COLORADO OIL AND GAS INDUSTRY

Updated Economic Assessment of Colorado Oil and Gas Ballot Initiatives in 2014

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BUSINESS RESEARCH DIVISION

Business Research Division

The Business Research Division (BRD) of the Leeds School of Business at the University of Colorado Boulder has been serving Colorado since 1915. The BRD conducts economic impact studies and customized research projects that assist companies, associations, nonprofits, and government agencies with making informed business and policy decisions. Among the information offered to the public are the annual Colorado Business Economic Outlook Forum—now in its 49th year—which provides a forecast of the state's economy by sector, and the quarterly Leeds Business Confidence Index, which gauges Colorado business leaders' opinions about the national and state economies and how their industry will perform in the upcoming quarter. The Colorado Business Review *is a quarterly publication that offers decision makers industry-focused analysis and information as it relates to the Colorado economy.*

BRD researchers collaborate with faculty researchers on projects, and graduate and undergraduate student assistants, who provide research assistance and gain valuable hands-on experience.

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SUMMARY

In late 2013, the Business Research Division (BRD) of the Leeds School of Business, University of Colorado Boulder began researching the economic implications of a statewide fracking ban on the state economy. In March 2014, the BRD published a paper titled, *Hydraulic Fracturing Ban: The Economic Impact of a Statewide Fracking Ban in Colorado,* which described a scenario where a 95% reduction in new activity constituted an average decrease in gross domestic product (GDP) of $8 billion in the first five years and $12 billion between 2015 and 2040. The impact reduced Colorado jobs on average by 68,000 over the first five years and by 93,000 jobs on average between 2015 and 2040.

This paper refines the work completed in March and describes the economic impacts of the two ballot initiatives that were frontrunners for restricting industry growth (ballot initiatives 88 and 89) prior to the compromise that was achieved on August 4, 2014, effectively ending all four 2014 oil and gas ballot initiatives. This summary also updates various oil and gas economic and fiscal metrics based on 2013 data to provide context into the industry's economic footprint leading up to 2014.

Based on estimates provided by the oil and gas industry, a 2,000-foot setback would curtail drilling locations by 25% to 50%. Extrapolating this to indicate a reduction in new production, coupled with the quickly depleting yields from existing wells, leads to an average decrease in GDP between $2.2 billion and $4.4 billion in the first five years and an average decrease between $3.2 billion and $6.4 billion from 2015 to 2040. The impact on total employment ranges between 18,000 jobs and 36,000 jobs in the first five years on average, and between 24,000 and 49,000 jobs from 2015 to 2040.

Under an expanded setback scenario, it is unclear how a reduction in land access would ultimately manifest in reduced production given the variation in production by basin and by well, technological improvements that allow for horizontal drilling, as well as the opportunity for property owners to consent to drill within the setbacks, which was written into the initiative. Under a local control scenario, the impact on production due to the speculation on which communities would pass moratoriums on fracking is even more unclear. Front Range metropolitan counties[1] (excluding Weld) accounted for 1.7% of assessed taxable oil and gas activity in 2013, and cities accounted for 4.6% of activity. While the signal from communities that have passed fracking bans or moratoriums indicates an urban, metropolitan movement, the local control initiative is not written exclusively for metropolitan communities. This report does not quantify the potential economic impacts of a local control measure.

[1]Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Elbert, El Paso, Gilpin, Jefferson, Larimer, Park, Pueblo, and Teller counties. Excludes Weld County.

Overall, Colorado's oil and gas industry continued to expand in 2013, building on growth that transpired following a dip in production during the recession. More drilling permits were recorded in 2013 than in 2012, and oil production increased while gas production fell compared to 2012. Weld County and Garfield County continue to be the center of new activity, garnering more than four out of five drilling permits.

Employment and wages grew in the upstream and midstream industry sectors in 2013 (Extraction, Drilling Wells, Support Activities, Oil and Gas Pipeline and Related Structures Construction, and Pipeline Transportation). An estimated 33,897 people worked in the upstream and midstream oil and gas industry in 2013, earning total wages of $3.5 billion, or $104,626 per worker. The year marked the greatest number of industry workers on record in Colorado. Wage growth in the industry outpaced wages growth for the state overall (4% compared to 0.6%).

The public revenue stream, related to upstream and midstream activities, was estimated at more than $1.1 billion in 2013, the largest source of which was the tax on production.

This paper was prepared using the Regional Economic Models, Inc. (REMI) Tax-PI model built for Colorado and calibrated with Colorado revenues, expenditures, employment, and population. Researchers from the BRD researched the known, quantifiable industry metrics, ranging from production and prices to employment, wages, and taxes.

ECONOMIC IMPACT OF ALTERNATIVE SCENARIOS

This paper is an update to the March 2014, the BRD published a paper titled, *Hydraulic Fracturing Ban: The Economic Impact of a Statewide Fracking Ban in Colorado.*

In early 2014, there were 22 proposed ballot initiatives related to the oil and gas industry. These initiatives can be categorized into three areas:

1. Setbacks (Initiatives 82, 85, 86, 87, 88, 117, 118, 119, 120)
2. Local Control (75, 89, 90, 91, 92, 93, 103, 115, 116) [2]
3. Pro-Industry (121, 137)

Many of these initiatives have been withdrawn, and as of July 31, 2014, four ballot initiatives related to the oil and gas industry appeared to have the greatest likelihood of appearing on the November ballot. (See Appendix 1 for a summary.)

- Ballot Initiative 88
- Ballot Initiative 89
- Ballot Initiative 121
- Ballot Initiative 137

On August 4, 2014, a compromise was reached on local control of oil and gas drilling that will remove all initiatives from the November ballot. Industry-supported backers agreed to drop both Initiative 121, which would have withheld state oil and gas revenue from communities banning drilling, and Initiative 137, which required a fiscal impact note for all initiatives. On the opposing side, U.S. Rep Jared Polis, agreed to withdraw two initiatives that would have required drilling rigs to be set back 2,000 feet from homes and the addition of an environmental bill of rights to the state constitution. The Colorado Oil and Gas Conservation Commission (COGCC) also agreed to withdraw the lawsuit against Longmont over its oil and gas ordinance. The ballot battle was moving in the direction to be the most expensive campaign in state history. In addition to the compromise, Governor Hickenlooper said he will appoint an 18-member commission that will be chaired by La Plata County Commissioner Gwen Lachelt and by XTO Energy president Randy Cleveland. The commission will make recommendations to the legislature on ways "to minimize land-use conflicts that can occur when siting oil and gas facilities near homes, schools, businesses and recreational facilities." He also said that he will more rigorously enforce a 1,000-foot setback. This distance is currently encouraged but not required. The state enforces a 500-foot setback in most circumstances. This compromise drew support from both political parties, as well as Anadarko Petroleum Corp. and Noble Energy Inc., the two largest operators in the state.

[2]Ballot initiatives 89 and 115 are environmental, but are local control in nature.

The two industry-restricting ballot initiatives that presumably would have made it onto the November ballot can be divided into two topic areas: setbacks and local control. The impact of the initiatives in either area is elusive.

Under an expanded setback scenario, it is unclear how a reduction in land access would ultimately manifest in reduced production given the variation in production by basin and by well, technological improvements that allow for horizontal drilling, as well as the opportunity for property owners to consent to drill within the setbacks, which was written into the initiative. That is, the impact of the setbacks rule could vary widely by location. Under a local control scenario it is unclear which communities would pass moratoriums on fracking. To illustrate the variation in impacts, holding quality of production equal across the state, the following scenarios model reduced production based on industry reports and public filings.

The economic impacts presented below are deviations from the baseline scenario. The reductions in production were modeled in REMI as changes in industry sales/exogenous production in the oil and gas industry beginning in 2015, assuming a 25% reduction and a 50% reduction in new activity and continuing but depleting, production in existing wells. Blended depletion rates from 40 years of historical data on oil and gas well production in Colorado were applied based on the current split of industry activity between oil and gas. On a per employee basis, oil and gas is a high-output, high-wage industry, resulting in an increase of the magnitude of the multiplier effect. While the resulting economic impact is notably positive during times of industry expansion, it is equally negative during times of industry contraction.

This analysis is based on the current distribution of production across Colorado, but there are indications that production will expand into areas that are currently nonproducing or low-producing counties. In 2013, Weld County accounted for four-fifths of oil production in Colorado and one-sixth of gas production, but the county's market share will change over time. A ban on activity in areas such as Douglas County would be considered lost opportunity, and are not explicitly modeled with regard to the setback or local control initiatives.

Setback

An ideal methodology for modeling the economic impact of the setbacks initiative would include GIS mapping of each parcel of land. The mapping exercise would identify spatial setbacks from structures, adding a probability of setback based on structure type (e.g., 100% for schools, 100% for hospitals, 70% for homes). This information would be coupled with existing production in nearby parcels as an indication of well activity in order to convert the land restriction to a production restriction.

Absent of such an exercise, percentages were derived based on signals from the industry: (1) Noble Energy publicly indicated that a 2,000-foot setback would curtail locations by 25% (Seeking Alpha, July 2014), and (2) another energy company provided estimated reductions of 50%. Comparatively, in January 2013 Anadarko Petroleum, Encana Oil & Gas, Noble Energy, and PDC Energy provided a presentation at a COGCC setback hearing, stating that the impact of a 1,000-foot setback would affect 30% of the wells in the greater Wattenberg area. Therefore, two production scenarios under a 2,000-foot setback include reductions in production between 25% and 50%.

Other public information, notably the 10-Q filings by public companies, illuminate the presence of negative impacts due to policy changes in Colorado, without quantifying the value at risk (See Appendix 2 for more summaries).

> Anadarko 10-Q June 30, 2014
>
> "In the event state or local restrictions or prohibitions are adopted in areas where we currently conduct operations (such as in the Wattenberg field, which is among the largest and most cost efficient oil and natural gas development projects in Anadarko's U.S. onshore portfolio) or in the future plan to conduct operations, we may incur significant costs to comply with such requirements or we may experience delays or curtailment in the pursuit of exploration, development, or production activities, and possibly be limited or precluded in the drilling of wells or in the amounts that we are ultimately able to produce from our reserves."
>
> Noble 10-Q June 24, 2014
>
> "In particular, a statewide drilling setback will likely delay or otherwise limit our drilling and development activities in certain parts of the DJ Basin. This could result in a reduction in our proved reserves and negatively impact our results of operations, cash flows, and stock price."

50% Reduction

Given a 50% reduction in new production beginning in 2015, the economic consequence would result in a lower GDP by an average of $4.4 billion and 36,000 fewer jobs in the first five years, and a lower GDP by an average of $6.4 billion and 49,000 fewer jobs between 2015 and 2040. The negative impact on disposable personal income places drag on the consumption-supporting industries (e.g., retail, real estate), as well as on taxes. The unemployment rate stays somewhat unaffected as the decline in industry jobs marks a shift in the labor force.

TABLE 1: 50% REDUCTION IN NEW PRODUCTION SCENARIO, SUMMARY OF IMPACTS, 2015–2040

Category	Units	Average Difference from Baseline Scenario					
		Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 21-25	Years 2015-2040[a]
Total Employment	Jobs (Thousands)	-36.0	-59.5	-62.1	-49.9	-38.3	-48.9
	Change from Baseline	-1.0%	-1.5%	-1.5%	-1.1%	-0.8%	-1.2%
Private Non-Farm Employment	Jobs (Thousands)	-32.4	-53.7	-56.2	-45.3	-34.8	-44.3
	Change from Baseline	-1.0%	-1.5%	-1.5%	-1.2%	-0.8%	-1.2%
Output	Dollars (Billions)[b]	-6.9	-11.5	-12.4	-10.3	-8.2	-9.8
	Change from Baseline	-1.1%	-1.6%	-1.6%	-1.2%	-0.8%	-1.2%
Gross Domestic Product	Dollars (Billions)[b]	-4.4	-7.4	-8.1	-6.7	-5.4	-6.4
	Change from Baseline	-1.2%	-1.8%	-1.7%	-1.3%	-0.9%	-1.3%
Personal Income	Dollars (Billions)[b]	-2.5	-4.7	-5.5	-5.0	-4.3	-4.4
	Change from Baseline	-0.9%	-1.4%	-1.4%	-1.1%	-0.9%	-1.1%
Real Disposable Personal Income	Dollars (Billions)[b]	-2.0	-3.7	-4.3	-3.9	-3.5	-3.5
	Change from Baseline	-0.8%	-1.3%	-1.3%	-1.0%	-0.8%	-1.0%

[a]This average impact over the 25-year period (2015–2040) indicates Colorado total employment would be shifted lower by 49,000 jobs on average and that GDP would be lower by an average of $6 billion over the entire 25-year horizon.
[b]Dollars are fixed (2012) dollars.

25% Reduction

Given a 25% reduction in new production beginning in 2015, the economic consequence would result in a lower GDP by an average of $2.2 billion and 18,000 fewer jobs in the first five years, and a lower GDP by an average of $3.2 billion and 24,400 fewer jobs between 2015 and 2040.

TABLE 2: 25% REDUCTION IN NEW PRODUCTION SCENARIO, SUMMARY OF IMPACTS, 2015–2040

Category	Units	Average Difference from Baseline Scenario					
		Year 1-5	Year 6-10	Year 11-15	Year 16-20	Year 21-25	Years 2015-2040[a]
Total Employment	Jobs (Thousands)	-18.0	-29.7	-31.0	-24.9	-19.1	-24.4
	Change from Baseline	-0.5%	-0.7%	-0.7%	-0.6%	-0.4%	-0.6%
Private Non-Farm Employment	Jobs (Thousands)	-16.2	-26.8	-28.0	-22.6	-17.4	-22.1
	Change from Baseline	-0.5%	-0.8%	-0.8%	-0.6%	-0.4%	-0.6%
Output	Dollars (Billions)[b]	-3.4	-5.7	-6.2	-5.1	-4.1	-4.9
	Change from Baseline	-0.6%	-0.8%	-0.8%	-0.6%	-0.4%	-0.6%
Gross Domestic Product	Dollars (Billions)[b]	-2.2	-3.7	-4.0	-3.4	-2.7	-3.2
	Change from Baseline	-0.6%	-0.9%	-0.8%	-0.6%	-0.4%	-0.7%
Personal Income	Dollars (Billions)[b]	-1.2	-2.3	-2.7	-2.5	-2.1	-2.2
	Change from Baseline	-0.4%	-0.7%	-0.7%	-0.6%	-0.4%	-0.6%
Real Disposable Personal Income	Dollars (Billions)[b]	-1.0	-1.8	-2.1	-2.0	-1.7	-1.7
	Change from Baseline	-0.4%	-0.6%	-0.6%	-0.5%	-0.4%	-0.5%

[a]This average impact over the 25-year period (2015–2040) indicates Colorado total employment would be shifted lower by 24,000 jobs on average and that GDP would be lower by an average of $3.2 billion over the entire 25-year horizon.
[b]Dollars are fixed (2012) dollars.

Local Control

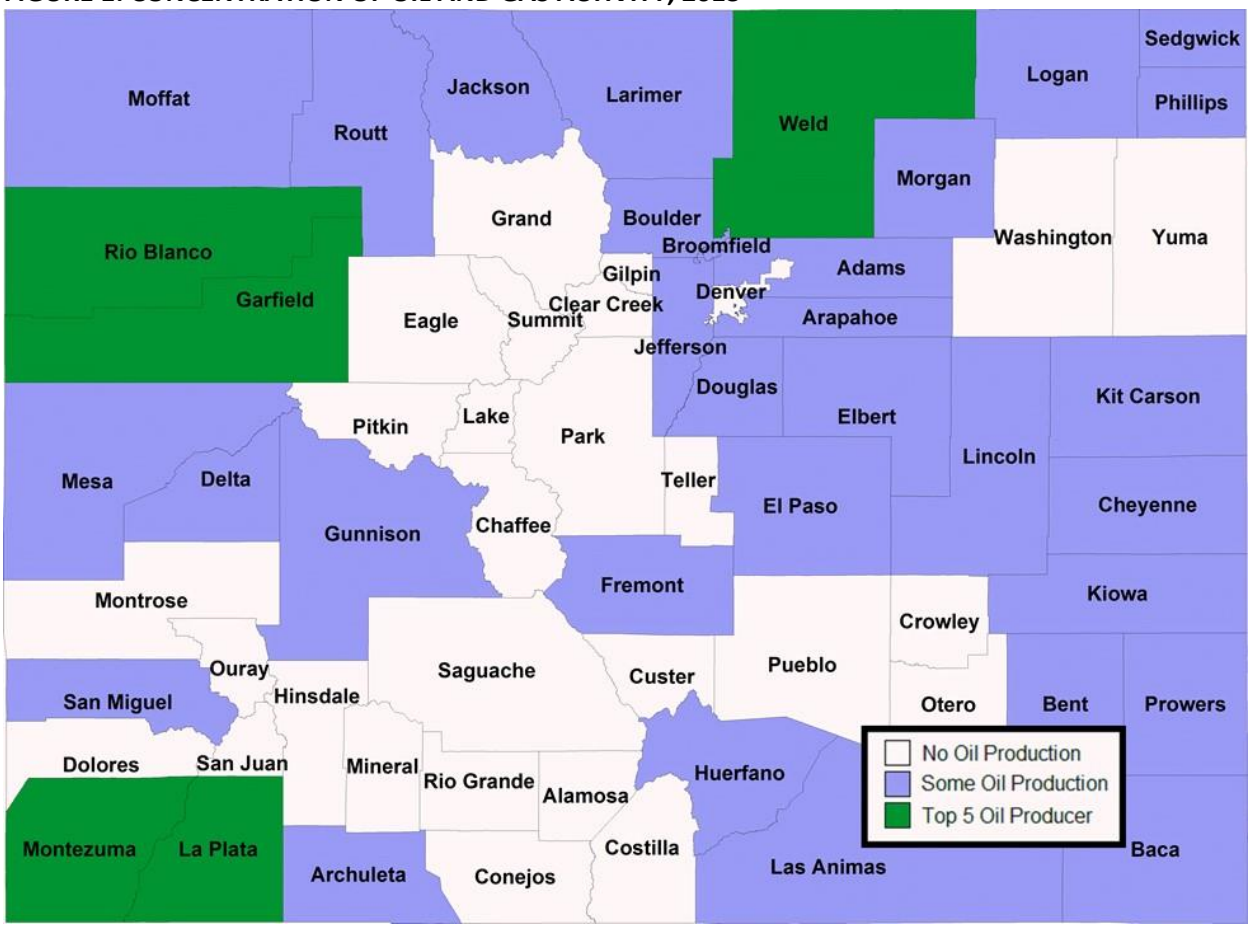
The reduction in production is more speculative under the local control measures without a clear signal about which communities would institute fracking bans or moratoriums. The Longmont fracking ban and the Boulder, Broomfield, Fort Collins, and Lafayette moratoriums illustrate the current movement as occurring in urban, relatively low-producing areas of the state, but there is no exclusivity to such movements. Based on assessed property values, 4.6% of taxable oil and gas activity occurs in cities across

the state, and 1.7% occurs along the metropolitan Front Range (excluding Weld County, or 46.3% including Weld County).[3] However, this does not account for oil and gas in areas that have potential but have not yet been accessed. This report does not quantify the potential economic impacts of a local control measure.

PRODUCTION AND DRILLING

Most oil production in Colorado occurs on the Eastern Plains and most gas production occurs on Colorado's Western Slope according to county-level production data from the COGCC. Data from the Department of Local Affairs, Division of Property Taxation, show most oil and gas assessed values (88%) are concentrated in five counties: Weld, Garfield, Rio Blanco, La Plata, and Montezuma (Figure 1). In 2013, oil production increased (Figure 2), marking three consecutive years of growth following the recession, while gas production fell (Figure 3).

FIGURE 1: CONCENTRATION OF OIL AND GAS ACTIVITY, 2013



Source: Department of Local Affairs, Division of Property Taxation, 2013 Annual Report.

[3]Adams, Arapahoe, Boulder, Broomfield, Clear Creek, Denver, Douglas, Elbert, El Paso, Gilpin, Jefferson, Larimer, Park, Pueblo, and Teller counties.

FIGURE 2: SUM OF OIL PRODUCTION BY COUNTY IN COLORADO

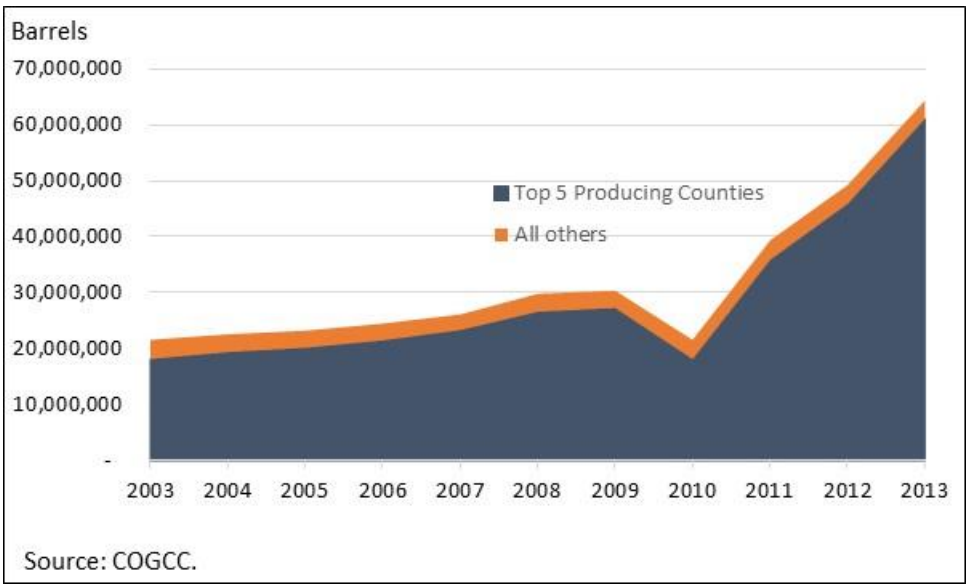
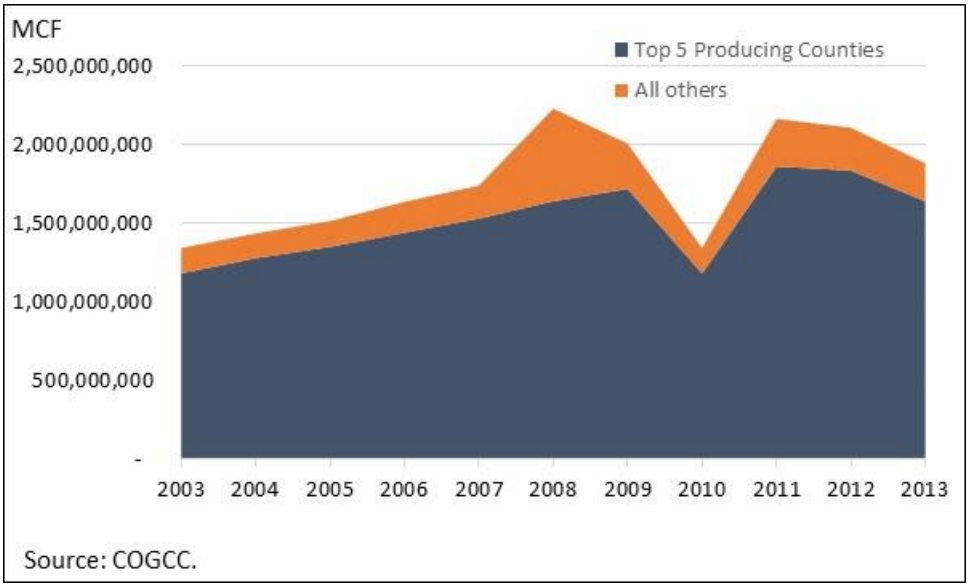


FIGURE 3: SUM OF GAS PRODUCTION BY COUNTY IN COLORADO



Based on drilling permits, new activity is also geographically concentrated—five counties represented more than 90% of permits in 2013 and 2014 (through July 14, 2014), and two counties (Weld and Garfield) represented more than 83% of permits (Figure 4). Drilling permits in Colorado peaked in 2008, at 8,027, and totaled 4,025 in 2013—the second-lowest number of permits in the past six years. Year-to-date, drilling permits in 2014 are on par with 2013 permits as of July 14, 2014 (Figure 5).

FIGURE 4: COLORADO OIL AND GAS DRILLING PERMITS BY COUNTY, 2013

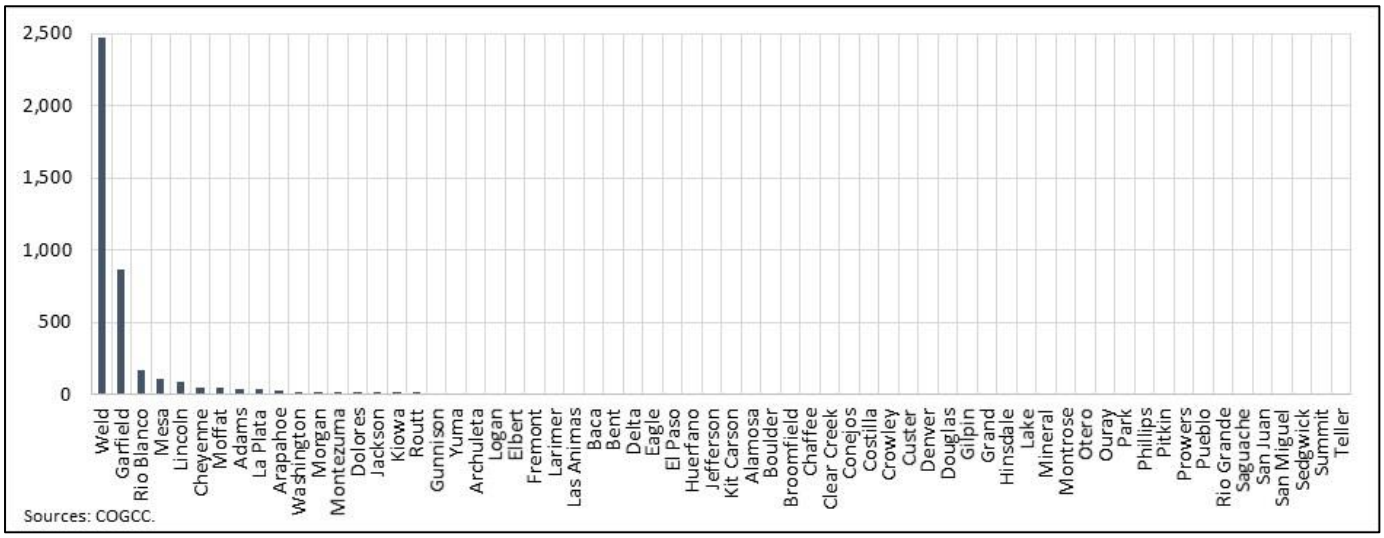
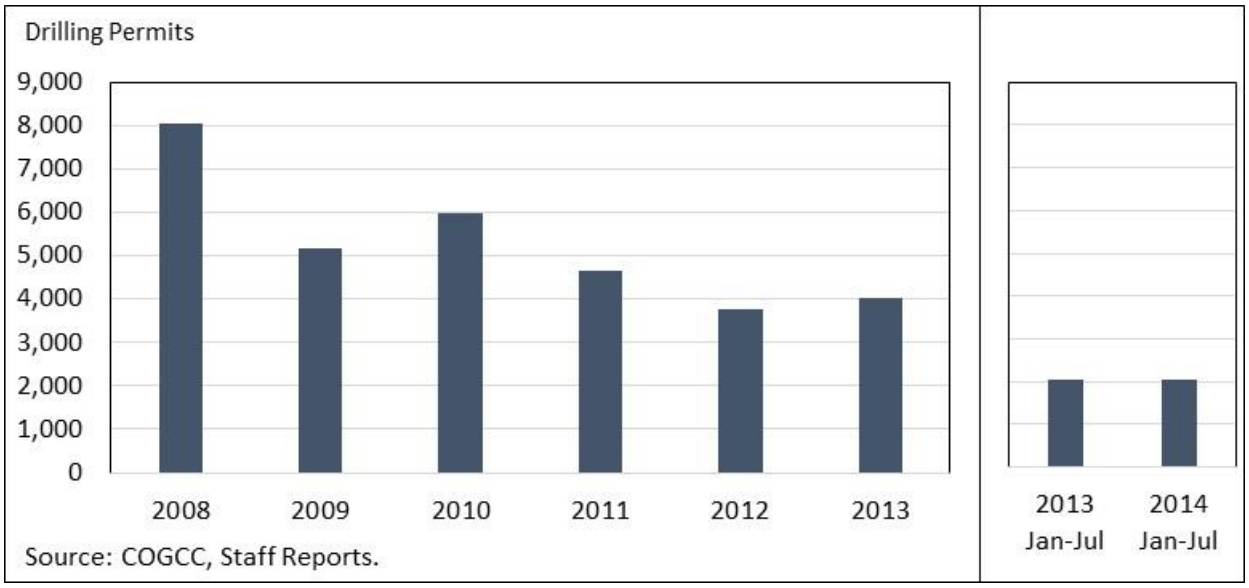
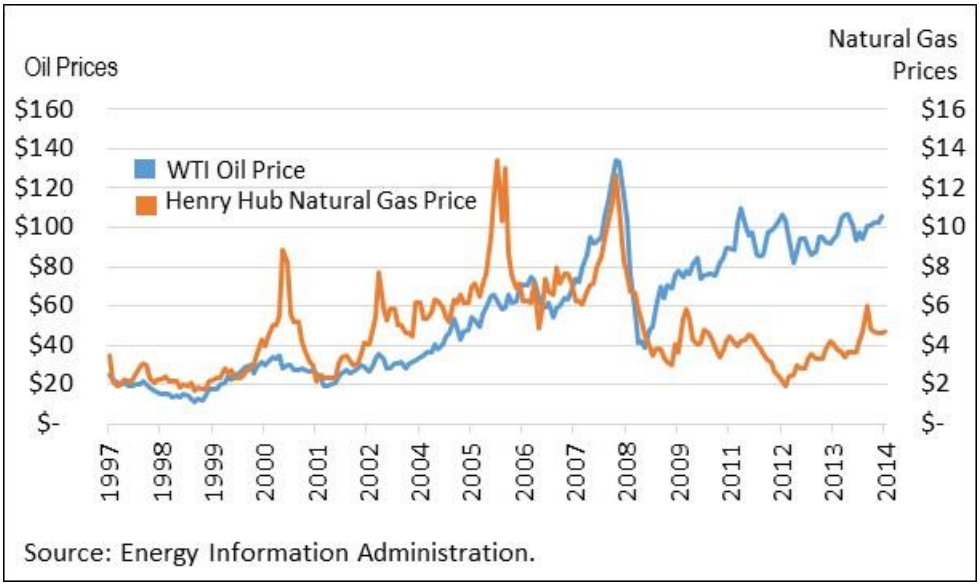


FIGURE 5: ANNUAL COLORADO OIL AND GAS DRILLING PERMITS



Average prices for oil (WTI) and for gas (Henry Hub) were higher in 2013 compared to 2012. Prices are also higher through June 2014 year-to-date compared to the same period in 2013 (Figure 6).

FIGURE 6: AVERAGE OIL AND GAS PRICES



EMPLOYMENT AND WAGES

The oil and gas industry continued to add jobs in 2013. Examining upstream and midstream employment, including Extraction, Drilling Wells, Support Activities, Oil and Gas Pipeline and Related Structures Construction, and Pipeline Transportation, the industry employed an estimated 33,897 workers in 2013 (Figure 7). Most of these (87%) are counted as covered wage and salary employees by the Department of Labor, and the remainder are estimated as self-employed based on 2012 Census nonemployer statistics. This marks the largest number of upstream and midstream oil and gas industry workers on record in Colorado.

Wages grew in conjunction with employment growth, expanding to $3.5 billion in 2013, and average oil and gas wages for covered workers grew about 4% compared to 0.6% for all industries in Colorado (Figure 8).

FIGURE 7: EMPLOYMENT, STATE UPSTREAM AND MIDSTREAM OIL AND GAS, EMPLOYER AND NONEMPLOYER

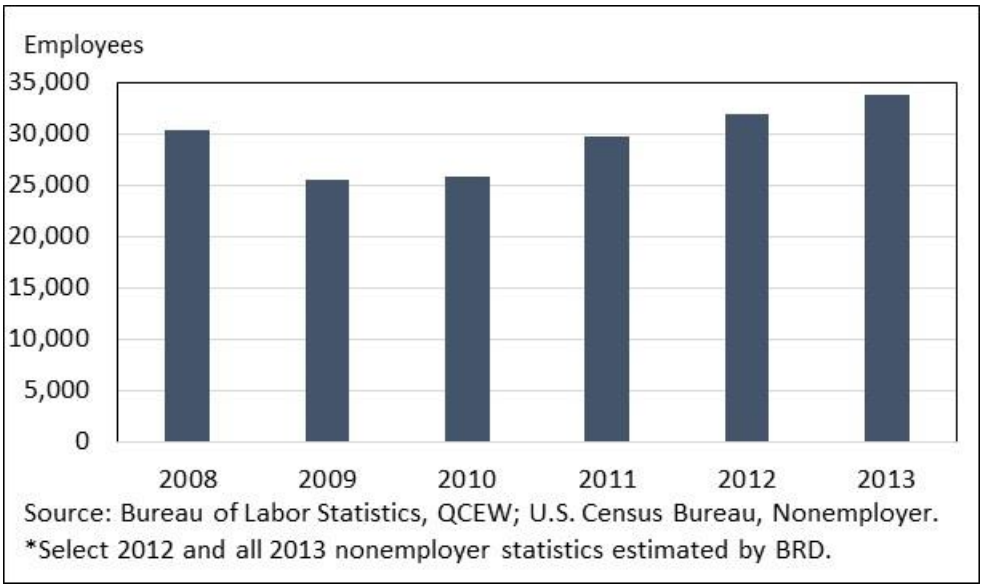
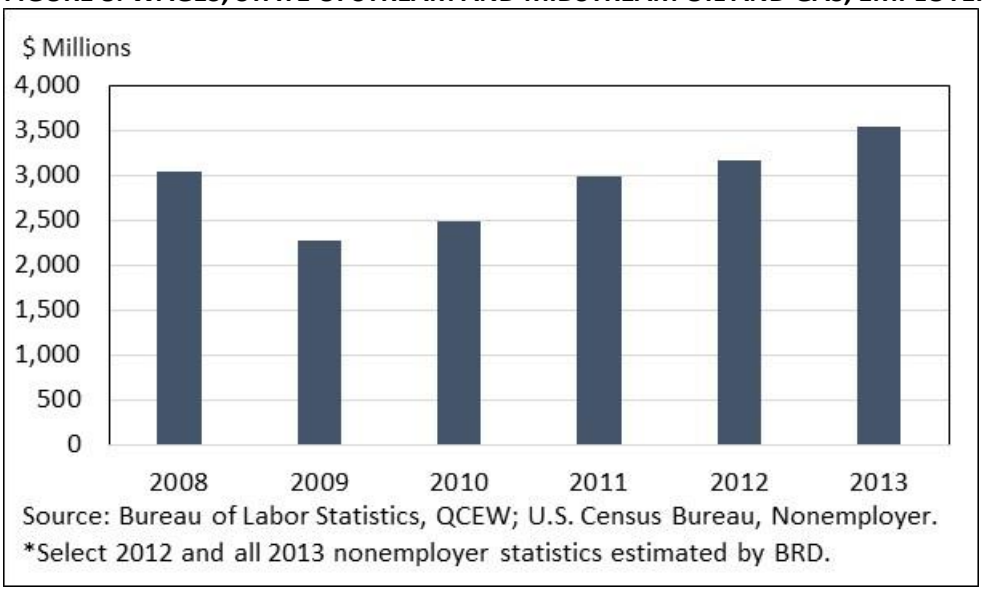


FIGURE 8: WAGES, STATE UPSTREAM AND MIDSTREAM OIL AND GAS, EMPLOYER AND NONEMPLOYER



PUBLIC REVENUE

The public revenue stream related to upstream and midstream activities was estimated at more than $1.1 billion in 2013 (Table 3). The largest source of revenue was taxes from production.

TABLE 3: SUMMARY OF PUBLIC REVENUE, MILLIONS, 2013

Severance	Production	Commercial and Residential	Leases	Royalties	Personal Income	Income	Sales Taxes	COGCC Tax	Total
$170.6	$357.6	$131.0	$61.7	$142.5	$97.8	$20.7	$138.4	$5.9	$1,126.2

Property Taxes

Property taxes are derived from local property assessments for oil and gas. For midstream and upstream activities, property taxes were estimated at $372.8 million in 2012 and $383.3 million in 2013. This was estimated by multiplying county-level oil and gas assessed values by jurisdictional type (county, city, special district, and school district) by the average corresponding mill levy within the county. This yields an estimate of local property taxes that can be aggregated to a state total, which is superior to multiplying the state total assessed values by state average mill levies because counties with the greatest levels of oil and gas production have lower property tax mill levies than the state average (Figure 10). Greater accuracy could be achieved if oil and gas assessed values and corresponding mill levies and exemptions were published for each individual taxing jurisdiction.

FIGURE 9: COLORADO OIL AND GAS PROPERTY TAX ESTIMATES

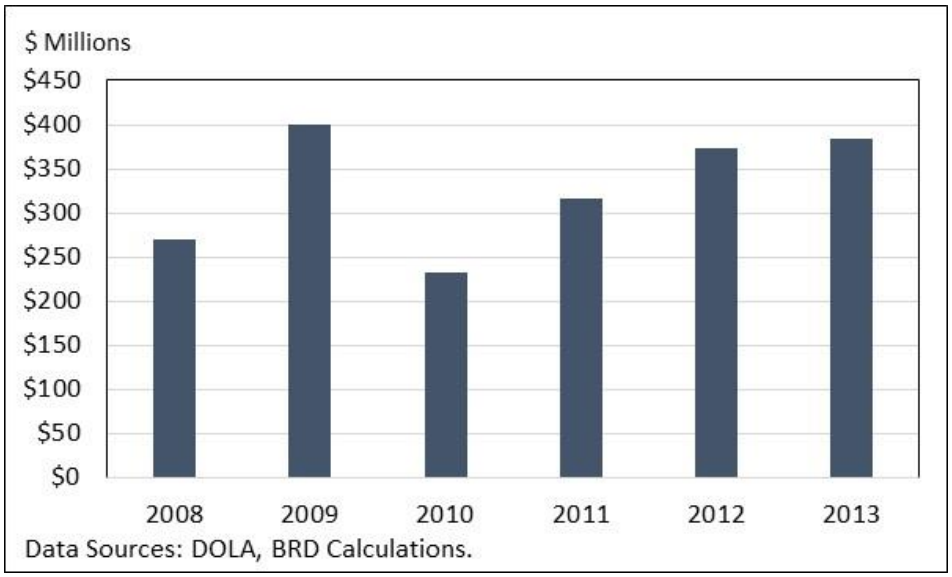
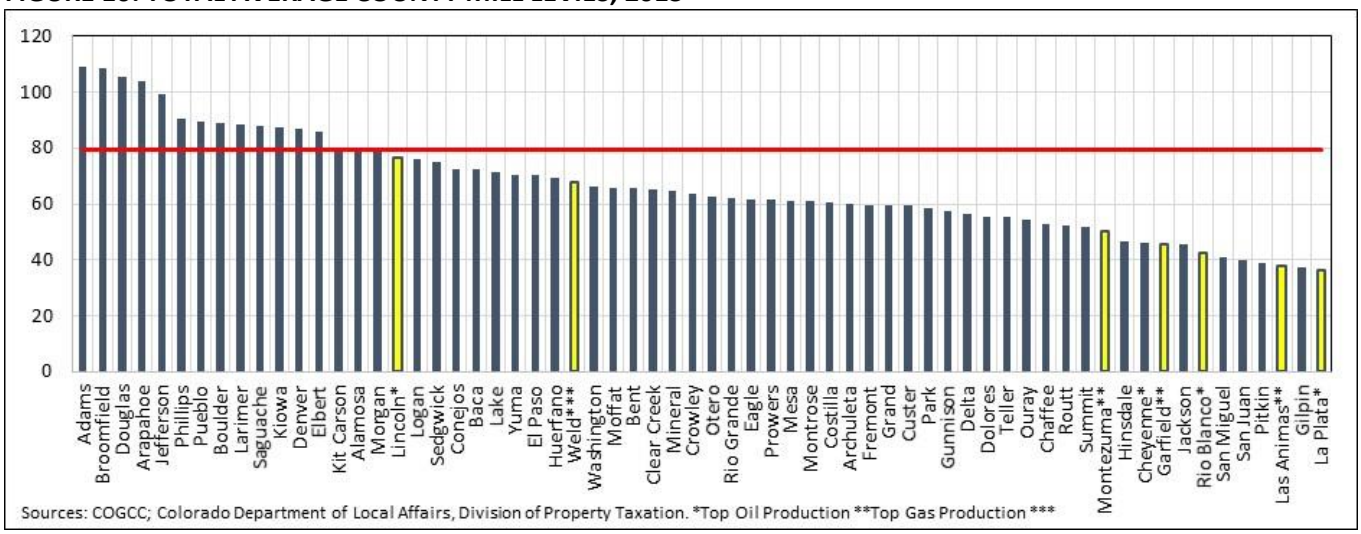


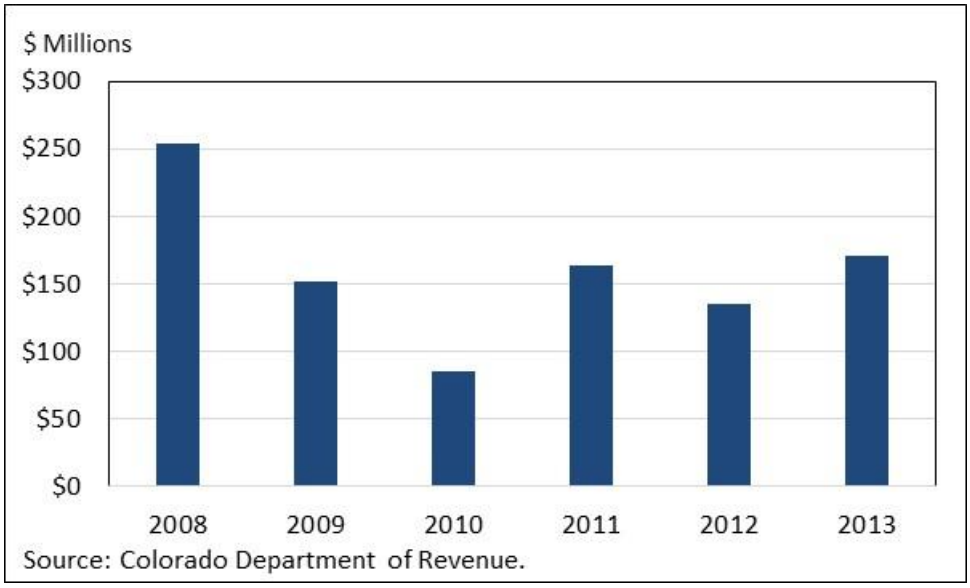
FIGURE 10: TOTAL AVERAGE COUNTY MILL LEVIES, 2013



Severance Taxes

Severance taxes are those that states charge for the removal of nonrenewable natural resources and are reported by the Colorado Department of Revenue for oil and gas, coal, and metals and molybdenum. Severance taxes related to oil and gas in 2012 and 2013 were reported at $134.9 million and $170.6 million, respectively (Figure 11). From 2008 through 2013, the oil and gas industry paid $959.8 million in severance taxes, which represented 93.6% of total severance taxes paid in Colorado from all resources (i.e., oil and gas, coal, metals and molybdenum) over that period.

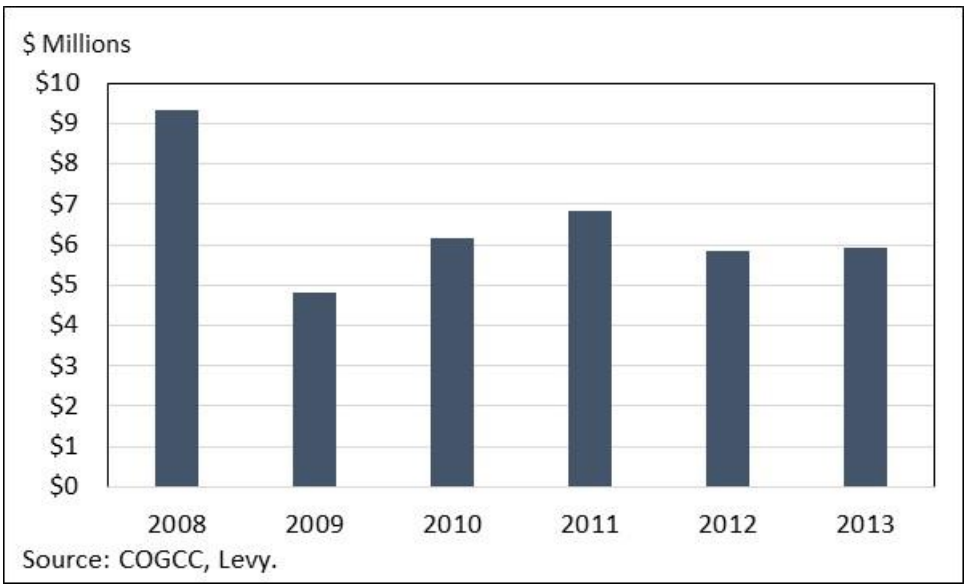
FIGURE 11: COLORADO OIL AND GAS SEVERANCE TAXES



COGCC Taxes

Oil and gas companies pay COGCC a conservation levy that is designed to offset the expenses of the agency. As of July 2007, the charge is 0.07% of oil, natural gas, and CO2 production sales, less exemptions. The COGCC levy totaled $5.8 million in 2012 and $5.9 million in 2013 (Figure 12).

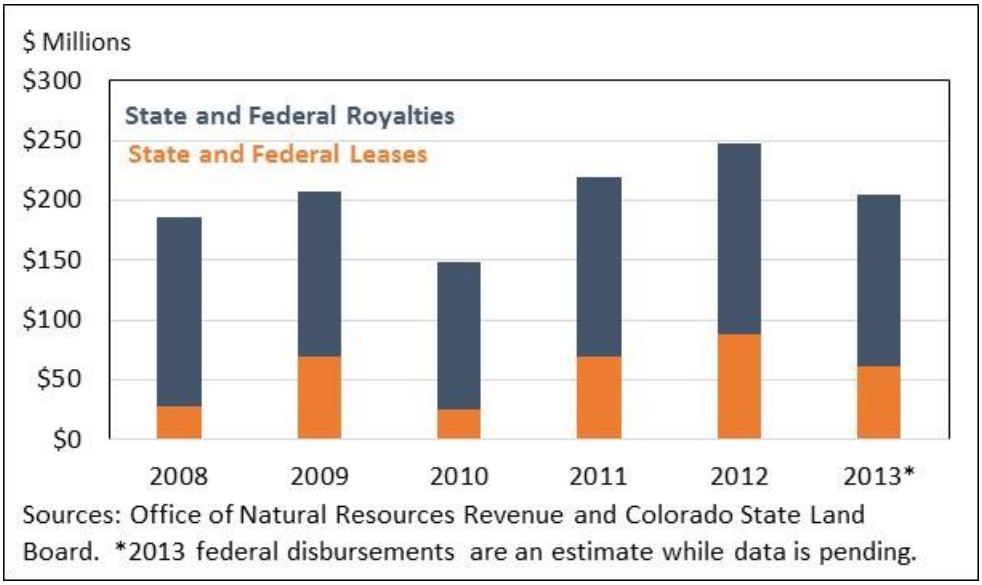
FIGURE 12: COGCC LEVY



Public Leases and Royalties

Oil and gas exploration and development on state and federal lands provide revenue through leases, premiums above rents (bonuses), and royalties. Federal disbursements are reported by the Office of Natural Resources Revenue, and Colorado disbursements are reported by the Colorado State Land Board. Federal and state rents and royalties are estimated at nearly $248 million in 2012 and $204 million in 2013 (Figure 13).

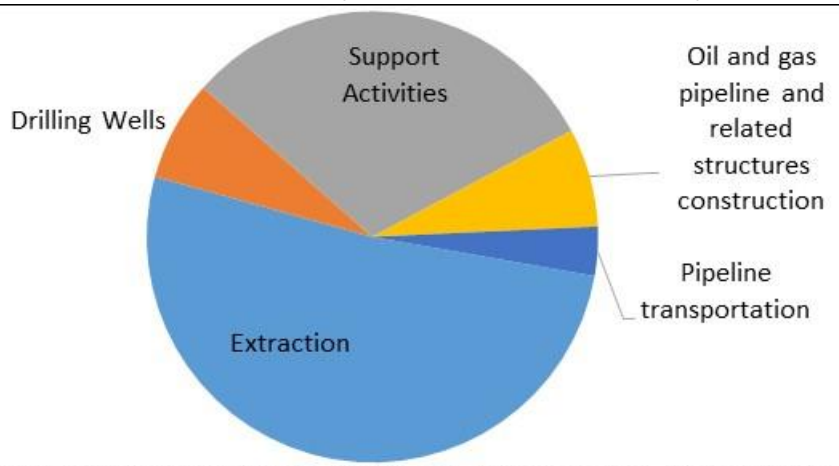
FIGURE 13: COLORADO PUBLIC LEASES AND ROYALTIES



Income Taxes

Personal income taxes were estimated by multiplying the average tax rate by income cohort (using the Colorado Department of Revenue, Statistics of Income report) by the corresponding average wage by upstream and midstream industry sector in Colorado. The 2013 estimate of income taxes was nearly $98 million, most of which derived from the Extraction and Support Activities sectors (Figure 14).

FIGURE 14: COLORADO OIL AND GAS, INDIVIDUAL INCOME TAXES, 2013



Source: Bureau of Labor Statistics, QCEW; U.S. Census Bureau, Nonemployer; Dept. of Revenue , Statistics of Income. *Select 2012 and all 2013 nonemployer statistics estimated by BRD.

Other Taxes

Other taxes include commercial and residential property taxes (excluding production), corporate income taxes, and sales taxes. These three revenue streams were estimated using the IMPLAN model based on 2013 employment and projection estimates.

BIBLIOGRAPHY

Anadarko Petroleum Corporation. Investor Relations, SEC filings, 10-Q report, July 29, 2014, http://www.anadarko.com/Investor/Pages/SECFilings.aspx. Accessed August 3, 2014.

Anadarko Petroleum, Encana Oil & Gas (USA) Inc., Noble Energy, Inc., PDC Energy, Inc. COGCC Setback Hearing, January 7-9, 2013, http://cogcc.state.co.us/RR_HF2012/setbacks/Presentations/Anadarko_Encana_Noble_PDC_Coalition_Setbacks_Presentation_01072013.pdf. Accessed August 1, 2014.

Bureau of Labor Statistics, Quarterly Census of Employment and Wages. www.bls.gov (accessed July 20, 2014).

Colorado Department of Local Affairs. April 2009. *2008 Thirty-Eighth Annual Report*. Division of Property Taxation.

_____. April 2010. *2009 Thirty-Ninth Annual Report*. Division of Property Taxation.

_____. April 2011. *2010 Fortieth Annual Report*. Division of Property Taxation.

_____. April 2012. *2011 Forty-First Annual Report*. Division of Property Taxation.

_____. May 2013. *2012 Forty-Second Annual Report*. Division of Property Taxation.

_____. May 2014. *2013 Forty-Third Annual Report*. Division of Property Taxation.

Colorado Department of Revenue. *Federal AGI and Tax, All Full-year Resident Returns, 2009 Individual Income Tax Returns.* Office of Research and Analysis.

Colorado Department of Revenue. *Severance Tax Collections*. January 2004-Current [June 2014].

_____. October 2012. *Income & Inventory Report Fiscal Year 2011−12*, p. 11. http://www.trustlands.state.co.us/Documents/FY%202011-12%20Income%20and%20Inventory%20Report%20FINAL.pdf (accessed June 20, 2013).

_____. October 2012. *Income & Inventory Report Fiscal Year 2012−13*, p. 11. http://www.trustlands.state.co.us/ (accessed July 28, 2014).

Colorado Secretary of State. 2013-2014 Initiative Filings, Agendas & Results. http://www.sos.state.co.us/pubs/elections/Initiatives/titleBoard/index.html. Accessed July 31, 2014.

Encana Corporation. Annual Information Form, February 20, 2014, http://www.encana.com/pdf/investors/financial/annual-reports/2013/form40-f.pdf. Accessed August 3, 2014.

Jaffe, Mark. Hickenlooper compromise keeps oil and gas measures off Colorado ballot. The Denver Post. August 4, 2014. http://www.denverpost.com/News/ci_26272493/Hickenlooper-compromise-keeps-oil-and-gas-measures-off-Colorado-ballot. Accessed August 5, 2014.

MIG, Inc. 2013. *IMPLAN Economic Modeling, Version 3.0.* Hudson, WI. http://implan.com/V4/index.php?option=com_content&view=article&id=694:implan-data-components-detailed&catid=241:KB23

Noble Energy, Inc. SEC filings, 10-Q quarterly report, July 24, 2014, http://investors.nobleenergyinc.com/sec.cfm. Accessed August 3, 2014.

Nonemployer Statistics. U.S. Census Bureau. http://www.census.gov/econ/nonemployer/index.html, (accessed July 28, 2014).

Office of Natural Resources Revenue. *States and Offshore Regions Statistics*. http://statistics.onrr.gov/ReportTool.aspx (accessed July 21, 2014).

Rice, Anne. "Energy Pipeline: Executive profile of Barton Brookman at PDC Energy," Greeley Tribune, http://www.greeleytribune.com/news/feature2/10355614-113/brookman-pdc-industry-oil, accessed August 5, 2014.

Rittiman, Brandon. Fracking fight may be called off with last-minute deal. 9News. August 4, 2014. http://www.9news.com/story/news/local/politics/2014/08/04/fracking-deal/13573859/. Accessed August 5, 2014.

Seeking Alpha. Noble Energy reiterated Top Pick, Synergy pullback overdone, FBR says, July 28, 2014, http://seekingalpha.com/news/1872975-noble-energy-reiterated-top-pick-synergy-pullback-overdone-fbr-says. Accessed July 28, 2014.

2014 Colorado Business Economic Outlook. University of Colorado Boulder, Leeds School of Business. http://leeds.colorado.edu/asset/brd/2014_colo_bus_econ_outlook.pdf (accessed July 22, 2014).

U.S. Bureau of Labor Statistics. http://www.bls.gov/data/.

U.S. Census Bureau, Nonemployer Statistics. http://www.census.gov/econ/nonemployer/index.html, accessed July 27, 2014.

U.S. Energy Information Administration. Cushing, OK WTI Spot Price FOB. http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=D. Retrieved July 30, 2014.

U.S. Energy Information Administration. Henry Hub Natural Gas Spot Price. http://www.eia.gov/dnav/ng/hist/rngwhhdm.htm. Retrieved July 30, 2014.

Wobbekind, Richard and Brian Lewandowski. March 2014. Hydraulic Fracturing Ban: The Economic Impact of a Statewide Fracking Ban in Colorado. Business Research Division, Leeds School of Business, University of Colorado Boulder.

APPENDIX 1: FOUR LEADING BALLOT INITIATIVES

The following summaries are derived from the Colorado Secretary of State, 2013–2014 Initiative Filings, Agendas & Results.

Ballot Initiative 88

A ballot initiative that seeks to impose mandatory setback of oil and gas wells. This initiative would require new oil and gas wells be located 2,000 feet away from occupied structures, including homes, schools, and hospitals. This mandate would be waived if the owner of the property consents.

Ballot Initiative 89

This ballot initiative would amend Article II of the Colorado constitution, adding that Colorado's environment is "the common property of all Coloradans" and specifying that the environment includes clean air, pure water, and natural and scenic values. It also states that environmental conservation is "fundamental." This initiative would allow local governments to enact laws, regulations, ordinances, and charter provisions that are more restrictive and protective of the environment than laws or regulations enacted or adopted by the state government. In accord with this, the initiative declares that if state or local laws conflict, the more restrictive law or regulation governs.

Ballot Initiative 121

This is measure would prevent local governments that prohibit oil and gas development from receiving any state revenue that was derived from oil and gas.

Ballot Initiative 137

If passed, this initiative would amend state statutes so that proponents of any given ballot initiative must submit a fiscal impact estimate of the measure. The fiscal impact estimate must include estimates of the measure's impact on state and local government revenues, expenditures, taxes, and liabilities.

APPENDIX 2: INDUSTRY DISCUSSION OF OIL AND GAS RISKS IN COLORADO

In the June 30, 2014, Form 10-Q public filing by Anardarko:

> *"Colorado state and local ballot, legislative and regulatory initiatives relating to our oil and gas operations could result in increased costs, additional operating restrictions, delays or prohibitions, and could adversely affect our production.*
>
> Certain states in which we operate have adopted, and other states are considering adopting, measures that could impose new or more stringent permitting, disclosure, and additional well location and well-construction requirements related to our exploration or production operations. For example, in Colorado, several initiatives have been proposed for inclusion on the Colorado state ballot in November 2014. Although it is early in the political process, if approved these initiatives would give local governments in Colorado greater authority to limit hydraulic fracturing and other oil and gas operations and/or require greater distances between certain well sites and occupied structures. In the event state or local restrictions or prohibitions are adopted in areas where we currently conduct operations (such as in the Wattenberg field, which is among the largest and most cost efficient oil and natural gas development projects in Anadarko's U.S. onshore portfolio) or in the future plan to conduct operations, we may incur significant costs to comply with such requirements or we may experience delays or curtailment in the pursuit of exploration, development, or production activities, and possibly be limited or precluded in the drilling of wells or in the amounts that we are ultimately able to produce from our reserves. Depending on the areas in which they are adopted, such restrictions or prohibitions could have a material adverse effect on our business, prospects, results of operations, financial condition, and liquidity."

In the June 24, 2014, Form 10-Q public filing by Noble Energy:

> *"Potential Rulemaking* Although hydraulic fracturing is regulated primarily at the state level, governments and agencies at all levels from federal to municipal are conducting studies and considering regulations, and some have proposed rules.
>
> A measure to ban hydraulic fracturing was on the ballot in the City of Loveland in northern Colorado in June of 2014. Industry worked with the community to defeat that initiative. Also during 2014, we have been actively campaigning against statewide ballot initiatives that would unreasonably restrict or limit crude oil and natural gas development in Colorado. There are currently two remaining initiatives that have survived titling and Supreme Court review and are in a position to collect sufficient signatures to be placed on the November 2014 ballot. These are:
>
> - an initiative to amend the state constitution to establish an environmental bill of rights; and
> - an initiative to amend the state constitution to impose a 2000-foot statewide drilling setback from occupied structures, unless a waiver is obtained from the landowner.

Petitioners have until August 4, 2014 to gather 86,105 verified signatures and we will work with the State of Colorado to ensure any signatures submitted on these initiatives are properly verified. The ultimate passage and implementation of one or both of these initiatives could have a negative impact on our business. In particular, a statewide drilling setback will likely delay or otherwise limit our drilling and development activities in certain parts of the DJ Basin. This could result in a reduction in our proved reserves and negatively impact our results of operations, cash flows, and stock price."

In the December 31, 2013, Form 40-F public filing by Encana Corporation:

"In the state of Colorado, several cities including Boulder, Longmont, Fort Collins, Lafayette and Broomfield, as well as the County of Boulder, have passed local ordinances limiting or banning certain oil and gas activities, including hydraulic fracturing. These local rule-making initiatives have not significantly impacted the Company's operations or development plans in the state and are not anticipated to have a negative impact on the Company's operations in the future. On January 21, 2014, a ballot initiative was filed in the state seeking to transfer the authority to regulate all for-profit companies to local government and specifically stating that local ordinances pre-empt all international, federal and state laws, except for individual fundamental rights. Though broad in nature, the ballot initiative is understood to be primarily intended to restrict oil and gas development in the state. This and other possible measures could make certain Colorado jurisdictions inaccessible to drilling in the future. Therefore, it is possible that the Company's operations in Colorado could be impeded should such initiatives succeed. Encana continues to work with state and local governments, academics and industry leaders to develop and respond to hydraulic fracturing related concerns in Colorado. The Company recognizes that additional hydraulic fracturing ballot initiatives are a possibility and will continue to monitor and respond to these developments in 2014.

Further, certain governments in jurisdictions where the Company does not currently operate have considered a temporary moratorium on hydraulic fracturing until further studies can be completed and some governments have adopted, and others have considered adopting, regulations that could impose more stringent permitting, disclosure and well construction requirements on hydraulic fracturing operations. Any new laws, regulations or permitting requirements regarding hydraulic fracturing could lead to operational delay, increased operating costs or third party or governmental claims, and could increase the Company's cost of compliance and doing business as well as reduce the amount of natural gas that the Company is ultimately able to produce from its reserves."

In the February 21, 2014 10-K public filing by PDC Energy"

"In Colorado, local governing bodies have begun to issue drilling moratoriums, develop jurisdictional siting, permitting and operating requirements and conduct air quality studies to identify potential public health impacts. For instance, in 2013, the City of Fort Collins, Colorado, adopted a ban on drilling and fracturing of new wells within city limits. In the November 2013 election, voters in the cities of Boulder, Lafayette, Fort Collins and Brighton passed hydraulic

fracturing bans. We do not currently have operations in any of these areas. In addition, as discussed in more detail in Item 1A. Risk Factors, a ballot initiative has been proposed in Colorado which, if approved and upheld, could greatly expand the right of local governments to limit or prohibit oil and natural gas production and development in their jurisdictions. If new laws or regulations that significantly restrict hydraulic fracturing or well locations continue to be adopted at local levels or are adopted at the state level, such laws could make it more difficult or costly for us to perform fracturing to stimulate production from dense subsurface rock formations and, in the event of local prohibitions against commercial production of natural gas, may preclude our ability to drill wells. If hydraulic fracturing becomes regulated as a result of federal legislation or regulatory initiatives by the EPA or other federal agencies, our fracturing activities could become subject to additional permitting requirements and permitting delays, as well as potential increases in costs. Restrictions on hydraulic fracturing could also reduce the amount of crude oil and natural gas that we are ultimately able to produce from our reserves. We continue to be active in stakeholder and interest groups and to engage with regulatory agencies in an open, proactive dialogue."

Further,

"A ballot initiative has been proposed in Colorado which, if approved, could vastly expand the right of local governments to limit or prohibit oil and natural gas production and development in their jurisdictions. Should this or any similar initiative or legislation be successful and survive legal challenge, additional limitations or prohibitions could be placed on crude oil and natural gas production and development within certain areas of Colorado or the state as a whole. This could adversely affect the cost, manner, and feasibility of development activities in Colorado, particularly those involving hydraulic fracturing, and significantly affect the value of our assets and our financial results and impede our growth."

Barton Brookman, Vice COO at PDC Energy made the following comment during an interview with the *Greeley Tribune* on April 1, 2014, regarding the anti-fracking movement in Colorado:

"We are heavily involved in pro-industry campaigning through the Colorado Oil and Gas Association. We are not directly affected by the bans in Boulder, Longmont, Fort Collins, Lafayette and Broomfield because the bulk of our acreage is in the northeastern part of the Wattenberg Field. If there were ever an effort to ban fracking statewide, we'd strongly oppose it. But the opposition is not going to go for a ban. That's not winnable. They are going to go for some creative approach to give local communities control to shut fracking down."