the state is making higher wages.

Drilling down into particular oil and gas job categories, a sizable range exists in earning potential across the oil and gas sector. The highest earners work in oil and gas extraction. These workers made, on average, \$189,967 in 2019. The lowest earners in Colorado in 2019 worked in oil and gas field machinery and equipment manufacturing. Overall, these workers made, on average, \$68,939 last year.

Table 6: Average Wages for Colorado Oil and Gas Workers, by NAICS Code—2019

Sector	Wages (\$)
Average Wage per Colo. O&G Worker	121,439
211—Oil and Gas Extraction	189,967
213111—Drilling oil and gas wells	103,338
213112—Support activities for oil and gas operations	94,888
2212—Natural gas distribution	160,662
23712—Oil and gas pipeline construction	75,010
333132—Oil and gas field machinery and equipment manufacturing	68,939
4861—Natural gas pipeline transportation	173,970
4862—Oil pipeline transportation	155,027

Table 7 shows the annual wages for specific occupational positions within the oil and gas sector in Colorado. Across all positions, the average wage for oil and gas workers in the field is \$61,491.³⁰ This is quite similar to the average wage of all Colorado workers. The discrepancy between these wage figures and those shown in Table 6 is likely explained by the differentiation between oil and gas management salaries and those of workers in the field. This is exacerbated in Colorado—given it is home to a number of oil and gas headquarters.

Table 7: Average Wages for Colorado Oil and Gas Workers, by Occupational Code—2019³¹

Sector	Wages (\$)
Average Wage per Colo. O&G Worker in the Field	61,491

²⁹ Comprehensive data on union membership density is not readily available. Were it, this would provide insights on wage differences between management and labor. Union wage premium assessments, for example, are based on national data.

³⁰ For comparative purposes, the average salary in 2019 for Wind Turbine Service Technicians in Colorado is \$62,270 and for Solar Photovoltaic Installers is \$47,370.

³¹ BLS, Occupational Employment Statistics (2019 data)

<i>Derrick Operator</i>	48,950
<i>Rotary Drill Operator</i>	67,010
<i>Service Unit Operator</i>	51,850
<i>Roustabouts</i>	46,210
<i>Gas Plant Operator</i>	70,880
<i>Refinery Operator and Pump System Operator</i>	82,560
<i>Gas Compressor and Pumping Station Operator</i>	59,720
<i>Wellhead Pumper</i>	71,860
<i>Plumbers, Pipefitters & Steamfitters</i>	54,380

2. New Mexico

The average wage for an oil and gas worker in New Mexico, across all oil and gas job categories, was \$80,774 in 2019. Here, too, this average wage is considerably higher than the average New Mexico wage for all workers. In 2019, the average New Mexico worker made \$47,043. In other words, the average wage of an oil and gas worker in New Mexico is approximately 172 percent that of the average New Mexican.

In New Mexico in 2019, the highest wage for an oil and gas industrial category is \$122,683—for workers involved in oil pipeline transportation. Oil and gas pipeline construction was the lowest paid category in 2019. Workers in this sector earned \$63,429. It is notable that this is still over \$16,000 higher than the 2019 wage of the average worker in New Mexico.

Table 8: Average Wages for New Mexico Oil and Gas Workers, by NAICS Code—2019

Sector	Wages (\$)
<i>Average Wage per N.M. O&G Worker</i>	80,774
<i>211—Oil and Gas Extraction</i>	117,205
<i>213111—Drilling oil and gas wells</i>	85,807
<i>213112—Support activities for oil and gas operations</i>	74,280
<i>2212—Natural gas distribution</i>	67,677
<i>23712—Oil and gas pipeline construction</i>	63,429
<i>4862—Oil pipeline transportation</i>	122,683

Table 9 shows the annual wages for specific occupational positions within the oil and gas sector in New Mexico. Across all positions, the average wage for oil and gas workers in the field is \$56,436.³² While this is less than the average annual wage for these job categories in Colorado, this figure is well above the average wage for all New Mexico workers (\$47,043).

The difference between total average Colorado oil and gas wages and Colorado oil and gas worker wages is much larger than the difference for those two categories in New Mexico. This is likely explained by Colorado having more oil and gas corporate headquarters than New Mexico—and therefore having a significantly higher proportion of management workers making high salaries.

Table 9: Average Wages for New Mexico Oil and Gas Workers, by Occupational Code—2019³³

Sector	Wages (\$)
<i>Average Wage per N.M. O&G Worker in the Field</i>	56,436

³² For comparative purposes, the average annual salary in 2019 in New Mexico for Wind Turbine Service Technicians is \$52,530, and for Solar Voltaic Installers is \$43,260.

³³ BLS, Occupational Employment Statistics (2019 data)

<i>Derrick Operator</i>	49,500
<i>Rotary Drill Operator</i>	47,400
<i>Service Unit Operator</i>	63,900
<i>Roustabouts</i>	35,690
<i>Gas Plant Operator</i>	63,080
<i>Refinery Operator and Pump System Operator</i>	77,080
<i>Wellhead Pumper</i>	68,560
<i>Plumbers, Pipefitters & Steamfitters</i>	46,280

II. Economic Impact

This section assesses the contribution of the oil and gas sectors to the Colorado and New Mexico economies. It highlights the positive job creation impact of oil and gas workers on the respective economies. Through modeling, it then explores the unemployment ripple effects across both states and specific counties were the oil and gas sectors to be eliminated -- an extreme scenario intended to simply illustrate the economic significance of these sectors.

A. Sector Contribution

Even while relatively small, the oil and gas sectors in both Colorado and New Mexico provide significant economic contributions to their respective economies. In 2019, the oil and gas sector in Colorado comprise 2.4 percent of all wages earned across the state. In dollar terms, this is \$4.01 billion. In that same year in New Mexico the oil and gas sector produced \$2.3 billion in total wages, comprising 5.8 percent of all earnings across the state. It is worth noting that while Colorado's collective wage earnings are larger than New Mexico's, its proportional share of all earnings is smaller. This is explained by Colorado having a larger population and economy.

Table 10: Total Oil and Gas Wages—2019

Total Wages from All O&G Sectors in State—2019	Amount (\$—in thousands)
Colorado	4,011,557
New Mexico	2,293,096

Table 11: Oil and Gas Share of Total State Wages—2019

Share of State Wages—2019	Percent
Colorado	2.37%
New Mexico	5.83%

B. Workforce Impact

This section explores the positive job growth impacts of the oil and gas sector. It also assesses the implications of job losses in the sector on other parts of the economy. The section first looks at modeled statewide impacts, and then at modeled impacts of particular counties in Colorado and New Mexico.

1. Workforce Impact—State

This analysis indicates that the oil and gas sector have a significant positive impact on the state economy. Utilizing new research by the Upjohn Institute for Employment Research³⁴, a job multiplier of 1.9 is used in this analysis.³⁵ A job multiplier indicates that each direct job in the oil and natural gas industry will support, in this analysis, an additional 1.9 jobs elsewhere. Depending on the sector and location, these job additions could be local, regional, or national—or, more likely, a mix thereof. These additional jobs represent positions along the oil and gas supply chain.

Utilizing this approach, we estimate that the 33,034 oil and gas jobs in Colorado in 2019 will produce 29,731 additional jobs, resulting in an estimated 62,765 direct and related total jobs. In

³⁴ Bartik, Timothy J., and Nathan Sotherland. 2019. "Realistic Local Job Multipliers" in *W.E. Upjohn Institute for Employment Research—Employment Research Newsletter*. Vol. 26.

(https://research.upjohn.org/cgi/viewcontent.cgi?article=1280&context=empl_research)

³⁵ A job multiplier of 1.9 is more conservative than the more frequently used multiplier of 2.7. The Upjohn research indicates that use of a multiplier of 2.7 is not supported.

New Mexico, the 28,268 oil and gas jobs will produce 25,441 additional jobs, resulting in an estimated 53,709 total jobs.

Table 12: Oil and Gas Job Creation (Modeled)—2019

Modeled Job Creation—2019	O&G Jobs	Additional Jobs Created
Colorado	33,034	29,731
New Mexico	28,268	25,441

In the same vein that the presence of jobs will produce new jobs, the loss of particular jobs will have ripple effects that cause negative job impacts (i.e., losses) elsewhere. This analysis uses an unemployment multiplier methodology developed by the Economic Policy Institute (EPI).³⁶ Unemployment effects take two forms: ‘backward’ and ‘forward.’ Backward effects refer to the impacts on suppliers to a given industry sector. Forward effects refer to the impacts on those sectors where industry workers would have spent their income. Because these backward and forward effect groups are qualitatively different, unique unemployment multipliers are used for each. In turn, the EPI generates unique unemployment multipliers for each industrial category. These groupings align with NAICS industrial categories.

Table 13 shows the results of a scenario in which all jobs in the oil and gas sector in Colorado and New Mexico are lost. We take this approach for two reasons. First, 100 percent job losses show the extreme bounds of this ripple effect. That is, it shows the worst-case impacts for this sector and for local, regional, state, and national economies. Second, it highlights the damage that may well occur if oil and gas jobs are lost (at any level) and are not replaced with jobs of economic equivalence. In other words, it’s not just the oil and gas jobs that are lost, but also those of many workers in other sectors. The economic fallout, in this scenario, is profound.

As demonstrated in Table 13, significant, negative job loss ‘ripples’ occur if the oil and gas sectors in Colorado and New Mexico are to disappear (whether through regulatory or market-based means.) In Colorado, the loss of the oil and gas sector could result in 65,329 upstream or supplier, jobs and 39,475 downstream, or induced, jobs lost. In combination with the lost oil and gas sector jobs being lost this could result in a total of nearly 138,000 unemployed. This is the equivalent of five percent of the entire Colorado workforce losing their jobs. In New Mexico, a loss of all 28,268 oil and gas jobs could ultimately result nearly 109,000 jobs beings lost. This would result in 13 percent of New Mexico’s workforce losing their jobs. Across both states, this works out to be job losses approaching nearly a quarter of a million workers.

Table 13: State Impacts of Oil and Gas Job Losses (Modeled)—2019

Modeled Job Loss—2019	O&G Jobs Lost	Supplier Jobs Lost	‘Downstream’/Induced Jobs Lost	Total Jobs Lost
Colorado	-33,034	-65,329	-39,475	-137,853
New Mexico	-28,268	-48,268	-32,363	-108,916

2. Workforce Impact—County

An assessment of county-level job losses highlights the serious impact that will occur to counties that are heavily reliant on oil and gas sector jobs. Two central assumptions guide this county-level

³⁶ Bivens, Josh. 2019. “Updated Employment Multipliers for the U.S. Economy.” Report. Economic Policy Institute. (<https://www.epi.org/publication/updated-employment-multipliers-for-the-u-s-economy/>)

analysis. First, all oil and gas jobs are lost—and not immediately replaced. While this may not be altogether realistic, it is still worth keeping in mind that in order to not incur job losses of the types illustrated below, oil and gas job losses must be substituted with jobs that have similar economic value. For example, we can imagine that the job loss of an oil and gas worker in Colorado will have minimal ripple effects on other parts of the economy if that worker finds a new job that provides equivalent wages in, for example, manufacturing. However, if that unemployed oil and gas worker only finds work in, say, the retail sector the backward and forward unemployment impacts of the job loss will be significant. A retail job provides less forward-directed buying power to stimulate the local economy. And, similarly, the nature of the retail environment will likely have less of a positive impact on the upstream or backward-looking supply chain. Second, we assume that all follow-on job losses will occur within the county. This, too, is not altogether realistic. Induced (downstream) employment effects will likely have pronounced local and regional impacts. Supplier (upstream) employment effects, however, are likely to be regional, statewide, or inter-state in nature. That said, those counties that do rely disproportionately on ‘in-county’ oil and gas supply chains will result in more upstream job losses within the county. In other words, unemployment impacts are not linear across county types and should be viewed, in part, as functions of reliance on a particular sector and geographic location. We can also use this approach to show the disproportionate impacts to counties with heavier concentrations of oil and gas workers in them. In other words, counties that have lower proportions of oil and gas workers—i.e., that have a more diversified workforce—are going to have fewer overall impacts than those that rely heavily on oil and gas employment.³⁷ It also goes without saying that regardless of whether unemployment effects take place in a given jurisdiction (i.e., a county), those unemployment impacts will take place somewhere in the U.S. and will therefore have negative impacts in those locations.

The six Colorado counties with the highest numbers of oil and gas workers are estimated to result in varying degrees of total unemployment with the loss of the oil and gas sector. The Colorado counties with the largest oil and gas workforces in 2019 were: Weld, Denver, Mesa, Adams, Garfield, and Larimer. Table 14 provides detailed information about these counties, along with modeling projections. Weld County has the highest oil and gas workforce in the state: 11,485 oil and gas workers. In the case of the disappearance of the oil and gas sector, no employment substitutions, and as a result of downstream and upstream unemployment effects, total job loss in the county could be 49,549 individuals. This would be nearly 36 percent of Weld County’s workforce. Economic dislocation would be severe. Most oil and gas employment in Colorado are based in Weld, Denver, Mesa, and Adams Counties. While Garfield and Larimer Counties have the fifth and sixth highest oil and gas employment in the state, their workforce numbers are considerably lower than the preceding four counties. Garfield County has 770 oil and gas workers, and Larimer County has 547. Larimer County could see total economic losses of 1.1 percent of the county population going unemployed. Garfield County—with a similarly low oil and gas workforce—would see much higher unemployment effects. With 770 losses from the oil and gas sector, Garfield County could see 2,059 upstream (supplier) and 1,029 downstream (induced) jobs lost, resulting in a total of 3,858 potentially unemployed. This may result in 14.7 percent of the county workforce losing their jobs. The difference between the 1.1 percent unemployment loss in Larimer County and the 14.7 percent unemployment loss in Garfield County is attributed to the latter having a much higher proportion of the county workforce dedicated to oil and gas. As a

³⁷ It also goes without saying that regardless of whether specific upstream or downstream job losses take place within the confines of a county or not, the overall unemployment impacts will still be real—they may just take place in other parts of the state or the country.

result, induced job losses for that county will be much higher. (The same logic applies to Weld County, albeit on a larger scale.)

Other counties included in this analysis are Las Animas, La Plata, and Rio Blanco counties. While these counties do not have the largest number of employees in absolute terms, the inclusion of them illustrates the variation that occurs across counties. Rio Blanco County had 158 oil and gas workers in 2019. Because the county has a small population, however, it could have a high percentage of total workforce lost when assessing both associated upstream and downstream job losses: 18 percent. This is a similar situation for La Plata which could lose over nine percent of the county workforce with the disappearance of the oil and gas sector. Las Animas shows a smaller impact: three percent of total jobs lost.

Table 14: Colorado County Impacts of Oil and Gas Job Losses (Modeled)—2019

Modeled Job Loss- Colorado Counties (2019)	O&G Jobs Lost	Supplier Jobs Lost	Induced Jobs Lost	Total Jobs Lost	Total % of County Workforce Lost
Weld	-11,485	-16,979	-12,488	-49,959	35.8%
Mesa	-2,424	-3,063	-2,540	-8,029	12.6%
Adams	-2,142	-2,286	-2,109	-6,538	2.9%
Garfield	-770	-2,059	-1,029	-3,858	14.7%
Larimer	-547	-652	-554	-1,754	1.1%
La Plata	-588	-1,122	-677	-2,388	9.1%
Rio Blanco	-158	-192	-167	-516	18%
Las Animas	-48	-58	-51	-157	3.1%
Denver ³⁸	-7,873	-24,679	-11,578	-44,132	8.3%

If induced unemployment losses are confined to counties, the collapse of the oil and gas industry in New Mexico could have significant impacts to some areas. As a result of the large size of the oil and gas workforce in some New Mexico counties, whole county populations could effectively disappear. Lea County has an overall workforce size of 33,028 workers—including, but not limited, to the oil and gas workforce. If the oil and gas sector was to disappear and Lea County was to lose 8,991 oil and gas jobs, we may expect to see 11,229 upstream (supplier) jobs lost and 9,340 downstream (induced) jobs lose. In sum, this could result in 29,566 jobs lost in Lea County—or 89.5 percent of the working population of that county. Even worse, Eddy County could see 33,434 jobs lost out of a 33,483 total jobs—a loss of 99.9 percent of the county workforce. Without effective job replacement, and from an employment point of view, Eddy County would cease to exist.

The central reason that Eddy and Lea Counties have such job losses is that their economies are very much concentrated towards oil and gas production. Both counties have seen significant population increases in recent years as a result of high oil and gas production levels in the area. The lack of employment type diversification would make these counties especially vulnerable to shocks in the oil and gas employment landscape.

³⁸ Denver is home to headquarters of a number of oil and gas enterprises. These employees consist of a number of job categories that may not be as present in counties in which oil and gas production are the primary activities. For example, more oil and gas executives will be located in Denver than in other counties in Colorado where oil and gas activities take place.

The other three counties in New Mexico with the next highest oil and gas employment totals—San Juan, Bernalillo, and Chaves—could see overall county job losses of 27.3, 0.1, and 1.2 percent, respectively. Here, too, the impacts are mixed because of a) the size of the oil and gas sector in those counties; and b) the relative share of the oil and gas workforce relative to other employment sectors.

Table 15: New Mexico County Impacts of Oil and Gas Job Losses (Modeled)—2019

Modeled Job Loss— New Mexico (2019)	O&G Lost	Jobs Lost	Supplier Jobs Lost	Induced Jobs Lost	Total Jobs Lost	Total % of County Workforce Lost
Lea	-8,991	-11,229	-9,340	-29,566	89.5%	
Eddy	-8,620	-14,849	-9,960	-33,434	99.9%	
San Juan	-4,091	-4,532	-4,099	-12,724	27.3%	
Bernalillo	-135	-130	-126	-392	0.1%	
Chaves	-59	-129	-59	-247	1.2%	

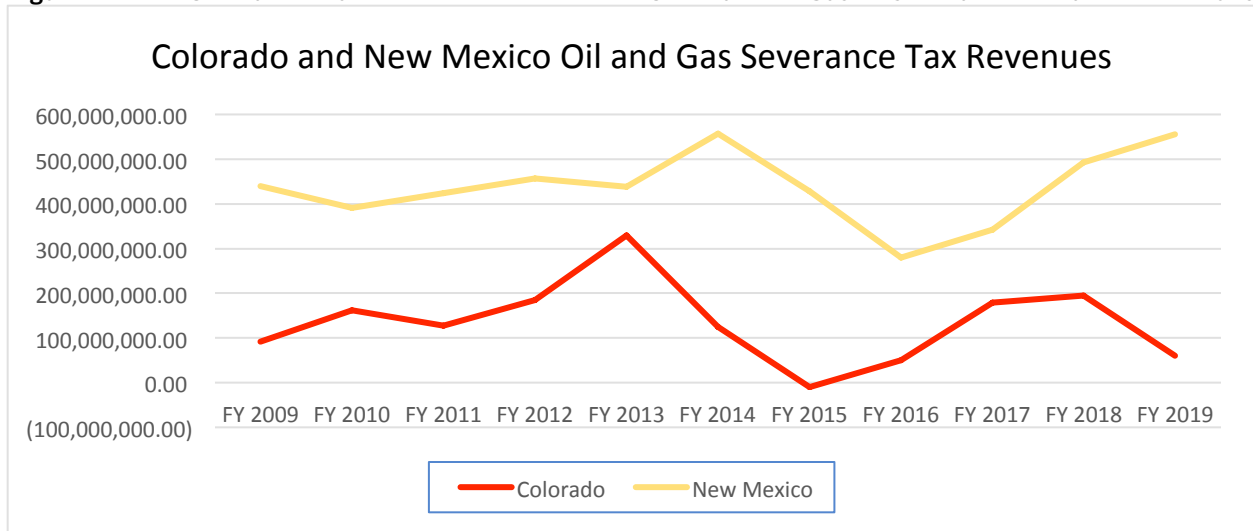
C. Tax Revenues

Oil and gas production results in tax revenues for both Colorado and New Mexico. While each state uses different tax vehicles to generate revenues from oil and gas production, both states use severance taxes. Were oil and gas production to be constrained in either or both states, severance tax revenues would necessarily decrease.

As demonstrated in Figure 7, New Mexico receives more revenues from oil and gas severance taxes than does Colorado. New Mexico received \$555.4 million in oil and gas severance taxes in FY2019, while Colorado received \$212 million. Between fiscal years 2009 and 2019, the highest amount of tax revenues brought in by New Mexico was \$557.1 million in FY2014 and the lowest amount was \$279.8 million in FY2016. Note that this figure would rank as the second highest revenue figure over this same period for Colorado. Colorado brought in its highest level of severance tax revenues in FY2013: \$329.4 million. Its lowest year was in FY2015 where it brought in negative \$10 million. This negative figure is a function of Colorado's severance tax structure that allows the tax deduction of oil and gas property taxes to be taken from severance tax payments. In FY2015, these deductions were of a greater amount than the severance taxes that would have been levied.

It is worth noting that because New Mexico's severance tax revenues are higher and have been more stable over time, significant declines in this tax revenue source may be felt more acutely in that state than in Colorado if there is a substantive decline in oil and gas production.

Figure 7: Colorado and New Mexico Oil and Gas Severance Tax Revenues



III. Impact of Affiliated Industries in Colorado and New Mexico

This analysis assesses the scope of industries in Colorado and New Mexico affiliated with the oil and gas sectors. Two of these—the steel manufacturing and petroleum and natural gas refineries—are reliant upon the oil and gas sectors. From an upstream perspective, the steel manufacturing sector supplies equipment for oil and gas operations. Downstream, refineries in Colorado and New Mexico process some of the natural gas and oil produced in these states. If the oil and gas sector was to shrink, these two sectors would likewise be negatively affected. This section provides an overview of the size of these sectors, their employment impacts, and potential unemployment effects were these industries to shrink or disappear.

A. Steel Manufacturing in Colorado and New Mexico

To measure the size and scope of the steel industry sector—as it pertains to the oil and gas sector—in Colorado and New Mexico, NAICS data was used. The following NAICS industrial codes were used to determine the elements identified in Tables 16 and 17: 3311—Iron and steel mills and ferroalloy manufacturing; 3312—Steel product manufacturing from purchased steel; 331511—Iron foundries; 332111—Iron and steel forging; 332312—Fabricated structural metal manufacturing; 3329—Other fabricated metal product manufacturing.

Table 16: Size of the Colorado Steel Sector—2019

Colorado Steel Sector—2019	
Total number of workers in the Colorado steel sector	3,746
Number of establishments	169
Total Wages (<i>in thousands</i>)	\$235,266
Average wage per worker in the Colorado steel sector	\$62,802

The Colorado steel industry, as it relates as a supplier to the Colorado oil and gas sector, employed 3,746 workers in 2019. These workers were employed across 169 establishments (of varying sizes). Collectively, this produced \$235 million in wages. The average wage of a worker in the Colorado steel sector in 2019 was \$62,802. This is very similar to the average income for all Colorado workers (across all sectors) in 2019: \$61,820.

In New Mexico, the steel sector employed 579 workers in 2019. These workers were employed at 74 establishments. The summed wages of these steel workers in 2019 was \$31 million. The average wage of a steel worker in New Mexico in 2019 was \$54,442. This was approximately \$7,000 higher than the average annual income of a worker in New Mexico. That average worker made \$47,043 annually.

Table 17: Size of the New Mexico Steel Sector—2019

New Mexico Steel Sector—2019	
Total number of workers in the New Mexico steel sector	579
Number of establishments	74
Total Wages (<i>in thousands</i>)	\$31,501
Average wage per worker in the Colorado steel sector	\$54,442

In assessing the employment and unemployment effects of the steel sector in Colorado and New Mexico, we use the same methodology that was used in the previous section.

The 3,746 direct jobs in Colorado's steel sector will support 3,371 additional jobs. The direct jobs in New Mexico's steel sector will produce 521 jobs. In other words, across both states, the presence of the steel sector resulted in 3,892 additional jobs in 2019.

Table 18: Steel Sector Job Creation (Modeled)—2019

Steel Sector—Modeled Job Creation: 2019	Steel Jobs	Additional Jobs Created
Colorado	3,746	3,371
New Mexico	579	521

Were the steel sector to collapse in both states, however, job losses in other sectors would follow. In Colorado, using 2019 employment data, we could anticipate 7,227 supplier (upstream) and 5,039 induced (downstream) jobs to be lost with a full shut-down of the steel industry in the state. In New Mexico, with a smaller steel sector, we could anticipate 962 supplier and 694 induced jobs to be lost. This would result in 16,012 total jobs lost in Colorado, and 2,235 jobs lost in New Mexico—a total of 18,247 jobs lost across both states.

Table 19: State Impacts of Steel Sector Job Losses (Modeled)—2019

Steel Sector—Modeled Job Loss: 2019	Steel Jobs Lost	Supplier Jobs Lost	'Downstream'/Induced Jobs Lost	Total Jobs Lost
Colorado	-3,746	-7,227	-5,039	-16,012
New Mexico	-579	-962	-694	-2,235

B. Petroleum Refining in Colorado and New Mexico

To measure the size and scope of the refining sector in Colorado and New Mexico we use NAICS industrial code 324—Petroleum and Coal Products Manufacturing.³⁹ This sector includes refining crude petroleum into refined petroleum. The U.S. Energy Information Agency defines refineries as facilities that manufacture finished petroleum products from crude oil, unfinished oils, natural gas liquids, and other hydrocarbons. While there are a number of refineries in Colorado, Colorado's primary refinery is the Commerce City Refinery (Suncor Energy) in Commerce City. New Mexico's primary refineries are the Navajo Refinery (HollyFrontier) in Artesia and the Ciniza Refinery (Marathon Petroleum) in Gallup.

Table 20: Size of the Colorado Petroleum Refining Sector—2019

Colorado Petroleum Refining Sector—2019	
Total number of workers in the Colorado petroleum refining sector	808
Number of establishments	20
Total Wages (<i>in thousands</i>)	\$88,672
Average wage per worker in the Colorado petroleum refining sector	\$109,685

The Colorado petroleum refining sector employed 808 workers in 2019. This workforce was spread across twenty locations. As noted above, the primary refinery is Suncor's refinery in Commerce City. Other locations do include headquarter locations for a number of companies. The collective earnings for workers in this sector in 2019 was \$88.7 million, and the average annual wage was nearly \$110,000. While this is greater than the annual average earnings of a Colorado worker (\$61,820) it is likely inflated, in part, because it includes executive earnings.

³⁹ Natural gas refining and processing is captured by the NAICS codes in Table 1.

Table 21: Size of the New Mexico Petroleum Refining Sector—2019

New Mexico Petroleum Refining Sector—2019	
Total number of workers in the New Mexico petroleum refining sector	1,033
Number of establishments	14
Total Wages (<i>in thousands</i>)	\$107,180
Average wage per worker in the Colorado petroleum refining sector	\$103,740

The New Mexico petroleum refining sector employed over 1,000 workers in 2019. These workers were employed at fourteen facilities across the state. The collective earnings of the petroleum refining workforce in New Mexico in 2019 was nearly \$110 million. The average annual wage per refinery worker in 2019 was \$103,740. This is well above the average annual wage earnings of a worker in New Mexico (\$47,043), but, as with Colorado, likely includes corporate incomes as well.

Table 22: Petroleum Refining Sector Job Creation (Modeled)—2019

Petroleum Refining Sector—Modeled Job Creation: 2019	Petroleum Refining Jobs	Additional Jobs Created
Colorado	808	727
New Mexico	1,033	930

In assessing the employment and unemployment effects of the petroleum refining sector in Colorado and New Mexico, we use the same modeling methodology that was used in the previous section.

Direct employment in Colorado’s petroleum refining sector will support 727 additional jobs. The 1,033 direct jobs in New Mexico’s petroleum refining sector will produce an additional 930 jobs. In other words, across both states, our model predicts that the presence of the petroleum refining sector resulted in 1,657 additional jobs in 2019.

Table 23: State Impacts of Petroleum Refining Sector Job Losses (Modeled)—2019

Petroleum Refining Sector—Modeled Job Loss: 2019	Petroleum Refining Jobs Lost	Supplier Jobs Lost	‘Downstream’/Induced Jobs Lost	Total Jobs Lost
Colorado	-808	-7,643	-4,078	-12,529
New Mexico	-1,033	-9,771	-5,214	-16,018

Complete loss of the petroleum refining sector in both states would result in both negative ‘upstream’ and ‘downstream’ jobs impacts. In Colorado, using 2019 employment data, we could anticipate 7,643 supplier (upstream) and 4,078 induced (downstream) jobs to be lost with a full shut-down of all petroleum refining facilities across the state. In New Mexico, we predict 9,771 supplier and 5,214 downstream jobs to be lost. This would result in 12,529 total jobs lost in Colorado, and 16,018 jobs lost in New Mexico—a total of 28,547 jobs lost across both states (using 2019 figures).

IV. Recommendations: Economic Support Policies for the Oil and Gas Workforce

This report provides an overview of the sizable contribution and impact that the oil and gas sector provide to the Colorado and New Mexico economies. In terms of direct and induced employment, wage earnings, and tax revenues the sector is an important part of both states. This analysis models potential impact to the states' economies were the oil and gas sector to cease to exist. This, as noted in section II.B.1, is simply an assumption that is applied to show the extreme economic and workforce impacts that could potentially occur. In fact, this is not a realistic outcome. Rather, while we do predict a significant reduction in the oil and gas sectors over time, it will not be immediate, nor will it involve the extent of the sector. Rather, at the local level, it will impact different communities in varying degrees. In those communities, however, that are heavily reliant on oil and gas production, negative impacts would be more exacerbated than in those that have diversified economies. Given future market trends (decreasing oil and gas production; increasing renewable penetration; increased share of electric vehicles), we recommend that economic diversification for local, county, and state economies is paramount.

A. COVID Stimulus Provisions: Assessment of the CARES Act

The CARES Act, signed into law on March 27, 2020, included various provisions to support individuals, businesses, and states as a result of the economic downturn associated with the coronavirus (Covid) pandemic. Amongst the provisions were expanded unemployment insurance (\$250 billion), support for small businesses (\$350 billion), support payments to individuals and households (\$300 billion), support for states (\$150 billion), and industry support funding (\$450 billion.) The law also includes a prohibition on corporate stock buybacks.

CARES Act support for individuals and small businesses has provided needed assistance. The Paycheck Protection Program (PPP) provided an additional \$600 a week in unemployment benefits. This has been essential for many families across the country. It most benefited, however, those in the workforce with lower incomes. While unemployed higher wage earners—such as those in the oil and gas sector—did receive PPP support, this was, in some cases, less than their original wages had been. Similarly, loans to small businesses—especially if forgiven—were contingent on preservation of jobs and maintenance of wages for those recipients of this funding.

The central issue with the CARES Act, however, is the lack of economic protections for workers as part of very significant industry funding support. Not enough oversight was provided towards ensuring that jobs, worker safety, wages, and benefits would be protected on appropriation of the collective \$450 billion in industry support funds. While the legislation called for job preservation “to the greatest extent practicable” the enforceability of this provision is extremely limited. As a result, significant amounts of CARES Act funding went towards corporate and executive support—with practically no job and wage protections for workforces. In a sector with already decreasing profit margins, CARES Act corporate support—in the absence of effective worker protections—may almost have been an invitation for job dismissals.

B. Federal Policy Recommendations—Going Forward

Congress has taken significant steps to protect workers, and must continue to prioritize the most vulnerable; safeguard working peoples' jobs, homes, and livelihoods; shore up essential public services; and protect the health and safety of frontline workers. Future Covid stimulus bills may provide additional relief for industries wracked by the pandemic, but must continue to meet the

following standards, principles, and conditions, and incorporate the policy priorities outlined below:

Overarching Standards/Principles:

- Ensure all projects built with public resources are subject to Buy America standards that maximize the return to taxpayers and the American economy;
- Enforce Davis-Bacon provisions that ensure workers are paid prevailing wages;
- Utilize project labor agreements (PLA), community benefit agreements (CBA), local hire, and other provisions and practices;
- Drive forward-looking planning and investments that meet environmental standards and build resilient infrastructure systems and communities;
- Ensure we “Buy Clean” to prioritize use of the most efficient, resilient, and cleanest materials and products with the lowest carbon and toxicity footprints, and “Buy Fair” to enhance labor standards, workers’ rights, career pathways, equity and community benefits;
- Enhance and enforce hiring and procurement policies that benefit low-income communities, people of color, and women;
- Prioritize investments in those communities most in need;
- Workers and families must receive the majority of the benefits of any federal aid package and aid will be clawed back if workers don’t benefit; and
- Ensure adequate enforcement, including an outside oversight board with the authority to periodically review recipient compliance and adequate funding for state and local enforcement to ensure construction projects truly meet PLAs, CBAs and other workforce provision requirements.

Business Relief Must be Contingent on the Following Conditions:

- Providing mandatory paid sick leave and a \$15 minimum wage for all direct employees;
- Ensuring no layoffs, no benefits cuts, and no dividend or stock buybacks;
- Respect for collective bargaining agreements and workers’ organizing rights such as neutrality, majority sign-up, and first contract arbitration and no hiring of anti-union consultants;
- Installing workers on boards, providing equity ownership stakes, other measures to ensure continued alignment with the public interest with regard to major rescue packages;
- Protect workers and their benefits in bankruptcy proceedings; and
- Require companies to permanently comply with the requirements in Workers’ Right to Training Act (S. 2468) to ensure any investments in technology or automation, which may be accelerated as a result of the COVID-19 pandemic, are predicated on worker consultation and training.

Future relief should also protect workers’ jobs, wages, and benefits, including by:

- Extending UI benefit eligibility for the duration of COVID-19-caused economic downturn and expand UI work-sharing eligibility to avoid layoffs;
- Ensure workers in all sectors—and at companies of all sizes—have access to paid sick leave for themselves and family members, closing the loophole from CARES to cover companies with over 500 employees;
- Ensure a workers’ leave for COVID-19 is separate from their existing leave, and that they are eligible at any time they are employed;
- Protect workers’ healthcare and pension plans and coverage of missed contributions due to missed work or layoffs;

- Guarantee retirement security through a federally-funded cash infusion to shore up multi-employer pension plans, using the House-passed Butch-Lewis Act and/or direct fiscal aid to plans (\$10 billion);
- Provide direct additional, unrestricted, funding to state and local government facing severe budget shortfalls (\$200 billion);
- Ensure that any taxpayer is eligible to receive stimulus benefits; and
- Protect workers and their benefits in bankruptcy proceedings, including the Protecting Employees and Retirees in Business Bankruptcies Act of 2018 (S. 2518, 115th Congress)

C. State Policy Recommendations

The states of Colorado and New Mexico, already experienced with the downturn in their coal economies, should proactively provide support to the oil and gas workforce and oil and gas communities to ease a likely energy transition in these sectors. The following recommendations are drawn from the State of Colorado's *Draft Colorado Just Transition Plan*⁴⁰ and the BlueGreen Alliance's recently released *State-Based Policies to Build a Cleaner, Safer, More Equitable Economy*.⁴¹ These recommendations are oriented towards workforces undergoing energy transition, as well as fundamental workforce protection measures.

1. *Increase funding for and the expand the numbers of workforce centers*
 - a. Workforce centers provide career support services to workers. These should be oriented to provide information and career mentorship for the oil and gas workforce.
2. *Develop or expand state workforce development program*
 - a. Provide workforce training, skills development, job search, and income support benefits program.
 - b. Design the program so that it is similar to the federal Trade Adjustment Assistance program.
3. *Authorize and fund an energy transition workforce relocation program*
 - a. In order to take advantage of job sectors that are in demand, unemployed or underemployed energy workers may need to relocate. In addition to the costs of the relocation itself, the worker may encounter cost of living differences.
 - b. The states should provide grants for energy transition workers for relocation expenses, and to ease the cost of living transition.
4. *Wage Differential Benefit Program*

⁴⁰ Just Transition Advisory Committee. 2020. *Draft Colorado Just Transition Plan*. Colorado Department of Labor and Employment. Aug. 1, 2020. (https://cdle.colorado.gov/sites/cdle/files/2020-09/draft_colorado_just_transition_plan_08.03.2020.pdf)

⁴¹ BlueGreen Alliance. 2020. *State-Based Policies to Build a Cleaner, Safer, More Equitable Economy: A Policy Toolkit*. July 24, 2020 (<https://www.bluegreenalliance.org/resources/state-based-policies-to-build-a-cleaner-safer-more-equitable-economy-a-policy-toolkit/>)

- a. Establish a state program to provide wage support to energy transition workers to bridge any difference between lower current earnings and those realized in their former oil and gas position.
 - b. Eligibility is time-limited, and criteria such as participation in workforce training programs should be required.
- 5. *Mandate Project Labor Agreements for all new energy and utility construction projects on public lands or subject to utility commission jurisdiction.*
 - a. Project Labor Agreements serve as collective bargaining agreements for identified construction projects. These should include requirements for union labor for projects on public lands, as well as local hiring provisions.
- 6. *Mandatory Prevailing Wage Provisions*
 - a. Mandate prevailing wage provisions be included in all energy and energy-related projects occurring on public lands
- 7. *Local Hire Provisions*
 - a. Include review criteria for use of local, unionized labor for all energy and energy-related projects occurring on public lands.
- 8. *Targeted Hire Provisions*
 - a. Prioritize hiring of underemployed or unemployed oil and gas workers on energy or energy-related projects occurring on public lands, including methane reduction and abandoned well remediation.
- 9. *Organizing Rights*
 - a. Support resolutions that commit states to supporting existing labor laws.
- 10. *Incentivize Contractor Support of Labor Laws*
 - a. Provide preference to the hiring of contractors on public works, and energy and energy-related projects on public lands who have not previously violated labor laws.

APPENDIX—Methodology

Data Sources

Employment, facility, and wage data used in this report comes from the North American Industry Classification System (NAICS) and the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) and Occupational Employment Statistics (OES).

Employment Multiplier

Workforce impacts, otherwise known as employment multipliers, were determined through new research by the Upjohn Institute for Employment Research.⁴² In this analysis, we use a job multiplier of 1.9.⁴³ Employment multipliers of 2.7 have frequently been used in previous analyses. The Upjohn methodology relies more on empirical analyses than traditional approaches. These can be very assumptions-driven. For example, previous models may have relied on a virtuous cycle of an industry growing a local economy and therefore yielding high levels of follow-on (induced) employment. These models have not, however, taken into account the higher wages and real estate that ensue as a result of a growing economy. These factors can end up limiting growth. Therefore, traditional job multipliers can be artificially high.

Upjohn researchers Bartik and Sotherland state:

Input-output models [e.g., IMPLAN] can estimate local job multipliers by tracing how one industry's local expansion leads to changes in business and worker purchases from other industries. Regional input-output models typically do not have direct evidence on regional purchasing patterns.... These input-output models are Keynesian-style quantity models that ignore any responses to relative prices or other variables. Purchase patterns are implicitly assumed to be fixed, even if prices change.

Regional input-output model estimates of local job multipliers will likely be biased upwards because they ignore congestion effects. The models ignore local price effects but increased local prices will reduce the market share of local industries that sell to national markets. Increased local prices will also reduce the regional purchase coefficients of both local businesses and workers.⁴⁴

In sum, the very high and positive indirect and induced job effects used in other analyses may well be due to unsubstantiated job multipliers. Therefore, economic contribution projections in some other studies may likely be artificially and optimistically inflated.

Economic Contribution

This analysis takes a conservative approach to the economic impact of the oil and gas sectors in Colorado and New Mexico. Data is available for total wages in various elements of the sector. This is obtained from the BLS which gets data directly from states. This report does not represent

⁴² Bartik, Timothy J., and Nathan Sotherland. 2019. "Realistic Local Job Multipliers" in *W.E. Upjohn Institute for Employment Research - Employment Research Newsletter*. Vol. 26.

(https://research.upjohn.org/cgi/viewcontent.cgi?article=1280&context=empl_research)

⁴³ A job multiplier of 1.9 is more conservative than the more frequently used multiplier of 2.7. The Upjohn research indicates that use of a multiplier of 2.7 is not supported. In fact, Bartik and Sotherland argue that a multiplier as low as 1.1 should be used for county-level effects.

⁴⁴ Bartik, Timothy J., and Nathan Sotherland, 2019. "Local Job Multipliers in the United States: Variation with Local Characteristics and with High-Tech Shocks." *Upjohn Institute Working Papers*. 19-301. pp. 8-9

estimates of wages, but actual wages. Analyses that use induced and indirect wages to determine economic impact are, ultimately, speculative. These are often based on input-output models that are biased towards inflation of positive impact. We choose, in this analysis, to rely on empirical data as opposed to methodologically suspect estimates that may be selected to reinforce optimistic conclusions. While the economic impact in this analysis may be smaller than in others, it is grounded in data.

Job Loss

While employment multipliers are often used to support economic impact analyses, unemployment losses are less frequently used. Given the spillover effects on the upstream and downstream elements of the supply chain it is useful to get a sense of the magnitude of potential job losses. This is especially the case as manufacturing enterprises are increasingly at risk in the United States. This approach can be used to model the unemployment spillover effects for both real job or employment sector losses or used in a predictive capacity (as is the case in this analysis.) In this analysis, we use the unemployment multiplier methodology developed by the Economic Policy Institute.⁴⁵

Fees & Taxes

Oil and gas production yield a variety of federal, state, and local tax and fee revenues. In a direct sense these revenues include state severance taxes, levy and enforcement revenues, property taxes, and state and federal land and mineral fees. The scope of this analysis is solely on severance tax revenues in Colorado and New Mexico. This allows a comparison of tax revenues of a similar type between the two states. Comparisons of the other direct tax and fee revenue sources should be included in subsequent analyses.

Some oil and gas economic impact analyses do include indirect tax revenue flows, such as individual income taxes and corporate income taxes. These figures are estimates and are derived from input-output models, such as IMPLAN—and are not directly based in data. As a result, these values are speculative. More problematic, however, is the assumption that income tax revenues are non-substitutable. That is, researchers that attribute economic benefits from income taxes to a particular industry assume that in the absence of that industry income taxes would not be derived from other sources. In other words, in the absence of work in a particular sector, an individual would work in an alternate sector and income tax revenues would be generated from that source. As a result, use of personal income and corporate income tax data is methodologically suspect.

In addition, analyses that include both total income and individual taxes as contributors to economic contribution (or impact) are methodologically incorrect. This is double-counting—as income figures, as generated through federal data sources, are gross earnings (pre-tax.) Combining income tax revenues to those gross income figures results in an artificial inflation of a sector's economic contribution.

⁴⁵ Bivens, Josh. 2019. "Updated Employment Multipliers for the U.S. Economy." Report. Economic Policy Institute. (<https://www.epi.org/publication/updated-employment-multipliers-for-the-u-s-economy/>)



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