

Would Green Jobs Offset Oil Industry Job Losses Due to an Oil and Gas Production Ban?

This brief looks at the question of whether growth in “green jobs” in energy efficiency and renewable energy would be sufficient to offset the jobs lost by a shutdown in oil and gas production in Los Angeles County.

Summary

The oil and gas production industry is an important economic force in Los Angeles County (“County”), providing the region with \$2 billion in annual economic output, over 8,000 jobs, and \$205 million in state and local tax revenues. All these contributions would be eliminated by a ban on oil and gas production. Proponents of such a ban contend that the jobs lost will be replaced by an expansion in green jobs as the state and local governments mandate increasing reliance on renewable energy. Such a contention, however, ignores several important factors:

- **Green jobs pay less.** We estimate that pay rates in green jobs defined by federal and California agencies are, on average, 42 percent lower than in the oil and gas industry, with significant pay differentials existing across a range of occupations.¹ Working class families facing the elimination of oil-industry and allied construction jobs, many held by union members, would be particularly vulnerable to major reductions in pay and benefits, even after going through job retraining programs. The green “replacement” jobs may also be part-time or temporary, with less stability than industrial jobs in oil and natural gas production.
- **Many are in traditional sectors, not novel technologies.** While some green jobs are directly tied to advances in energy efficiency and renewable energy technologies, many others are reclassified jobs that have been in existence for many decades. These include jobs in sales, construction, transportation, product distribution and maintenance, as well as government agencies.

¹ Estimate based on the definition green industries advanced by the U.S. Bureau of Labor Statistics in September 2010 for data collection purposes. Using this definition, we calculated an average wage based on detailed employment and wage data by industry found in the *Quarterly Census of Employment and Wages* database maintained by the California Employment Development Department.

- **Even many green jobs would be negatively affected by a phase-out of oil production.** The fate of many of the reclassified jobs is principally tied to general economic conditions in the Los Angeles region. Green-new-deal policies phasing out the oil production industry and mandating a shift to more expensive and less-reliable renewable energy sources would damage the region's economy, and, ironically, depress jobs in many industries that have been reclassified as "green."
- **Green manufacturing unlikely to pick up the slack for blue collar workers.** In theory, blue-collar workers forced out of oil and gas production by government action could find work in subsidized green manufacturing jobs. In reality, however, the manufacturing sector has been losing jobs steadily in Los Angeles County for over three decades due to high costs, taxes and constantly changing regulatory requirements. This downward trend would likely intensify under expanded renewable energy mandates due to higher costs for energy and reliability challenges.² In fact, there is a significant concern that California's trend of increasing reliance on imported manufactured goods will accelerate in a green economy.

Given these factors, it is unlikely that growth in green jobs would replace either the quantity or quality of oil and gas industry jobs, or the overall economic contribution lost through a ban on oil and gas production in the County. Instead, such a ban would have a serious, regressive impact on career opportunities for industrial workers, particularly those without a college degree.

It is important for Los Angeles to continue to diversify its energy sources and production in the coming years. Diversification will have numerous benefits related to resource preservation, improved energy affordability and reliability, and expanded employment opportunities in both traditional and renewable energy. Investing in green jobs is thus an important part of strengthening California. However, this should not be done through arbitrary government mandates that eliminate and export traditional energy jobs.

Oil and Gas Production Industry in Los Angeles County

The oil and gas production industry is a major economic force in Los Angeles County. Combined onshore and offshore oil production in the County was 20 million barrels in 2017, accounting for about 11 percent of the statewide total. As indicated in Figure 1, the industry supports \$2 billion in annual economic output, over 8,000 jobs, and \$205 million in state and local tax revenues in the County. This includes almost \$90 million in local property taxes on oil reserves, sales taxes on oil industry purchases, and other taxes and fees that directly support police, fire, education, and other vital services in the community.³

The industry provides high-paying jobs to workers with a wide range of education, experience, and technical skills. Equally important, it provides a reliable source of crude oil that is critical to the operation of local refineries and California's economy as a whole. Revenues from oil and gas sales are plowed back into the local economy as companies invest in developing their reserves to replace the

² A recent study by Schneider Electric and Navigant Research noted that "California ... has ranked first in blackouts for nine years in a row." (Daily Energy Insider, May 17, 2019). Major utilities have recently announced plans to significantly increase prophylactic electricity outages during high winds to prevent wildfires and have requested substantial rate increases to make electric transmission less susceptible to causing wildfires.

³ Estimates in this section are based on "Economic and Fiscal Effects of Set-Back Requirement on the Oil and Gas Industry in Los Angeles." Capitol Matrix Consulting. March 2018. Job and labor income totals include employees of establishments as well as self-employed independent contractors.

barrels of oil they produce. These investments further add to jobs, income, and economic activity in the Los Angeles region. All of these contributions to the Los Angeles economy would be eliminated by a phase-out of oil production.

Figure 1

CMC Estimates: Key Contributions of the Oil and Gas Industry in Los Angeles County

Oil Production	20 million barrels
Total Output	\$2.1 billion
Employment (direct and multiplier effects)	8,325 jobs
Labor Income (direct and multiplier effects)	\$713 million
State and Local Taxes (direct and multiplier effects)	\$205 million

Could Green Jobs Replace Those Lost Due to a Phase Out of Oil and Gas Production?

Proponents of an oil and gas production ban assert that the losses would be replaced by jobs of similar quality due to an expansion of green industries and jobs as the state and local governments mandate increasing reliance on renewable energy. In fact, Mayor Garcetti's Green New Deal, released on April 29, 2019, sets a goal of 300,000 green jobs by 2035, and 400,000 green jobs by 2050.⁴

We believe such claims are highly questionable for two key reasons: (1) they do not accurately reflect the quality of replacement jobs in terms of pay, benefits, and whether they are full- or part time; and (2) they do not take into account the negative economic impacts of (a) a phaseout of oil and gas production, and (b) a mandated shift to more expensive and less reliable energy sources.

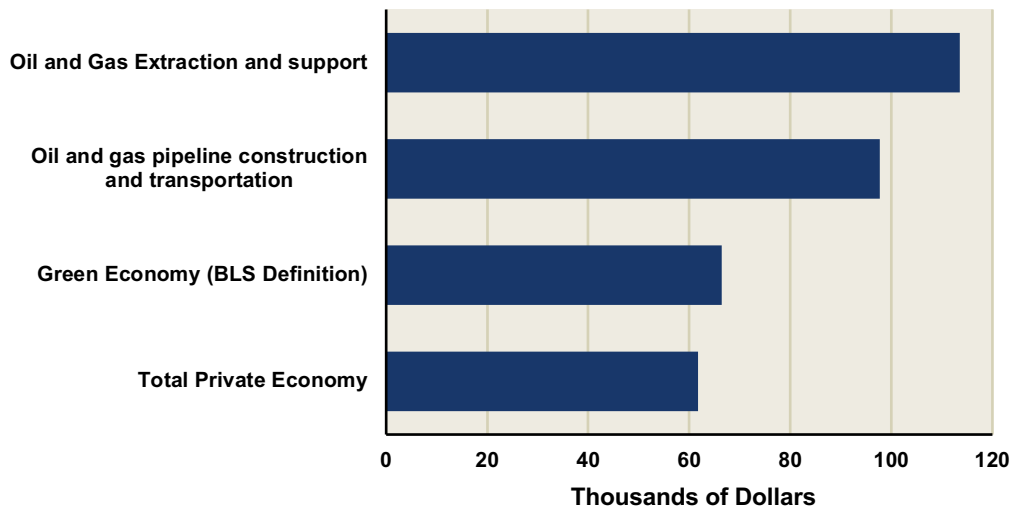
Characteristics of Green Jobs

Relative pay levels. While green industries include certain high-paying occupations such as engineering, environmental science, computer programming, and software system design, the overall average pay is well below that of the oil and gas production industry. Based on the wages for industries covered by the BLS survey, we estimate that average wages for all green jobs in Los Angeles County is around \$66,000 (see Figure 2) per annum. This is slightly above the County economy-wide average, but 42 percent less than the \$113,000 per year average for the oil and gas production industry. It is also one-third lower than the \$99,000 per year average in the oil and gas pipeline construction and transportation industries (which would also be impacted by an oil production ban).⁵

⁴ "L.A.'s Green New Deal, Sustainable City pLAn, 2019," Office of Mayor Garcetti. April 29, 2019.

⁵ Estimates of industry averages are based on 2017 establishment data on employees and wages from the *Quarterly Census of Employees and Wages*, California Employment Development Department.

Figure 2
Relative Pay, Oil and Gas Production Versus Green Industry Jobs
Los Angeles County, 2017



A more detailed perspective on relative pay in Los Angeles County can be found by comparing oil industry and green industry occupations using data from the EDD Occupational Employment Statistics and Wages program.⁶ As with the industry-wide averages, average wages in the County for specific occupations are considerably higher in the oil and gas production industry than in green industries.

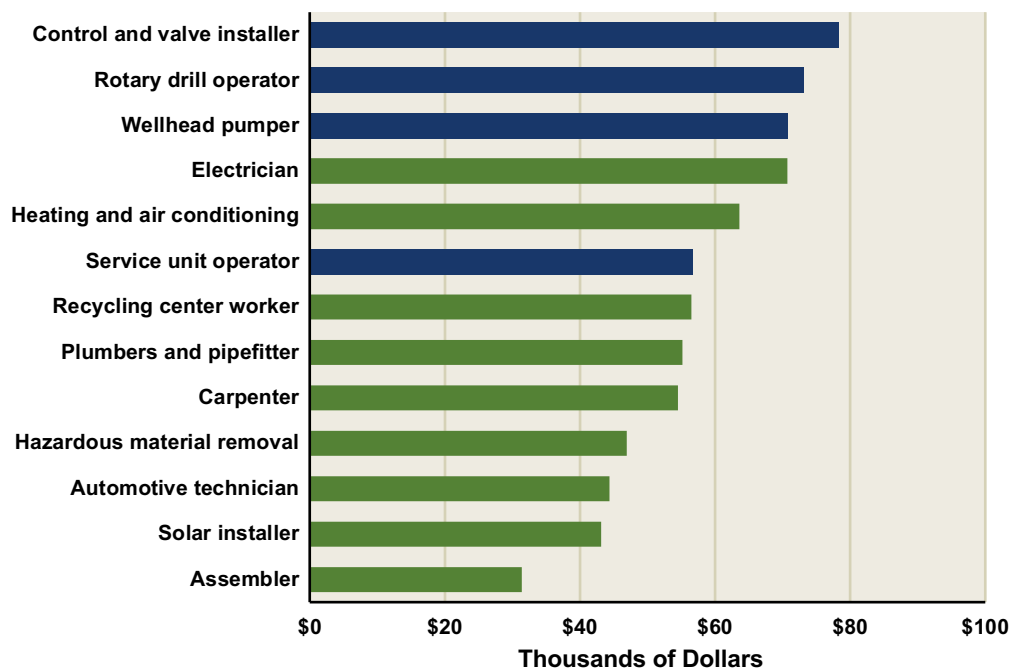
The difference is apparent in the professional ranks, where a typical petroleum engineer is paid \$136,000, compared to \$110,000 for civil engineers and \$103,000 for environmental engineers. It is even more significant in blue-collar occupations requiring high school degrees and technical training. As indicated in Figure 3, key oil-related technical occupations such as control and valve installers, rotary drill operators, and wellhead pumpers pay close to \$80,000 per year plus benefits. This compares to \$43,000 for solar photovoltaic installers, \$44,000 for automotive technicians, \$46,000 for hazardous materials removal jobs, and \$56,000 for recycling centers jobs. The one construction occupation paying close to oil and gas field jobs is electricians, who earn an average of \$71,000 per year. It should be noted that electricians working in the oil and gas production industry are paid at the same rate.

These major pay differences highlight that working families facing the elimination of oil-industry jobs would be vulnerable to major reductions in pay and benefits, even after going through job retraining programs.⁷

⁶ The “green” occupations chosen for these comparisons are based primarily on Figure 17, Top GREEN Occupations, in “California’s Green Economy, Summary of Survey Results.” Prepared by State of California, Employment Development Department, Labor Market Information Division. October 2010. The average wages are based on 2018 Occupational Employment Statistics (OES). <https://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html>

⁷ Retraining programs have come under increasing scrutiny for questionable results. See, e.g., “In Coal Country, a Promise of Computer Careers Dissolves in Dust” New York Times, page A1, May 12, 2019), reprinted at <https://www.nytimes.com/2019/05/12/us/mined-minds-west-virginia-coding.html>.

Figure 3
Average Pay of Key Occupations in Oil and Gas Production and Green Industries, 2017



In addition to the consideration of wages and benefits, evaluations of proposals to force workers out of local oil and gas production and into green “replacement” jobs must take into account whether those green jobs would be part- or full-time, and temporary or permanent. Many local jobs in oil and gas production provide stable, long-term careers, often for union members.⁸

Current number of green jobs. Although seemingly a straightforward issue, there is little agreement on exactly how large the green industry is. Official government industry classifications, such as the North American Industry Classification System, do not include estimates of green output, income or jobs. In most cases green businesses and employees are included within broader industry classifications. As examples, a solar installation firm is part of an industry labeled as “building equipment contractors”; an engineering firm developing a building temperature control system is classified as “engineering services”; and a company that repairs an electric, hybrid or fuel cell car is classified as “automotive repair.”

⁸ As one indicator of full-time versus part time jobs, average hours worked in the oil and gas industry (including overtime) averaged 43 hours per week in the first quarter of 2019. This compared to 34 hours in the total private sector, 41 hours in the manufacturing industry, 39 hours in the construction industry, 34 hours in the combined trade, transportation, and utilities industry, and 36 hours in the professional and business services industry.

Federal and California Definitions of Green Jobs

The federal and California governments have broadly defined “green jobs” in a way that captures a large number of workers in a variety of traditional private industry sectors as well as the public sector. The broadest definition was advanced by the U.S. Bureau of Labor Statistics in September 2010 for data collection purposes and includes either: (1) jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources; or (2) jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.⁹

The Energy Independence and Security Act of 2007 included as Title X the Green Jobs Act, 29 U.S.C. Section 2801, which created an energy efficiency and renewable energy worker training program in the following industries: the energy-efficient building, construction and retrofit industries; the renewable electric power industry; the energy efficient and advanced drive train vehicle industry; the biofuels industry; the deconstruction and materials use industries; the energy efficiency assessment industry; and manufacturers that produce sustainable products using environmentally sustainable processes and materials.¹⁰

To implement the subsidies under the federal Green Jobs Act, California's Economic Development Department in 2010 recategorized the above jobs into the following categories (designated by a “GREEN” acronym): **g**enerating and storing renewable energy; **r**ecycling existing materials; **e**nergy efficient product manufacturing, distribution, construction, installation, and maintenance; **e**ducation, compliance, and awareness; and **n**atural and sustainable product manufacturing.¹¹

Given the lack of specific information in government statistics, estimates of green industries and jobs have been based on supplemental surveys of businesses. The surveys differ substantially in terms of specific approaches and criteria used, and thus have arrived at a wide range of estimates (see Figure 4). For example:

- The Advanced Energy Economy (“AEE”), an advocacy group for alternative energy technologies, asserts that there were about 542,000 such California jobs in 2018.¹²
- The *Green Jobs Initiative Survey* undertaken by the U.S. Bureau of Labor Statistics (BLS) estimated that there were 268,000 California green jobs in California's private sector in 2011, and a total of 360,00 when government jobs were included. Adjusting for industry growth in the intervening years, we estimate the BLS estimate could translate into about 385,000 private sector jobs today.¹³

⁹ Department of Labor, Bureau of Labor Statistics, Notice of comments received and final definition of green jobs. 75 Federal Register No. 182, pages 57506 and 5711 (September 21, 2010).

¹⁰ 29 U.S.C. Section 2916(e)(1).

¹¹ California's Green Economy – Summary of Survey Results, State Employment Development Department, Labor Market Information Division, October 2010, pages 7 & 11.

¹² “California's Advanced Energy Jobs Fact Sheet.” Advanced Energy Economy. August 2018.

¹³ “Measuring Green Jobs.” U.S. Bureau of Labor Statistics. <https://www.bls.gov/green/#overview>

- In their *Sizing the Clean Economy* project, the Brookings Institution estimated that in 2010 there were about 318,000 green jobs in California, and about 90,000 in the Los Angeles, Long-Beach, and Santa Ana Metropolitan Area (which consists of Los Angeles and Orange Counties).¹⁴ The green definitions used in this survey were consistent with those developed by BLS.
- A study conducted in 2009 and 2010 by the California Employment Development Department Green Collar Jobs Council survey found a range of 263,000 workers who spend at least 50 percent of their time on green-related activities to 432,000 workers who spend any time on green-related activities.¹⁵
- A study conducted in 2018 by the California Business Roundtable estimated that there were a 318,000 green jobs in California during 2016 – but only 171,000 if reclassified jobs are excluded.¹⁶

Figure 4
Summary of Green Job Estimates

Organization	Year	Statewide Amount	Los Angeles Amount
Advanced Energy Economy	2018	540,000	102,000
U.S. BLS Green Jobs Initiative	2011	268,000 private sector; 360,245 total	NA
CA EDD Green Collar Jobs Council	2010	263,000 to 432,000	NA
The Brookings Institution	2010	318,000	90,000*
California Business Roundtable	2016	316,000; 171,000 excluding reclassified	NA

* Los Angeles, Long Beach, Santa Ana Metropolitan Area, which includes Los Angeles and Orange Counties.

There are major differences among estimates even within subgroups of employment. For example, AEE estimated that there were 112,000 workers involved in solar production, distribution, installation, and repair in 2015. This is 36,000 more than the Solar Foundation estimates for the same year.

Based on our review of individual industries containing green occupations at the state and Los Angeles County level, the number of green jobs in Los Angeles County corresponding to the expansive statewide estimates cited above is roughly 50,000 to 100,000 jobs. Using the business roundtable statewide estimate of jobs that have not been reclassified, the Los Angeles County total would be considerably less, in the range of 35,000.

Many green jobs are in traditional sectors, not novel technologies. An important issue brought to the forefront by the Business Roundtable estimate is that most green job estimates use an expansive definition of green jobs. They include many jobs that are only incidentally related to energy efficiency

¹⁴ "Sizing the Clean Economy. A National and Regional Green Jobs Assessment." Metropolitan Policy Program at Brookings. 2011. https://www.brookings.edu/wp-content/uploads/2016/07/0713_clean_economy.pdf

¹⁵ "Green Analysis of Occupations and Industries." California Employment Development Department. https://www.labormarketinfo.edd.ca.gov/Green/Green_Analyses_Occupations_Industries.html

¹⁶ "California Green Jobs. An Updated Review: Phase I Estimates." California Business Roundtable, May 2018. <https://centerforjobs.org/wp-content/uploads/Green-Jobs-2018.pdf>

and renewable energy generation, and thus are not really part of a newly emerging energy technology sector that could produce and sustain new jobs.

To be sure, some jobs are involved in research, development, and installation of novel energy technology. However, many more jobs are labeled as “green” even though they have been a part of the economy for decades.¹⁷ This group includes tens of thousands of jobs – some full time, some part time – in retail trade, construction, government and even leisure and hospitality industries, that are classified as “green” because they are involved with products that meet energy-efficiency guidelines or have some other resource-saving or emissions-reduction attribute. We estimate that roughly two-thirds of green jobs identified by the BLS classifications fall into the category of traditional jobs that have been tagged as “green.”

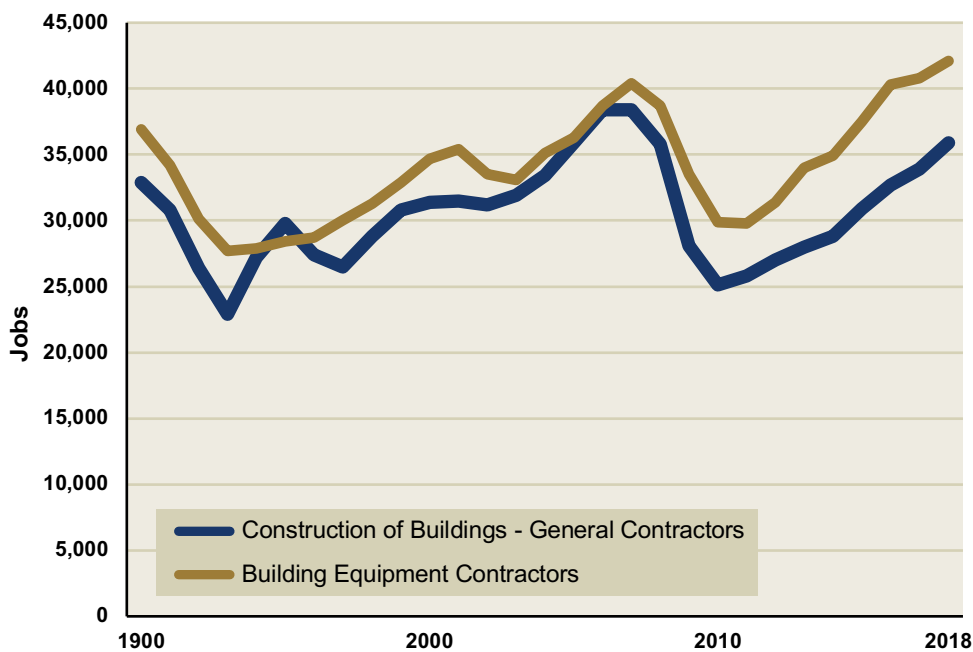
Workers in these jobs may use energy-efficient products or otherwise focus on environmental stewardship. However, their principal objective is to provide a product or service that has been in demand for decades. As examples, an automotive technician may now be working on hybrid cars, but the job primarily exists because automotive parts of all types wear out; a city planner may now be focused on high-density, transit-oriented housing projects, but the job fundamentally involves developing and reviewing land-use plans to accommodate population growth or revitalization of urban regions; or an appliance installer may be installing an oven that has an Energy-Star rating, but the installation itself is likely due to the completion of a newly constructed home or the replacement of a worn out appliance. Even manufacturing jobs related to the assembly of energy-efficient computers primarily exist to fulfill demand for computers with greater computing and storage capacity, and much of this manufacturing and assembly is performed outside of California.

Implications. While it may be appropriate to broadly define green jobs for some purposes, it is also important to recognize that many jobs captured in these broad definitions are only tangentially related to novel energy technologies. The outlook for most of these jobs is primarily determined by the strength or weakness in the region’s broader economy.

One example is the “building equipment contractors,” a NAICS industry category that includes installation of solar systems and energy efficient heating and air conditioning systems. It is a leading green sector in all surveys cited previously in Figure 4. As shown in Figure 5, the job totals in this category have closely followed the ups and downs in new construction activity in the County (as measured by the number of jobs in the “construction of buildings” industry, which consists of general contractors primarily engaged in the building of new residential, commercial, and industrial structures).

¹⁷ Examples of “reclassified” green jobs in the BLS survey include: farmers that produce certified organic fruits, vegetables, or dairy products; school bus drivers; employees of railroads and interstate bus companies, which are included because they save resources through mass transit; demolition contractors; employees in thrift shops and other establishments that sell used merchandise; employees in stores that sell energy-efficient light bulbs, organic food, and Energy Star certified TVs or computers; drivers of trucks that use biofuels or flex fuels; employees in car rental facilities that rent hybrid cars; mechanics in automotive transmission and exhaust repair shops that work on hybrids; workers in tire dealers that sell retreads; roofing and flooring contractors that use LEED-eligible tiles; workers in pulp mills that used recycled materials; and assemblers in computer and electronic industries that use energy-efficient semiconductors and displays.

Figure 5
Green Construction Versus General Contractor Employment



Recent Trends and Outlook. Given the linkage of many green jobs to the overall economy, a primary determinant of growth in those jobs is the broader economic outlook for the region. Over the past decade, the economy in Los Angeles County has experienced moderate economic growth, trailing the overall California economy by a significant margin, with a continued shift away from manufacturing to lower-wage service jobs. Cumulative job growth for all industries in Los Angeles County was 7.0 percent between 2008 and 2018, compared to the statewide average of 12.2 percent.

Economic forecasts generally anticipate a slowdown in economic growth in all of California over the next several years.¹⁸ This would imply a restrained outlook for Los Angeles County.

Negative Impacts of Green New Deal on Overall Economic Growth

In an economic growth environment that is already restrained, a ban on oil production and the consequent loss of industry jobs, many involving union members, could take a significant toll on future job growth. A similar shock would come from policies requiring a rapid shift toward more expensive and less reliable renewable energy sources. While such a shift may produce job gains in specific green businesses, the overall effect would be negative. The higher renewable energy costs would increase costs for food, water and a wide range of goods and services and depress spending on other products

¹⁸ For example, in its May 2019 survey, the Western Blue Chip, which is a monthly survey of top forecasters in western U.S. states, indicates that the average forecast of wage and salary employment growth is 1.7 percent in 2019, dropping to 1.3 percent in 2020. <http://seidmaninstitute.com/western-blue-chip/>

and services in the region, including those provided by companies classified as “green” under the expansive definitions cited above.

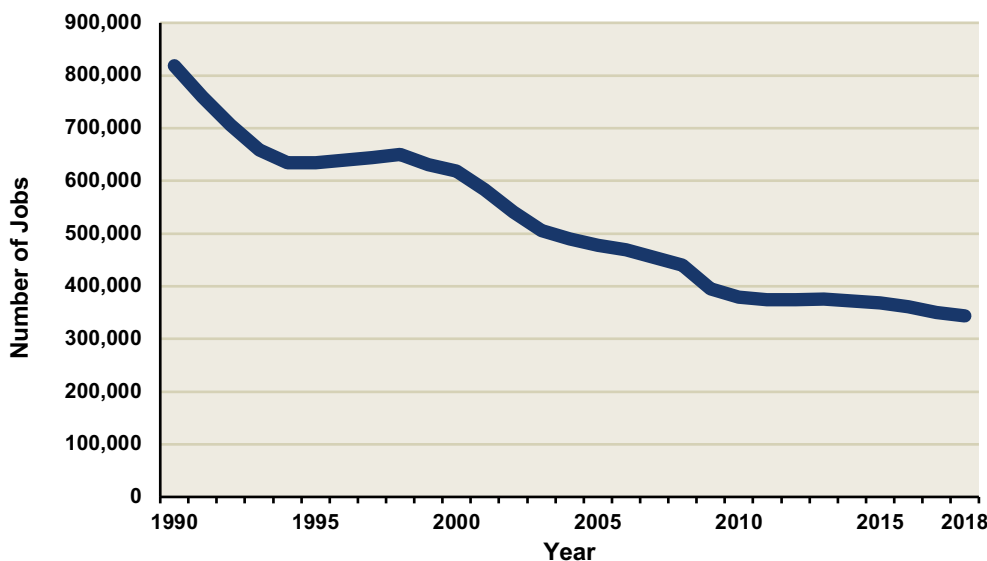
Specific effects on green manufacturing. Another key determinant of job growth in green industries is the likelihood that manufacturers and certain professional service firms will locate their operations in Los Angeles and “export” their products and services to broader regional, national, or even international markets. Some of the companies offer specialized technical services in areas such as environmental engineering, software design, or scientific research. Given California’s history for technological innovation and creativity, we hope these specialized businesses will continue locating in California – creating job growth both statewide and in Los Angeles County. This growth would, in turn, create job opportunities for engineers, scientists, software designers, and others in professional occupations requiring specialized green experience and training.

Again, these professional occupations account for a relatively small share of total green jobs. And within this group, the skill sets of petroleum engineers, geoscientists and other employees in specialized fields would not be directly transferable to green occupations. Thus, even if growth in professional green jobs was sufficient to offset the *number* of jobs lost by oil industry engineers and related professional-services employees, a shutdown in oil production would still create structural unemployment and related dislocations for many highly trained oil industry specialists in the region.

The outlook for oil industry workers with less than professional or four-year college degrees would be even more problematic. In theory, the growth in green manufacturing jobs could offset the loss in blue-collar oil production jobs caused by a ban. This is because manufacturing is targeted by local officials as a key green industry sector, and it is one of the few industries outside of oil and gas production that provides high-paying blue-collar jobs to workers with high-school and technical training.

However, a sudden expansion in manufacturing jobs in Los Angeles County seems highly unlikely in view of the persistent job declines that have been occurring in this sector for more than three decades (see Figure 6). Reasons cited for the declines include high costs, taxes and constantly-changing regulatory requirements that thwart investments in California for manufacturing operations (as well as technical support, call centers and corporate headquarters). There is a significant concern that Los Angeles’ trend of increasing reliance on imported manufactured goods will intensify in a green economy, due to the impact of higher energy costs and lower reliability if the region becomes wholly reliant on renewable energy.

Figure 6
Manufacturing Jobs in Los Angeles County



Conclusion

A phase-out of the oil and gas production industry in Los Angeles would have major negative impacts on the Los Angeles County economy. It would eliminate over 8,000 jobs, \$2.1 billion in economic output, and \$205 million in taxes paid to state and local governments. It would also eliminate 20 million barrels of reliable crude oil supplies to California refineries and, ultimately, the state's consumers, making California more dependent on oil imports from remote foreign sources, thereby increasing global emissions.

An objective review of publicly available data validates that green jobs would not replace the quality or quantity of the jobs lost as a result of an oil production shutdown. On the whole, green jobs pay less and are less likely to be full time, particularly in occupations requiring less than college degrees. In many cases, green jobs found in construction, transportation, wholesale and retail trade, and maintenance industries are jobs that have been in existence for decades and are highly dependent on the general conditions of the local economy. A phase-out of oil and gas production would weaken the economy, and the higher costs and reliability concerns of renewable mandates would raise prices paid by businesses and consumers for energy and make the region less competitive overall. In short, such policies would have a lasting and regressive impact on working families in the region.

Continued diversification of Los Angeles County's energy portfolio will have numerous benefits for the region, in terms of energy affordability and reliability, and expanded employment opportunities in both traditional and renewable energy. Investing in green jobs is thus an important part of strengthening all of California, including the Los Angeles region. However, this should not be done through arbitrary government mandates that eliminate and export traditional energy jobs.