

Economic and Tax Revenue Impacts of Oil Production in Ventura County

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Mike Genest founded Capitol Matrix Consulting (originally Genest Consulting) in 2010 after concluding a 32-year career in state government, which culminated as Director of the California Department of Finance (DOF) under Governor Arnold Schwarzenegger. Prior to his four-year stint as the Governor's chief fiscal policy advisor, Mr. Genest held top analytical and leadership positions in both the executive and legislative branches of government. These included Undersecretary of the Health and Human Services Agency, Staff Director of the Senate Republican Fiscal Office, Chief of Administration of the California Department of Corrections and Rehabilitation, and Director of the Social Services section of California's Legislative Analyst's Office.

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Executive Summary

The oil and gas industry has been operating in Ventura County (“County”) for over 100 years. It has been, and continues to be, a positive economic force in Ventura, supporting middle-class jobs (many of them in blue-collar occupations) that have been otherwise fleeing the region. Though the industry is highly regulated, there is growing interest among activist groups to ban production in Ventura County and other jurisdictions throughout the state. In view of this interest, Capitol Matrix Consulting has been commissioned by Californians for Energy Independence to estimate the contributions of the oil production industry to Ventura County’s economy and to state and local revenues. Information about the industry and our key findings are summarized below.

Oil and gas production in Ventura County. Oil production in the County totaled 7.7 million barrels in 2016, which represents 4 percent of California’s statewide total.¹ Natural gas production totaled about 7.0 million cubic feet (MMcf) in 2016. Most natural gas production in the County is associated with oil extraction. Some of this associated gas is used internally by companies for power and cogeneration (thus offsetting producer’s costs). The rest is sold to local utilities or Southern California Gas.

Workers employed by the industry. About 900 workers were directly employed in the County’s oil and gas production industry in 2016 (the most recent full year for which data are available). These jobs:

- Are high-paying, with the average wage in industry totaling just over \$115,000 per year – more than double the average in the rest of the private-sector in the County.
- Include workers in a variety of professional and technical fields.
- Provide vocational opportunities for workers with high school degrees, and have helped fill a void in middle-class jobs created by long-term declines in the finance, construction, and manufacturing industries in the County.

Industry’s effect on Ventura’s economy and government revenues. The oil and gas industry has a disproportionately positive impact on the region’s economy and state and local revenues. This reflects the enormous value of oil and gas reserves, the high wage payments in the industry, and the large amount of purchases made by oil producers from other local businesses. Taking into account the direct and multiplier effects of the industry (using the methodology and assumptions described in the *Broader Economic and Fiscal Impacts on Ventura County* section of the report) we estimate that oil and gas production has the following impacts:

¹ Of the total 7.7 million in oil production, 200,000 came from subsea formations on State Lands that are accessed entirely from onshore facilities.

- **Ventura Economy in 2018:** The oil and gas extraction industry in the County will account for \$760 million in economic output, \$474 million in gross regional product, 2,100 jobs, \$180 million in labor income, and over \$50 million in royalty and lease payments to mineral rights owners.
- **State and local tax revenues in 2018.** The industry is currently responsible for \$56 million in state and local taxes and fees, of which about \$35 million goes to state government and \$21 million goes to local jurisdictions within Ventura County. A large component of the local revenue is the property tax, which is applied to the value of oil and gas reserves. Oil and gas producers have historically been among the top four or five property tax payers in the County.
- **Perspective on 2018 estimates.** One important caveat to our economic and tax revenue estimates for 2018 is that they are being made when crude oil prices coming off a cyclical low point, and hence oil revenues, reserve valuations, and company expenditures are depressed.² To demonstrate how low these impacts are relative to the past and (likely) the future, we estimated the direct and indirect effects of the oil and gas production industry on employment and taxes going back to 2014 (based partly on actual employment and tax data for the direct impacts) and going forward to 2023 (using assumptions outlined in the *Broader Economic and Fiscal Impacts on Ventura County* section of the report). We found:
 - Employment directly and indirectly related to oil and gas production was about 3,100 in 2014 when oil prices peaked. This was 48 percent higher than current level of 2,100. Based on current and projected future increases in oil prices, we estimate that employment related to oil and gas production will rebound during the next several years, exceeding 3,000 jobs by 2023.
 - State and local tax revenues directly and indirectly related to oil production totaled \$89 million in 2014-15. This was 59 percent higher than the estimated 2018-19 level of \$56 million. Based on our long-term oil price projections, we estimate that tax payments attributable to the industry will rise to \$76 million by 2023. Of this total, \$47 million will be from state taxes and \$29 million from local taxes.

Impact of oil and gas production-related revenues on local government budgets. Twenty-nine million in local taxes is quite significant in the context of the cost pressures and relatively limited amount of discretionary funds (i.e. funds that

² The major decline since 2014 is tied to four main factors: (1) a slowdown in emerging market economies, particularly in China; (2) sharply rising U.S. shale production that persisted even after prices declined; (3) recent increases in crude production in Iran following the lifting of sanctions; and (4) until recently, the lack of output reductions among OPEC countries, whose members maintained production to both (a) avoid losses in market share and (b) drive U.S. shale producers out of business. Looking ahead, most forecasts anticipate, to varying degrees, an upswing in prices as supplies ease and global demand picks up. On the supply side, OPEC finally curtailed production beginning in late 2016 and renewed the restraints until 2018. The recent drops in exploration and new development spending by major producers imply less new supplies coming on line in future years to replace depleted reserves. On the demand side, energy consumption is rising and economic growth is improving in both developed and emerging markets, which implies further increases in consumption in the coming years.

are not earmarked for specific purposes) available to local governments within Ventura County to address budget challenges. Like many other cities and counties in California, local governments in Ventura County face budget pressures from a variety of quarters. These include unfunded pension liabilities, state mandates, and added costs related to state/local realignment of financial responsibilities for health, social services, and public safety programs. The loss of revenues due to curtailment or elimination of oil and gas production in the County would significantly reduce the limited amount of discretionary funds available to cover these budget pressures.

Estimated value of oil and gas fields in Ventura County. Finally, we estimate the total value of proven oil reserves in Ventura County is between \$650 million and \$1.6 billion, depending on future crude oil prices. Measures banning or restricting production from these fields would result in a major loss in value to oil producers and mineral rights owners in the County, and could put the County at risk of major liability associated with subsequent “takings” lawsuits seeking recovery for lost future profits from oil production.

Introduction

Oil and gas production has been an important source of economic activity in Ventura County for over 100 years. The industry has a disproportionately positive impact on economic activity and taxes paid to state and local government in the region. For example, it is an important source of high-paying, middle-class jobs that otherwise have been disappearing from Ventura County. The industry also has strong multiplier effects related to expenditures by oil producers and their employees, which boost jobs and income in supplying businesses throughout the region.

The industry is highly regulated by multiple state and federal agencies, including the California State Department of Conservation, Division of Oil, Gas & Geothermal Resources (DOGGR). It is also subject to Ventura County's detailed land use permitting requirements.

California imports over two-thirds of its oil, 90% of its natural gas and almost one-third of its electricity. Despite these factors, there is a growing interest among activist groups to ban oil and gas production in the region. Such a ban would reduce California crude oil supplies by about 4 percent and make the State more dependent on out-of-state and foreign oil produced under less stringent safety, labor and environmental standards. Aside from the negative environmental and economic consequences of greater foreign oil dependence, the elimination of local oil production would have serious economic consequences in terms of jobs, income, tax revenues, energy reliability and wealth in Ventura County.

Given these concerns, Capitol Matrix Consulting was commissioned by Californians for Energy Independence to estimate the direct and indirect economic contributions the oil and gas production industry makes to Ventura County.

Unlike some previous studies of economic impacts in the region, our current analysis focuses solely on upstream production activities. Thus, the economic and tax impacts shown in this report are smaller than these past studies, which have focused on both upstream and downstream operations. (Downstream operations include refineries, storage, distribution networks, and gasoline stations.) In particular, our estimates of state and local taxes are focused on those related directly and indirectly to crude oil production in the County. They do not include the larger retail sales and excise taxes imposed on retail sales gasoline and other refined products made from that crude oil.

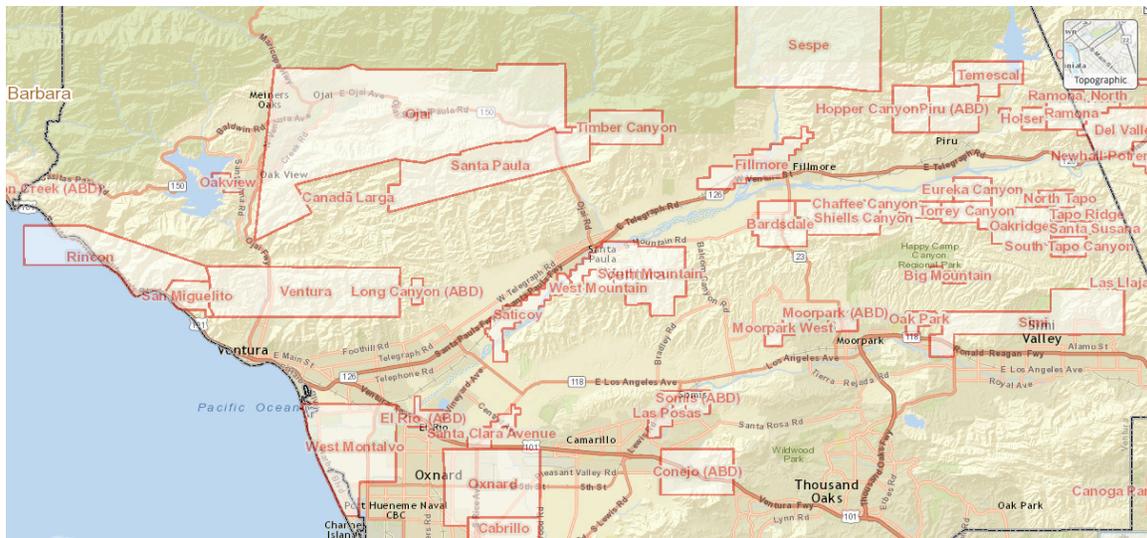
Economic and Tax Revenue Impacts of Oil Production in Ventura County

Our analysis focuses on the impacts of the oil production industry on the economy and tax revenues in Ventura County. It does not address the broader impacts that Ventura County oil production has on the California economy. It is worth noting, however, that a loss of 4 percent of statewide oil production would have significant consequences for the California petroleum markets. For example, it would make California more dependent on foreign crude oil, with the majority coming from Saudi Arabia, Kuwait and Ecuador. The greater dependence on foreign sources would have negative environmental consequences associated with operating practices abroad and long-distance oil shipments. It would also empower countries that do not apply California's human rights standards. Over time, the loss of domestic production would put the state at greater risk of foreign supply disruptions and make the state vulnerable to higher petroleum prices.

Background

Ventura County has been a significant source of statewide oil production for many years. The County sits on a rich oil basin – an area that is so prolific that oil seeps can be spotted in the Ojai Field, and naturally occurring tar balls can be found in the ocean offshore from the County. Though some production can be traced back to the mid-1800s, significant oil production in Ventura County began with the discovery of the South Mountain Oil Field in 1916 and the Ventura Avenue Oil Field in 1919. These were followed by discoveries of the Rincon field, the adjacent San Miguelito field in 1931, and several others in subsequent years. The last major onshore oil field discovery was Saticoy Field in 1955, with discoveries in subsequent years related to small fields, or extensions to existing oil fields. Consequently, the great majority of production today is from conventional fields that have been in production for well over 60 years. Figure 1 shows the location of the oil and gas fields in the County.³

Figure 1
Oil Fields in Ventura County



Most oil and gas fields experienced peak production decades ago. In order to recover more of the oil in place from these mature fields and make the most efficient use of existing facilities, producers frequently rely on water flooding and steam injection techniques. The incremental volume of oil associated with these enhanced recovery techniques accounts for over three-quarters of total production in the County.⁴

³ Source: California Department of Conservation, Division of Oil, Gas, and Geothermal, GIS Mapping. Well Finder. <https://maps.conservation.ca.gov/doggr/wellfinder/#openModal>

⁴ Water flooding and steam injection are used frequently in California to improve oil flow in mature fields, such as those in Ventura County. Water flooding involves injection of produced water into oil reservoirs to increase help oil flow more freely into producing wells. Steam injection introduces heat to the reservoir, causing the oil's viscosity to drop and allowing it to flow more freely into producing wells. These techniques are distinct from hydraulic fracturing, which involves the injection of water, proppants (usually sand), and a small volume of additives into a well at high pressure to create fractures and increase the permeability of the target reservoir. About 11 percent of all active wells in Ventura County have been hydraulically fractured, the majority of them decades ago.

Top Oil Fields and Producers

In 2016, production in Ventura County fields totaled 7.7 million barrels of oil, which amounted to 4 percent of California’s total oil production during the year.⁵ According to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR), there were 2,455 active wells in Ventura County as of October 2017. These wells are operated by 39 companies, working in 35 oil and gas fields in the County.

Figure 2 shows the top-producing field in the County is the Ventura Oil Field, which is the 10th largest in the State, and spans 4,300 acres in an unincorporated area northwest of the City of Ventura. The next largest fields are Oxnard, South Mountain, Sespe, San Miguelito, and Montalvo.

Figure 2
Top Oil and Gas Fields in Ventura County
Ranked by 2016 Oil Production

Oil Field	Oil Produced (Thousands of Barrels)	Net Gas Produced (Thousands of BOE*)
Ventura	4,506	420
South Mountain	542	112
Oxnard	433	3
Sespe	373	150
San Miguelito	367	51
Montalvo	325	30
Rincon	220	33

BOE stands for “barrels of oil equivalent,” a term often used to summarize the amount of energy in natural gas that is equivalent to that found in one barrel of crude oil. We are using the conversion factor of 6,000 cubic feet of natural gas equals 1 BOE.

⁵ Source: “2016 Report of Oil and Gas Production Statistics.” California Department of Conservation, Division of Oil, Gas, and Geothermal Resources. About 7.0 MMcf (1.2 million barrels of oil equivalent) in natural gas was also produced in the County during the year. The great majority is “associated” gas, which is extracted in conjunction with oil. A significant portion of associated gas is not put on the market, but rather is used internally to support steam and power generation in the oil fields. Thus, the economic impacts of associated gas production are partly reflected as industry output and partly as a reduction in production costs for oil producers.

Economic and Tax Revenue Impacts of Oil Production in Ventura County

Two companies presently account for 86 percent of Ventura County’s oil production (see Figure 3). The largest operator is Aera Energy LLC (“Aera”), which is a joint venture between Shell Oil Company and Exxon Mobil. Aera is the sole operator in Ventura Field, and thus was responsible for 100 percent of the field’s 4.5 million barrels of annual oil production in 2016. California Resources Corporation (CRC) is the second largest producer, accounting for over 2.2 million barrels of production in 2016. CRC has active wells in 18 oil fields in the County, with significant production in the South Mountain, San Miguelito, Rincon and Montalvo fields.⁶ The remaining oil production in 2016 was attributable to several operators, including Seneca Resources Corporation and ABA Energy Corporation.

Figure 3
2016 Top Oil Producers in Ventura County

Producer	Total Barrels (In Thousands)
Aera Energy, LLC	4,506
California Resources Production Corporation	2,155
Seneca Resources Corporation	366
ABA Energy Corporation	244
Vaquero	31
Other	420
Grand total	7,722

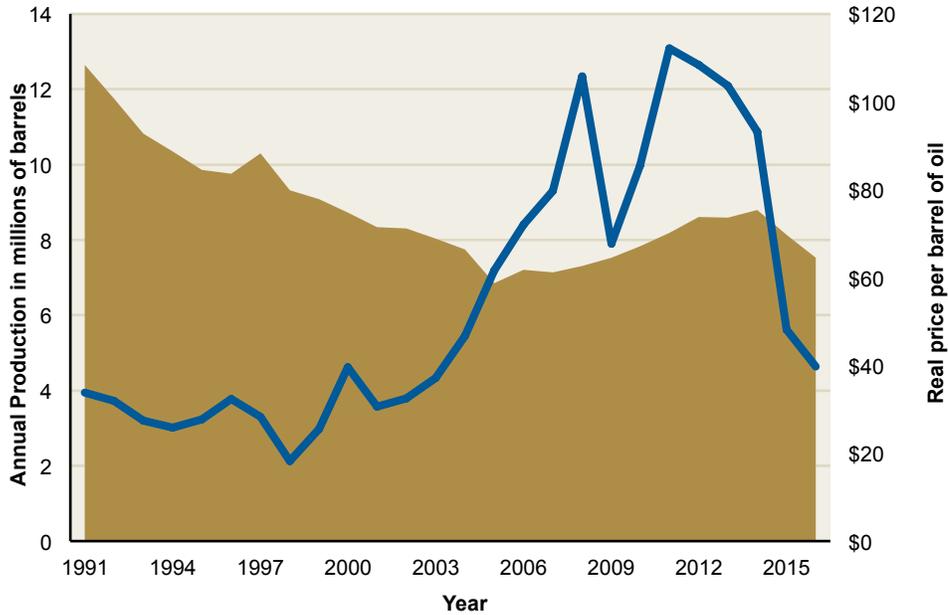
Recent Production

Oil production is influenced by oil prices in the global markets. As shown in Figure 4, production in Ventura County declined steadily from 1990 through the early 2000s when oil prices were generally low, but rebounded when oil prices started to rise in 2005. During the 8-year period from 2005 to 2013, world oil prices (in constant 2015 prices) jumped from \$61 to \$103 per barrel, and oil production in Ventura County rose from 6.9 million barrels to 8.6 million barrels annually.⁷ The increased production was due to investments aimed primarily at extracting more oil from existing oil fields through additional drilling, restoration of marginal wells, and installation of enhanced oil recovery (EOR) systems like water flooding and steam flooding. The sharp decline in oil prices during the subsequent three years led to corresponding reductions in oil production in the County. As noted below, we believe that oil production bottomed out in 2017, and will start to recover in 2018.

⁶ Source: California Department of Conservation, Division of Oil, Gas, and Geothermal – Well Search. <https://secure.conservation.ca.gov/WellSearch88>.

⁷ Source: Oil prices are from the U.S. Energy Information Administration, and represent the inflation-adjusted price of imported crude oil. <https://www.eia.gov/outlooks/steo/realprices/>. Production data is from the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources. <https://secure.conservation.ca.gov/WellSearch>.

Figure 4
Annual Oil Production and Prices in Ventura County
(1991 to 2016)



Employment, Wages, and Occupational Patterns

The oil and gas production-related industries directly supported 900 jobs in Ventura County during 2016. As shown in Figure 5, the total includes 465 workers employed by oil producers. It also includes 32 workers employed by companies providing drilling services, and 198 workers in companies providing other support services to the oil producers on a contract basis. These other support services include surveying, excavation, the testing and maintenance of wells, and inspection and operation of field gathering lines. They also include workers involved in construction and maintenance of facilities, many of whom are union members in the Building and Construction Trades.

The total also includes 76 workers involved in oil and gas pipeline construction, and 129 self-employed independent contractors, mostly providing field support services discussed above. The industries account for \$79 million in wage payments in the County.⁸

⁸ Employment and wage data is from the *Quarterly Census of Employment and Wages*, California Employment Development Department. <http://www.labormarketinfo.edd.ca.gov/qcew/qcew-select.asp>. Field estimates of self employed independent contractors from the U.S. Census Bureau, Non-employer statistics. <https://www.census.gov/programs-surveys/nonemployer-statistics.html>.

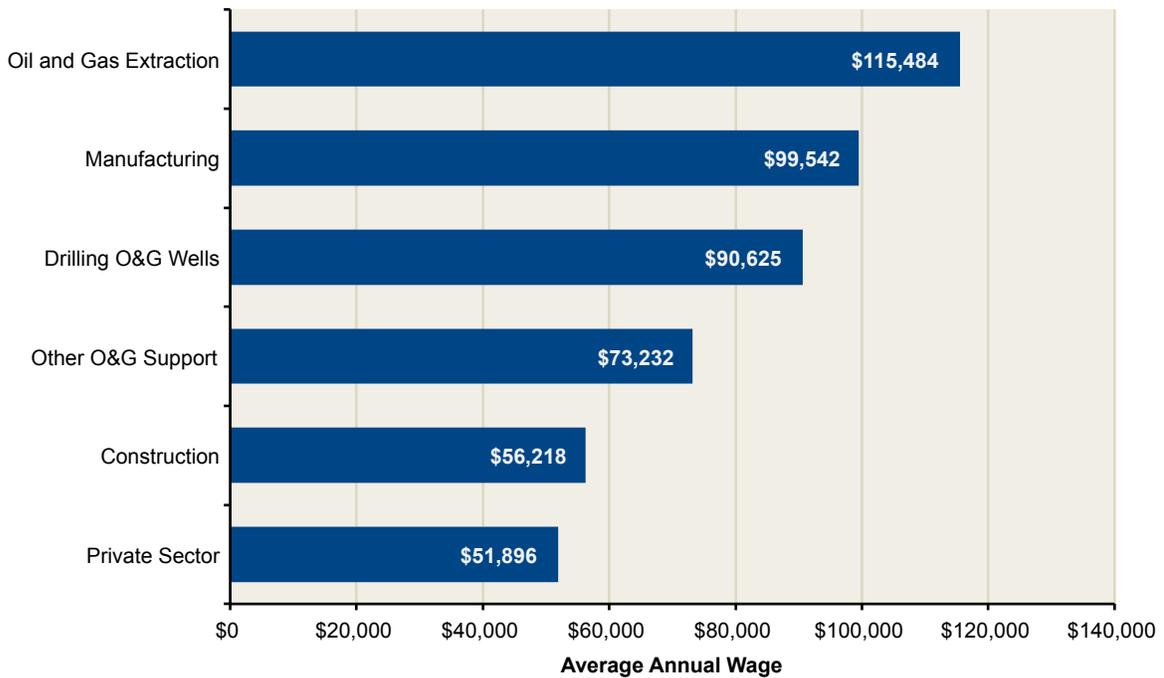
Figure 5
Employment and Wages in Oil and Gas Production Industry
2016

Oil and Gas Industries	Ventura County Employment	Annual Wages (\$ Millions)	Average Annual Wage
Extraction	465	\$53.7	\$115,484
Support Activities:			
Drilling	32	2.9	90,625
Other	198	14.5	73,232
Pipelines construction	76	4.3	56,579
Total	771	\$76.4	\$99,092
Self employed independent contractors	129	\$3.9	\$30,233
Grand total	900	\$79.3	\$88,111

Comparison of wages paid to other industries. As indicated in Figure 6, the \$115,484 average pay for the oil and gas extraction industry is more than double the average pay for both the rest of the private sector, and for the Construction Industry (also a major employer of skilled technical jobs). The average pay is also 16 percent higher than the region’s manufacturing sector. The industry is one of the few in the County that pays wages that are high enough to enable a family to afford a median priced home in the region (\$634,000 in October 2017).⁹

⁹ Assuming a 10 percent down payment and an interest rate of 3.8% on a 30-year mortgage, annual payments on a median priced \$634,000 home would be \$32,167, or slightly less than one-third of the average \$99,000 employee salary in the oil extraction and support industries.

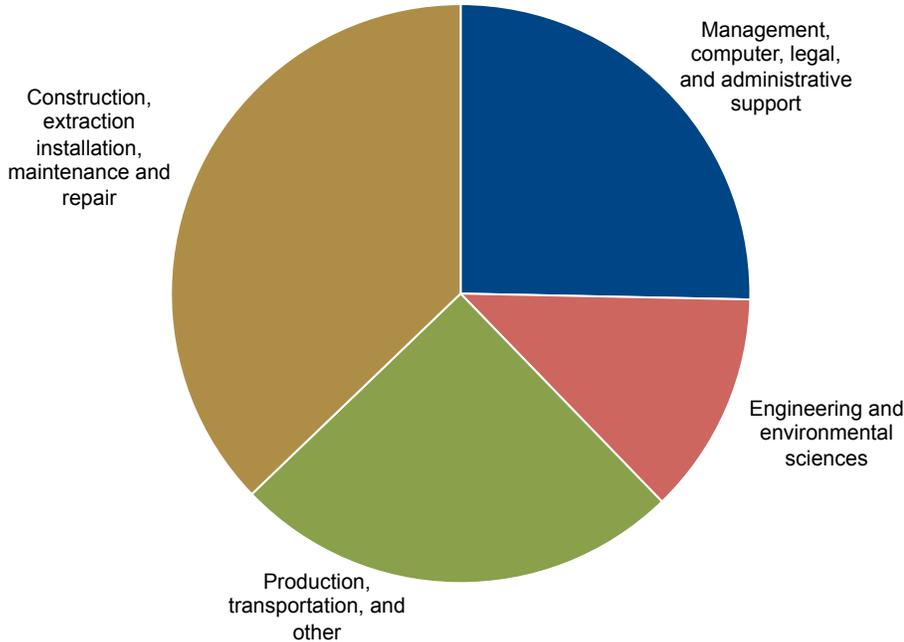
Figure 6
Ventura County Average Annual Wage by Industry



Occupational distribution. The oil and gas production and support industries employ a workforce with a diverse set of skills and educational backgrounds. As shown in Figure 7, 62 percent of total jobs the industry are in in construction, extraction, installation, maintenance, repair, and transportation occupations.¹⁰ The other 38 percent are in management and professional occupations.

¹⁰ Source: U.S. Department of Labor, Bureau of Labor Statistics Industry-Occupation Data Matrix. https://www.bls.gov/emp/ep_table_109.htm

Figure 7
Occupation Breakout of Oil and Gas Production-Related Industries

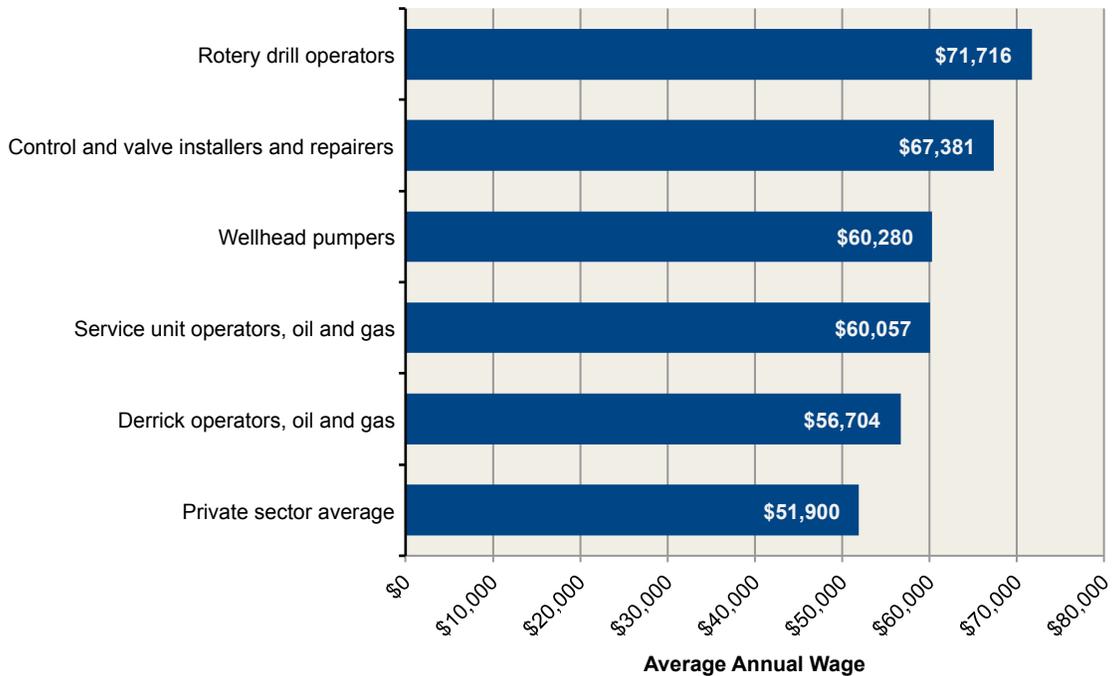


The industry is an important source of well-paying blue collar jobs, most of which are available to individuals with high-school degrees (see Figure 8). According to data from the California Employment Development Department, the average annual pay rates for derrick operators (\$56,704), service unit operators (\$60,057), rotary drill operators (\$71,716) and wellhead pumpers (\$60,280) all exceeded the average for all private sector jobs in the County (\$51,900) in the first quarter of 2017.¹¹ The pay rates are sharply higher than the \$40,000 per-year average for occupations in Ventura County requiring a high school degree or less.¹²

¹¹ Source: "Occupational Employment (May 2016) and Wage (2017 – 1st Quarter) Data. Occupational Employment Statistics (OES) Survey Results." Oxnard-Thousand Oaks-Ventura MSA. Ventura County. Released June 2017. <http://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html#OES>

¹² Source: "Employment Projections by Industry and Occupations, Ventura County." Employment Development Department. <http://www.labormarketinfo.edd.ca.gov/data/employment-projections.html#Long>

Figure 8
Average Pay, Selected Blue-Collar Jobs in Oil and Gas Mining and Support Industries, Ventura County

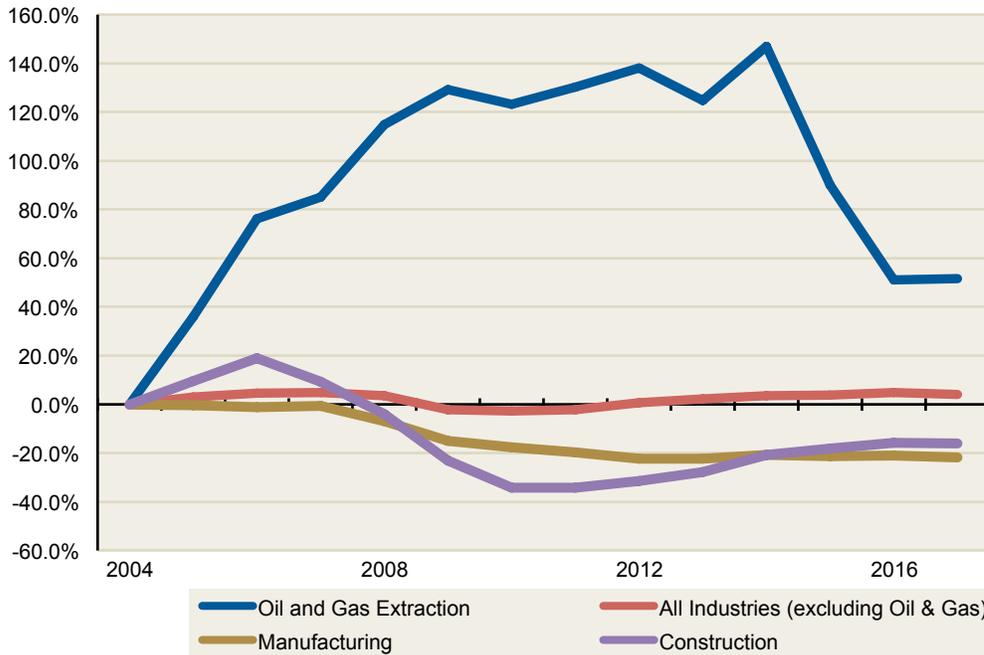


Above-average salaries also extend into the professional and managerial ranks. As one example, the average salary for a petroleum engineer in Ventura County is \$142,000 per year. This compares to \$97,000 for biomedical engineers, \$113,000 for electrical engineers, and \$106,000 for civil engineers.

Recent industry performance. Although subject to ups and downs due to changes in the world market for crude petroleum, the oil and gas production industry has been a stabilizing force in the Ventura County economy. Despite recent declines, it remains one of the few industries providing high-paying, middle-class jobs that have experienced job growth during this century. In this regard, it has offset some of the large losses experienced in the County’s finance, construction, and manufacturing sectors.

As indicated in Figure 9, jobs in the oil and gas industry increased by over 55 percent between 2004 and 2016. This is in stark contrast to near zero growth in Ventura County’s private sector, and the over 15-percent declines in its manufacturing and construction industries. The strong cumulative growth since 2004 has occurred despite the recent downturn in oil prices and production activity.

Figure 9
Cumulative Percent Change in Jobs: 2004-2016
Ventura County



Looking ahead, we expect oil and gas extraction to be one of the few high-paying industries in Ventura County to experience above-average job growth over the next decade. The majority of new jobs created outside of this industry are projected to be in retail trade, office, administrative, food preparation, managerial, and transportation occupations, which collectively have an average wage of less than \$40,000 per year in 2017.¹³

In sum, the oil and gas industry is an important part of the Ventura County economy, supporting jobs in a wide range of high-paying occupations. In addition, it boosts other industries through its large purchases of materials and services from businesses located in the region. We discuss the full impacts of the oil and gas industry on Ventura’s broader economy in the following section.

¹³ Ibid.

Broader Economic and Fiscal Impacts on Ventura County

In this section, we measure the full (direct and multiplier) economic and fiscal impacts of the oil and gas industry on Ventura County. We have prepared detailed estimates for the 2018, as well as aggregated estimates of employment and taxes going back to 2014 and going forward to 2023. (The retrospective estimates are based partly on actual data for employment and key taxes imposed on oil and gas producers, along with our IMPLAN-based multiplier estimates.)

Sources of Economic Impacts

The oil production industry generates economic activity in Ventura County through three main channels.

- The first is the output, employment, royalties and wages paid by the oil producers and companies providing on-site support services. These are referred to as direct impacts.
- The second is economic activity generated by local businesses that supply goods and services to the oil producers and their field contractors. These include suppliers of energy, engineering services, equipment, and repair and maintenance services. Economic activity generated by these supplying businesses is referred to as indirect impacts.
- The third is business activity that is generated by purchases of goods and services by the households of employees working for oil producers and their suppliers. These are referred to as induced impacts. These expenditures boost sales, jobs and wages in a wide range of industries, including restaurants, retail establishments, real estate offices, entertainment venues, and professional services.

Methodology

Our estimates of the three channels of impacts are based on a multi-step process that uses as a starting point historical information regarding oil production, employment, wage payments, royalty payments, purchases of materials and services, and taxes paid.

We developed this information from a combination of data supplied by oil producers and a variety of public sources. Examples of public data include: company expenditure data from SEC 10(k) annual filings; production data from the State Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR); oil price data from the U.S. Energy Information Agency (EIA); and employment and wage data from the California Employment Development Department's (EDD) Quarterly Census of Employment and Wages. We also developed information on average local tax rates by reviewing budget data from government agencies operating within Ventura County.

Economic and Tax Revenue Impacts of Oil Production in Ventura County

From these inputs, we estimated direct output, employment, wages, and taxes for 2018. We then estimated the multiplier effects of company expenditures on the broader economy, using the IMPLAN input-output model for Ventura County (see box below).

We also developed estimates of employment and tax revenues back to 2014 and forward to 2023. Our estimates for past years are based partly on actual employment and tax data. Our projections for future years are based on financial and regression-based models that translate key assumptions about oil prices, production and costs into estimates of employment, income, and tax payments.

Assumptions

Some of the key assumptions for our multi-year projection are as follows:

- **Oil prices.** Our estimates assume crude oil prices received by Ventura County producers will be consistent with the average of EIA's January 2017 long-term "reference" forecast and the World Bank's April 2017 projections.¹⁴ We specifically assume that prices (in constant 2018 dollars) to average \$60 per barrel in 2018, \$66 per barrel in 2020, and \$70 per barrel by 2023.
- **Oil production.** We assume that oil production in Ventura will total 7.8 million barrels in 2018, rising modestly to slightly over 8 million barrels by 2023. Over this period, natural declines in well production are slightly more than offset by (1) the reactivation of temporarily idled low-production wells and (2) investments in new wells and enhanced recovery operations, both of which occur as crude oil prices rise.
- **Production-related expenditures.** We assume oil production costs of \$26 per barrel for operational expenditures and \$10 per barrel for capital expenditures in 2018. We project that these per-barrel costs will increase by an inflation-adjusted rate of 4 percent per year between 2018 and 2023, as companies boost expenditures for operations and new investments in response to higher oil prices.
- **Percent of spending going to local households and businesses.** We assume that about 75 percent of total company expenditures will go to employees and business contractors located within Ventura County and the remaining 25 percent will go to businesses located outside the County. Most of the 25 percent going outside the County is related to capital expenditures for equipment, which is largely produced outside of California.
- **Employment and Income.** We estimate that employment in the oil and gas production related industries will average 940 during 2018, up

¹⁴ Source of EIA forecast is "Annual Energy Outlook, 2017. Table: Total Energy Supply, Disposition, and Price Summary." <https://www.eia.gov/outlooks/aeo/data/browser/#/?id=1-AEO2017&cases=ref2017&sourcekey=0>. Source of World Bank forecast is "World Bank Commodities Price Forecast (Nominal U.S. Dollars.) Released April 2017." <http://pubdocs.worldbank.org/en/662641493046964412/CMO-April-2017-Forecasts.pdf>

modestly from 900 in 2016.¹⁵ Our estimates take into account quarterly job and wage data available from EDD through the second quarter of 2017, which we extrapolated to 2018 based on recent oil price developments.

IMPLAN Input-Output Model

IMPLAN is an input-output modeling system that enables users to calculate the direct, indirect, and induced effects of output and/or spending in one industry on other industries located within a geographical region (national, state, county, metropolitan statistical area, or zip code). IMPLAN is widely used by academic institutions, federal, state, and local government agencies, and private companies for economic impact analyses. The model is based on benchmark U.S. input-output accounts produced by the U.S. Bureau of Economic Analysis (BEA). These accounts describe commodity inputs that are used by each industry to produce its output, the commodities produced by each industry, and the use of commodities by final consumers. The relationships in the national accounts are then modified by IMPLAN for each local region to take into account such factors as the relative size of the region's various industrial sectors. Based on these inter-industry tables, IMPLAN calculates a total requirements table, which estimates the full impacts (including multiplier effects) of a given change in output in one industry on all other industries in the economy.

Results For 2018

Economic Impacts. We estimate total output supported directly and indirectly by the oil and gas production industry will total \$760 million in 2018. The industry will also support about \$474 million in gross regional product,¹⁶ 2,100 jobs, and \$180 million in labor income during the year.

These totals include direct effects related to output, employment, and wages paid payments by oil producers, plus multiplier effects generated by the purchases made by oil producers of fuel, materials, and services from other businesses (indirect effects). The totals also reflect the impacts of purchases by households of employees working for oil producers and their suppliers (induced effects).

In addition to these totals, oil producers are expected to pay more than \$50 million in royalty and lease payments to owners of oil and gas mineral rights in Ventura County. A portion of these payments will be spent locally on goods and services, further boosting economic activity in the region.

¹⁵ The direct impact of 875 jobs shown in Figure 10 is equal to 940 total jobs in the oil and gas production related industries excluding 65 jobs in oil and gas pipeline construction. A portion of the construction jobs are included in the indirect impact row of Figure 10.

¹⁶ Economic output is the annual value of sales generated by the oil production industry and its suppliers. Gross regional product is akin to the widely cited U.S. gross domestic product. It is equal to the "value added" by the oil and gas production industry and each of its suppliers. Value added for each industry is equal to its total economic output minus the cost of its inputs (i.e. purchases from other industries). In the case of oil and gas production, these inputs include, for example, energy purchased from utilities to power its wells and maintenance services purchased from contractors needed to keep the wells operating. By backing out the cost of inputs, gross regional product avoids "double counting" of raw materials, parts, and business services used as products that are assembled, distributed and ultimately sold on the retail market.

Economic and Tax Revenue Impacts of Oil Production in Ventura County

As shown in Figure 10, the employment multiplier associated with the oil extraction industry is 2.4, implying that each job in the oil and gas industry supports more than one additional job in other industries within the County. The job multiplier for oil and gas production compares to median of about 1.8 for all industries in Ventura County. The above-average multiplier is partly due to the high wages paid by oil and gas producers, which generate substantial household income that is spent in the local economy. It also reflects the large amount of purchases made by oil and gas producers from other businesses in the local region.

Businesses supported by expenditures by oil and gas producers (and their employees) encompass a wide range of industries, including engineering services, maintenance and repair construction, wholesale and retail trade, finance, real estate, and professional and personal services.

Figure 10
Economic Impact of Oil and Gas Extraction on Ventura in 2018
(Dollars in Millions)

Type of Impact	Economic Output	Gross Regional Product	Number of Jobs	Labor Income
Direct	\$523	\$323	875	\$80
Indirect	120	81	355	61
Induced	117	70	870	39
Total	\$760	\$474	2,100	\$180
Multiplier	1.5	1.5	2.4	2.3

Revenue impacts. We estimate that oil and gas producers in Ventura account directly and indirectly for about \$56 million in annual taxes paid to state and local governments. Of this total, slightly over \$35 million is related to taxes and fees paid to the State (a significant portion of which is distributed back to cities and counties to support public safety, health, and social services programs), and slightly over \$21 million is related to taxes and fees collected by local governments and used to support local programs.

As indicated in Figure 11, major state tax and fee levies include: corporate income taxes; personal income taxes on royalties paid to mineral rights owners and wages paid to employees; sales taxes on oil producers' purchases of materials, fuels, and equipment; and the DOGGR administrative fee to support a variety of regulatory activities.

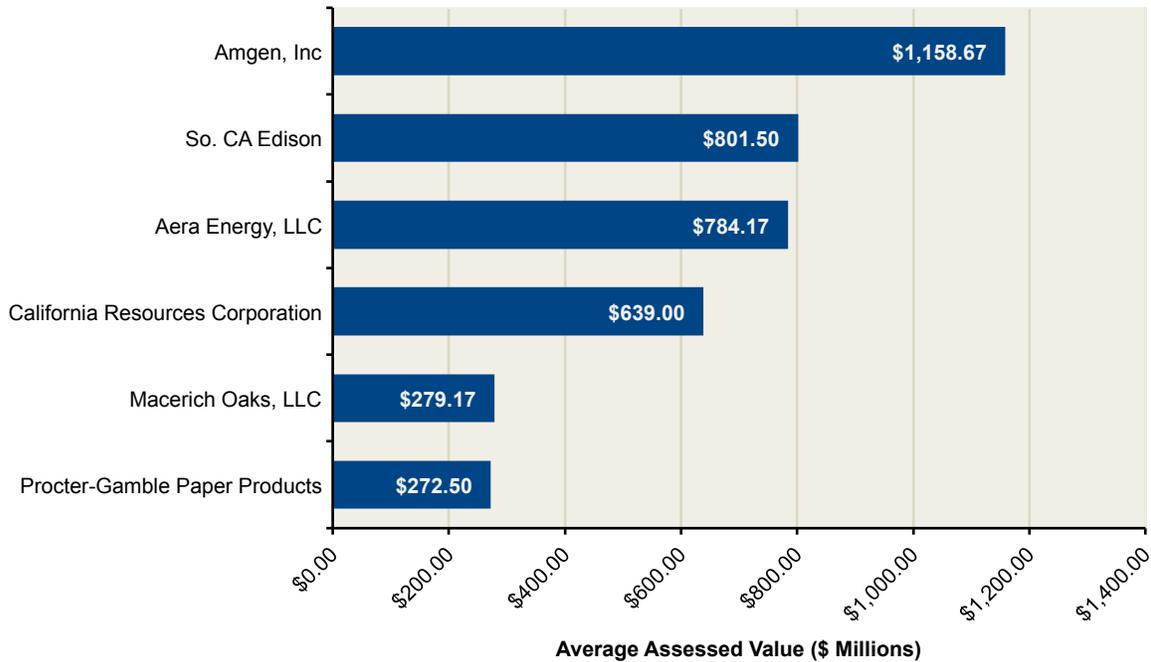
Figure 11
Taxes Paid To State and Local Governments in 2018-19

Tax Source	Total Amount (In Thousands)	Per Barrel Amount
Direct:		
State		
Corporation Tax	\$8,500	\$1.10
Personal income	4,140	0.54
Sales	5,265	0.68
DOGGR	4,439	0.57
Total	\$22,344	\$2.89
Local:		
Property	\$14,215	\$1.84
Sales	1,185	0.15
Business License/other	404	0.05
Total	\$15,804	\$2.05
Indirect:		
State	\$13,007	\$1.68
Local	5,203	0.67
Total	\$18,210	\$2.36
Combined, Direct and Indirect		
State	\$ 35,351	\$4.58
Local	21,007	2.72
Total	\$56,358	\$7.30

The largest local tax is the property tax, which is applied to the value of oil reserves and company facilities. Though recent declines in oil prices have reduced taxes from this source, oil producers have frequently been among the largest taxpayers in the County. As shown in Figure 12, Aera Energy, LLC and California Resources Corporation were the third and fourth largest property taxpayers in the County, respectively, during the five-year period ending in 2015-16.¹⁷

¹⁷ Source: County of Ventura, Principal Property Tax Payers, Current Fiscal Year (Unaudited).” In *Comprehensive Financial Report, Ventura County* for fiscal years 2010-11 through 2015-16. <http://www.ventura.org/auditor-controller/comprehensive-annual-financial-report-2011>

Figure 12
Top 6 Property Taxpayers in Ventura County, Average Assessed Valuation, 2010-11 through 2015-16



Other sources of local revenues are the local portion of the sales tax and a variety of business license taxes and fees levied by local jurisdictions in the County. These totals do not include routine environmental fees, well-permitting fees, or other regulatory fees where the proceeds are intended to offset the direct cost of governmental review and enforcement.

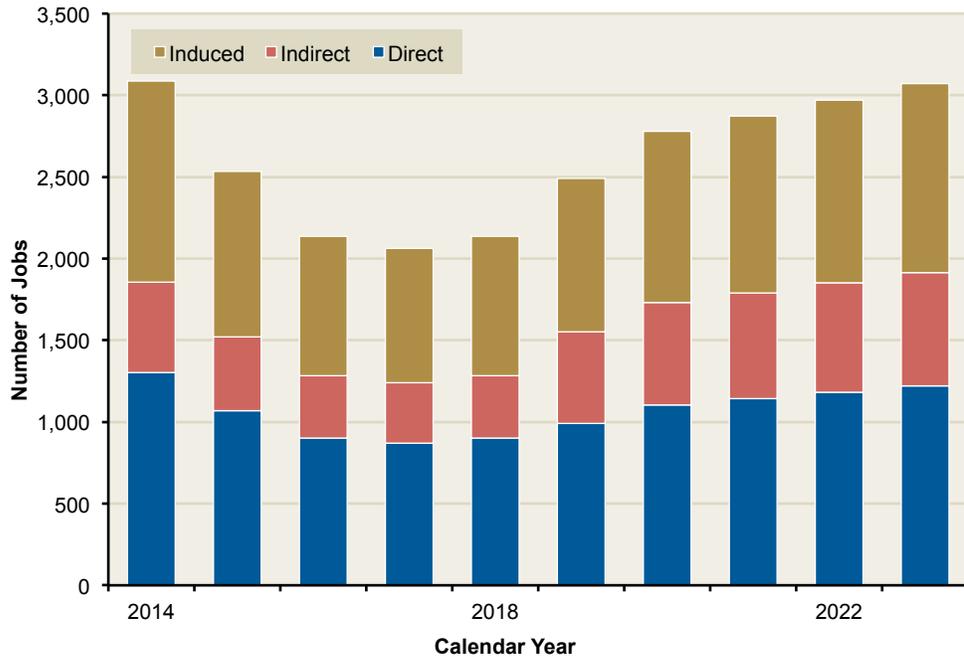
In addition to the taxes levied directly on oil producers, mineral rights owners, and employees, the industry generates a considerable amount of tax revenue indirectly, as expenditures by oil companies, the households of their employees, their vendors, and mineral right owners generate additional sales, jobs, and income throughout the region. We estimate these multiplier effects result in an additional \$18 million in state and local taxes per year.

Perspectives On Our 2018 Estimates

The above economic- and revenue-impact estimates are for 2018, a period when oil prices, investment, revenues, and reserve valuations are coming off a cyclical low point for the industry. To provide some perspective on how these estimates compare to past actual levels and future projections, we reviewed actual industry employment and tax collections in the four prior years, and made estimates of these two measures through 2023 based on current projections of crude oil prices. We then calculated the multiplier effects using the IMPLAN model described above.

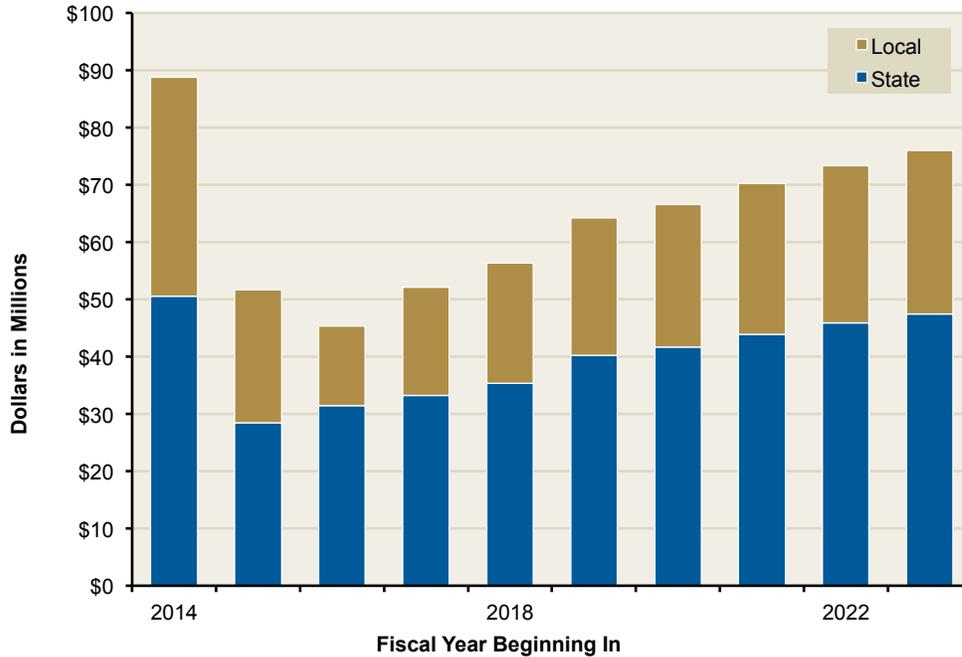
Employment. Figure 13 shows that employment directly and indirectly related to crude oil production was nearly 3,100 in 2014, about 48 percent above 2018 levels. Employment fell sharply in the following two years, as oil prices plunged and company investments in new wells and field development were sharply curtailed. After stabilizing in 2017, we expect employment to turn upward in 2018 and continue to expand during the next several years, as oil prices rise and companies renew investments in field operations. As indicated in Figure 13, we estimate that employment directly and indirectly related to oil and gas extraction will exceed 3,000 by 2023-24.

Figure 13
Employment Related to Oil and Gas Production in Ventura County



State and local taxes. As is the case with employment, state and local taxes related to the oil and gas production industry were much higher in the recent past. Specifically, we estimate that industry-related tax revenues were \$89 million in 2014-15, or 59 percent higher than today. The higher tax revenues reflected much stronger levels of operator revenues, purchases of taxable goods, and oil and gas reserve values subject to property taxation during 2014. As indicated in Figure 14, revenues fell in the subsequent three years, in line with declining oil prices. After bottoming out at \$45 million in 2016-17 they began to recover in 2017-18, and are expected to reach \$56 million in 2018-19. We expect that state and local taxes will rise further in subsequent years. Reflecting higher taxes on oil reserves, company expenditures, and oil revenues, we estimate that industry-related tax revenues will reach \$76 million by 2023-24. Of this total, \$47 million is related to state taxes and \$29 million is related to local taxes.

Figure 14
State and Local Taxes Directly and Indirectly Related to Oil and Gas Production in Ventura County



Impacts on State and Local Budgets

In Ventura County, the revenues attributable to the oil and gas production industry take on increased importance when considered in the context of two key factors:

- One, most revenues received by local governments (particularly for County government) are intergovernmental transfers and other dedicated revenue sources that are earmarked by law for specific purposes. The tax revenues we have identified are largely discretionary funds that can be allocated to address local government’s highest priorities.
- Two, local governments in Ventura County, like those throughout California, face major budget pressures related to employee pensions, health, social services, and other mandatory costs. In this context, every dollar counts.

Pension costs represent a major challenge. All ten cities located in Ventura County are members of the California Public Employee Retirement System (CalPERS). This is significant because CalPERS faces a major unfunded liability due to past investment shortfalls, a recently adopted reduction to its assumed future investment returns from 7.5 percent to 7.0 percent, and a variety of other factors. Based on CalPERS' most recent actuarial projections, annual pension contributions for the 10 cities combined will increase by over \$15 million between 2017-18 and 2022-23.¹⁸

Realignment and other state requirements put pressure on County costs. Ventura County employees are members of a separate pension system that does not presently face the same upward pressure on employer contributions as CalPERS members.¹⁹ The County also has a balanced budget with significant reserves.²⁰ However, the County faces future cost pressures from state mandates and state-local realignment of financial responsibilities for public safety, health, and social services programs. It will also face higher pension costs in future years if investment returns fall below its actuarial assumption of 7.5 percent per year, or if the County follows the lead of CalPERS and lowers its assumed rate of return.

Economic downturn is also a risk. Local government budgets are highly sensitive to changing economic conditions in California. A recession in the next few years would be accompanied by reduced local revenues, reduced subventions from the state (due to its own budget shortfalls) and rising costs for safety-net programs. As noted earlier, oil and gas revenues have been a stabilizing influence in past downturns, and we expect them to provide a cushion against future revenue downturns as well.

In summary, tax revenues attributable to the oil and gas industry represent an important source of discretionary funds available to local governments. The loss of these funds would have a significant impact on local budgets within the County, particularly if the economy were to slow.

¹⁸ Source: "Public Agency Actuarial Valuation Reports." California Public Employee Retirement System. <https://www.calpers.ca.gov/page/employers/actuarial-services/employer-contributions/public-agency-actuarial-valuation-reports>

¹⁹ County employees are covered by the Ventura County Employees' Retirement Association (VCERA) – a county pension system that is separate from CalPERS. See "Ventura County Employees' Retirement Association. Actuarial Valuation and Review as of June 30, 2016." <https://www.vcera.org/sites/main/files/file-attachments/actuarialvaluationjune302016.pdf>

²⁰ Source: "2017-18 Adopted Budget." County of Ventura, County Executive Office. http://vcportal.ventura.org/CEO/docs/publications/FY2017-18_Adopted_Budget.pdf

Economic Value of Ventura Oil Fields

Aside from the economic activity associated with annual production, the oil and gas reserves themselves represent a major source of wealth to Ventura County. The value of these reserves can be measured by estimating the present value of after-tax cash flows (i.e. annual revenues minus operational and investment costs) generated from all future extraction of oil from these reserves. The actual value depends on several factors, the most important of which is the future price of crude oil. To provide a reasonable range of potential values, we have performed calculations based on three price scenarios.

- A lower-end forecast that is consistent with the April 2017 projection made by the World Bank. Under this projection, crude oil prices (expressed in constant 2018 dollars) rise from then-current levels to \$59 per barrel in 2020. The oil prices remain stagnant thereafter, averaging \$60 per barrel in 2025, and just \$62 per barrel by 2030.
- A moderate-price forecast, which is an average of the EIA and World Bank projections. Under this forecast, crude oil prices (expressed in constant 2018 dollars) rise to \$66 per barrel in 2020, \$73 per barrel in 2025, and \$78 per barrel in 2030. (This forecast was used as the basis for our out-year projections of employment and tax revenues attributable to the oil and gas industry.)
- A high-end forecast, which is consistent with the EIA long-term projection made in January 2017. Under this projection, crude oil prices (expressed in constant 2018 dollars) rise from current levels to \$74 per barrel by 2020, \$86 per barrel by 2030, and \$94 per barrel by 2040.

As shown in Figure 15, we estimate that reserves would be worth \$650 million under the low-end oil price forecast, \$1.1 billion under the moderate price forecast, and \$1.6 billion under the high-end price forecast. In all cases, future local measures restricting or eliminating oil production would greatly diminish the value of these reserves. This would result in a major loss in employment and in wealth to mineral rights owners and producers in the County. It could also result in a major liability to the County if mineral rights owners and producers were to prevail in “takings” lawsuits.²¹ At a minimum the County would face millions of dollars in litigation costs defending against such lawsuits. If the plaintiffs were to prevail, the County would be required to pay the companies and owners of the mineral rights affected by the initiative the present value of the lost profits from the oil and gas that would no longer be recovered in these fields.

²¹ Under the “takings” theory, a county-imposed or voter-imposed ban on production would result in the “taking” by government of a valuable asset owned by oil companies and mineral rights owners. As compensation, the County would be required to pay the affected entities an amount equal to the present value of the lost profits from the oil and gas that would no longer be recovered from the Ventura County oil fields.

Figure 15
Estimated Value of Oil and Gas Fields in Ventura County Under Alternative Crude Oil Price Forecasts

Crude Oil Price Forecast	Present Value of Future Oil and Gas Production In Ventura County (\$ Millions)
Low (World Bank)	\$650
Average of World Bank and EIA	\$1,100
High (EIA)	\$1,600

Conclusion

Oil and gas production is an important source of high-paying jobs, economic activity, and tax revenues in Ventura County. The industry has an outsized positive effect on the County's economy and tax revenues, due to the considerable amount of payments by oil producers for employee and contractor wages, and other purchases of goods and services needed to maintain oil production. We expect these contributions to rise in future years as the oil market improves. Future measures that ban oil production in the County would be counterproductive, in that they would eliminate these economic- and tax-related benefits, increase statewide dependence on oil imports from remote sources (to the detriment of the environment and California's petroleum markets) and put the County at risk of major liability associated with "takings" lawsuits.