A New California Oil Boom?
Drilling the Monterey Shale

Part 5: Too Big to Believe: Top Economists Doubt California Oil Industry's Jobs Figures

Robert Collier

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Next Generation

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Editor's note: This is Part 5 in our series on the Monterey Shale. In Part 1, Next Generation researcher Robert Collier outlined the technical challenges of developing the Monterey Shale oil field – and how a technique known as "matrix acidizing" may be the key to its development. In Part 2 we explored the risks of widespread HF use, and in Part 3 and Part 4 we took a look at the potential impacts of Monterey Shale development on California's emissions goals.

Is California Really Like North Dakota?

The oil industry has been inflating its projections of jobs that could be created by a potential new California oil boom, according to independent economists who have reviewed the industry's research and who say the state should cast a more skeptical eye on claims of a potential new oil boom in the Monterey Shale.

These economists' view is bolstered by a little-publicized study from a top oil research firm that found little likelihood of a resurgence in oil production in California over the next one to two decades.

Up until now, the runaway growth of shale oil and gas production in North Dakota, Texas and Pennsylvania have led some analysts to predict that California's shale oil deposits, estimated to be the nation's largest, could spawn a gusher of economic growth.

The oil industry has helped promote this vision, predicting millions of new jobs, a statewide boost in personal income as well as billions of dollars in tax revenues for the state and local governments.

The most optimistic – and most widely publicized – of the economic projections are contained in a study published by researchers at the University of Southern California, and funded by the state's main oil lobbying group. Several leading California economists have criticized the study's methodology, baseline data and conclusions as "unreliable."

The USC study implicitly assumes a rapid rate of oil production growth. However, oil company engineers and geologists have not yet cracked the complex code of California's shale deposits, and large-scale production there has not yet begun. If and when they do figure out how to extract the oil, the pace of growth is uncertain.

> "The numbers seem too large to be believable"
> —Jerry Nickelsburg

In addition, a December 2012 study by IHS CERA, a leading consulting firm to the oil and gas industry, came to markedly different conclusions from the USC study, predicting that the Monterey Shale's promise will remain a mirage and will generate only minor economic benefit over the next two decades.

These rival forecasts seem likely to continue their role as political fodder in important policy battles. In 2014, the state will draw up new rules under a recently enacted law for oil regulations, SB4; further regulations may be discussed, and the issue could also be a factor in the statewide November election.

Predictions of an epic boom

The state's emerging debate over how to regulate the oil industry was jolted in March 2013, when USC's Price School of Public Policy and Global Energy Network issued "Powering California: the Monterey Shale and California's Economic Future." The study was funded by the Western States Petroleum Association (WSPA), which represents the state's major oil producing and refining companies, and its conclusions were attention-grabbing.

Meet the experts: Economists review the USC study

- Jerry Nickelsburg, Senior Economist at UCLA Anderson Forecast, the most oft cited of all economic forecasting agencies in California. Nickelsburg oversees economic modeling and forecasting for the United States, California, and the Los Angeles, Bay Area and Southern California regions.

- Olivier Deschenes, Associate Professor of Economics at UC Santa Barbara and Research Associate at the National Bureau of Economic Research. His work includes extensive published research on the economic impacts of climate change.

- Jesse Rothstein, Associate Professor at UC Berkeley's Goldman School of Public Policy and Department of Economics. Rothstein, a former chief economist of the U.S. Labor Department, has published often on labor markets.

- Carol Zabin, Research Director of the UC Berkeley Center for Labor Research and Education. Zabin is a labor economist whose research focuses on the impact of climate change legislation and the green economy on California's economy and workforce.

- Manuel Pastor, Professor of Sociology at University of Southern California. Pastor, an economist, has focused his research on economic development of low-income urban communities.

Each of the economists said the study's findings were unreliable and inflated. They cast doubt on its methodology, which did not base its estimates on any projections for oil production or capital investment in California oil; instead, the study's authors said they extrapolated from the effects of economic growth in North Dakota, South Dakota and Wyoming.

The study predicted an epic oil boom in the Monterey Shale, with the following results:

- An increase of 512,000 net new jobs by 2015 and 2.8 million net new jobs by 2020, linked directly and indirectly to oil production.

- Growth in per-capita GDP of 2.6 percent by 2015 and 14.3 percent by 2020.

- State and local government tax collections grow by $4.5 billion in 2015 to $24.6 billion in 2020, the equivalent of 2.1 percent and 10.0 percent growth, respectively.

Catharine Reheis-Boyd, president of WSPA, announced the study's conclusions as "a game-changing economic opportunity that California can't afford to ignore." Later in the same day as the study's release, Gov. Jerry Brown echoed the same note, saying, "The fossil fuel deposits in California are incredible, the potential is extraordinary."

In the months of legislative debate that followed, the USC report was repeatedly cited in the Legislature, with backers calling it evidence of the Monterey Shale's "magnificent potential for jobs."

But despite the report's broad influence, no independent analysis of its economic assumptions and methodology has been published to date.[1] Several leading academic economists who reviewed the study were puzzled by its findings, and baffled by its methodology.

Unrealistic scenarios

"The numbers seem too large to be believable," said Jerry Nickelsburg of UCLA Anderson Forecast,[2] the state's primary economic forecasting institution.

Nickelsburg noted several factors that undermine the USC report's methodology. First, he noted that the total direct employment of California's upstream and midstream sectors was 21,244 as of

2009.[3] Second, by using conventionally accepted "multipliers" for calculating indirect and induced employment – that is, jobs created in other sectors by the trickle-down effect from oilfield workers and company spending – the total direct, indirect and induced employment for California's upstream and midstream sectors is "probably no more than" 100,000.

The most recent analysis of total oil and gas industry employment in California, conducted in July 2013 by PricewaterhouseCoopers and commissioned by the American Petroleum Institute, estimated that the industry employed nearly 800,000 Californians. But the economists consulted by Next Generation said that using that number as a baseline for future job growth in a boom scenario is problematic because it includes the natural gas industry, which would not be included in any oil boom in the Monterey Shale, and also includes employment in downstream sectors such as refineries and gas stations, which are unlikely to grow in any oil boom scenario.[4]

Using even the PricewaterhouseCoopers estimate, however, USC's projections would require truly astronomical growth.

The study's scenario of 2.8 million net new jobs by 2020 represents a mean value between its low and high growth scenarios of 1,206,700 jobs and 4,425,000 jobs, respectively.

"What kind of growth rate do you need to get from there to 2.8 million jobs?" Nickelsburg asked. "This leads one to question what's really going on in this study."

The study cited its low-growth scenario as "the most conservative path, which involves what we call the "North Dakota scenario." " The study states:

> *We conducted analysis for California as well as three oil boom states: North Dakota, Wyoming and South Dakota. These three states have recently experienced the effects of a significant oil drilling boom.*

As mentioned above, any state-to-state modeling is problematic because the publicly available employment data includes apples-to-oranges dissimilarities, including sectors that are unlikely to grow in any conceivable expansion of California oil output. Even so, the gap between the USC projections and historical trends is notable.

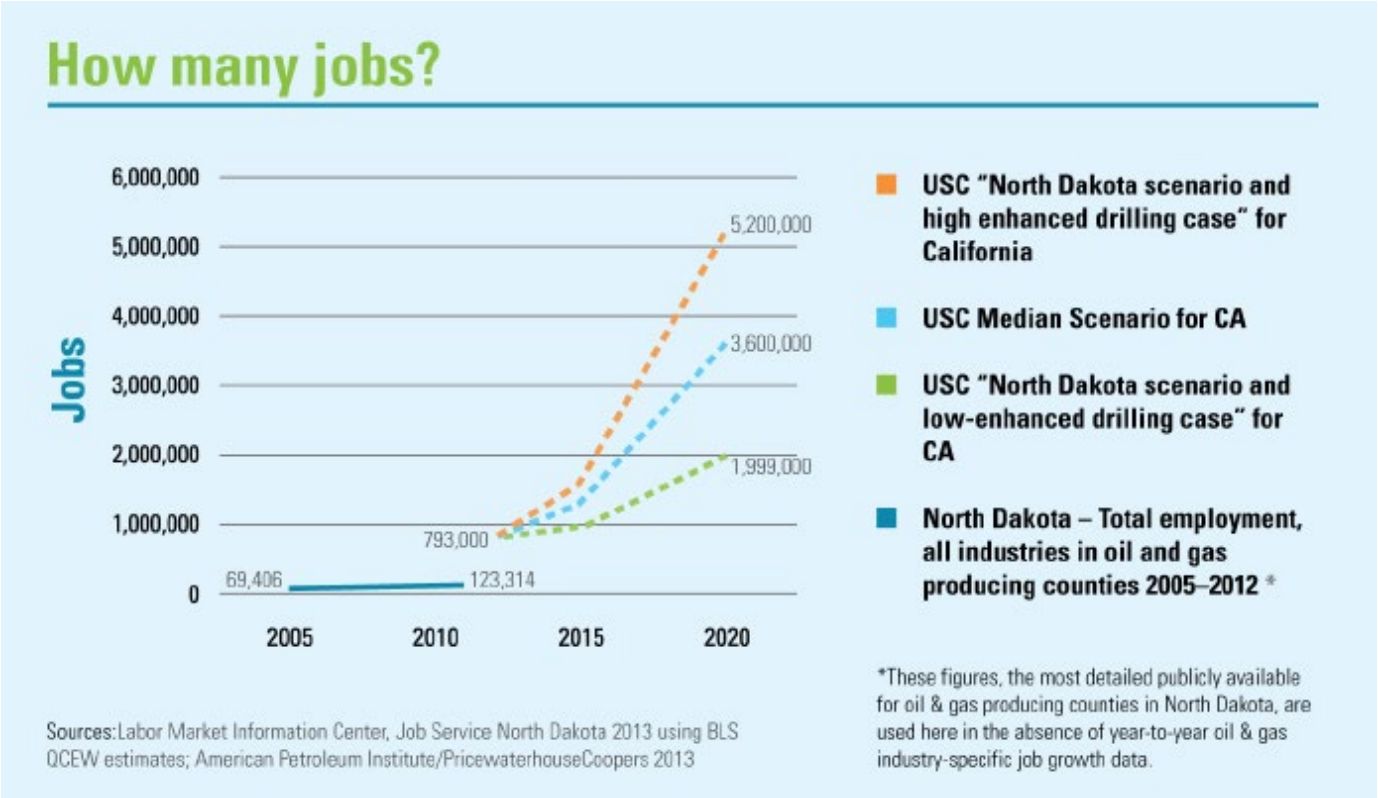
North Dakota experienced a 78 percent increase in total employment for all industries in oil and gas producing counties from 2005–2012. In contrast, USC's median scenario projection would mean a 350 percent increase in oil and gas employment (direct, indirect and induced) from 2011–2020, and its "high-enhanced drilling" scenario would mean a 558 percent increase over the same period.

How do multipliers calculate job creation?

In assessing the economic impact of any industry, economists of all stripes use "multipliers" to determine direct, indirect and induced effects. In the case of California's oil industry:

- Direct effects result from production in the oil and gas sector itself.
- Indirect contributions result from the broader supply chain of firms supporting production.
- Induced effects result when employees of all these firms spend their incomes on consumer goods, ranging from food and clothing to medical services.

Most economists use the IMPLAN system of multipliers, which vary by sector depending on how much contracting they do locally and other factors. For example, oil refineries have an employment multiplier of 9.0343, which means that every job created directly in that sector creates 8.0343 jobs in other businesses and industries. Oil and gas drilling has a multiplier of 3.8605, while gasoline stations have a multiplier of only 1.6961.



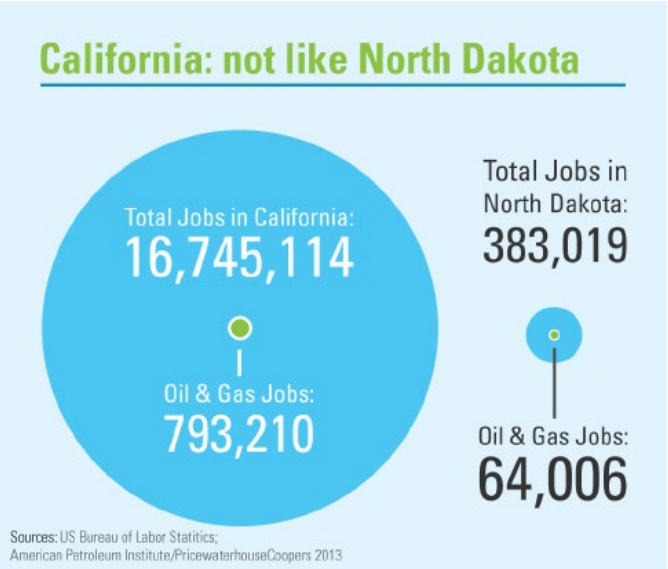
The economists who reviewed the USC study said North Dakota is not a legitimate basis of comparison for macroeconomic projections for California, no matter what the scenario. North Dakota has a population of 700,000 people, with a small, agriculture-based economy that was proportionately overwhelmed by the state's recent oil boom. California has 38 million people and a huge, complex economy, of which the state's oil industry represents only a tiny fraction.

The differences compound from there: North Dakota's oil industry began its relatively fast growth rate from a very low baseline – only about 100,000 barrels per day as recently as 2006, thus statistically exaggerating its percent rate of increase to over 800,000 barrels per day currently – while California is already the nation's third largest oil producer. Using North Dakota's explosive growth as an analog to California's potential therefore exaggerates the impact a new oil boom could have on the California economy.

"This report's methods are not credible," said Jesse Rothstein of UC Berkeley, a specialist in labor market economics.[5] "It assumes that a 10 percent increase in oil and gas production in California would have the same proportional effect on the state's highly diversified economy as would a similarly sized increase in North Dakota, where the economy is much more heavily concentrated in the fossil fuel extraction sector."

A more fundamental problem with the USC study, the economists pointed out, is that its high growth scenario appears to have no factual basis. According to oil production data from the U.S. Energy Information Administration, South Dakota and Wyoming have experienced nothing resembling an oil boom. South Dakota oil production increased from 4,024 barrels per day in 2005 to 4,805 barrels per day in 2012 – a 3 percent annual increase and close to the state's trend over recent decades. Wyoming's oil production grew during that period from 141,838 barrels per day to 158,123 barrels per day – a 1.8 percent annual increase. Over the past three decades, Wyoming's production has decreased by more than 50 percent overall.

Peter Gordon, the primary co-author of the USC study's economic projection, offered the following explanation for the inclusion of references to South Dakota and Wyoming:



> *Ours is a standard time series model. We analyze California trends with two tweaks: 1. New oil drilling forecasts from EIA; 2. A new California GDP-to-drilling relationship. We took this one from the North Dakota experience to 2010, the early part of their boom and the most conservative of the oil boom states we evaluated. 3. Our baseline for California was a trend extrapolation of California GDP growth. It is as simple as that. Given our time and budget constraints, this is all we could do.*[6]

Other experts who reviewed the USC study were puzzled by Gordon's response.

"As others have mentioned, the methodology is not transparent," said Olivier Deschenes of UC Santa Barbara, a specialist in econometrics and labor markets.[7] "I did not understand the methodology for the employment impacts."

Deschenes particularly questioned the study's macroeconomic analysis and modeling. "I spent two hours reading Chapter 3 and I continue to have a hard time understanding how the numbers in the tables are computed."

Next in the series: Keep Your Story Straight: Other Reports at Odds with USC

Notes

[1] A very useful critique of oilfield production scenarios, including those related to the USC report, is contained in a December 2013 report by J. David Hughes for the Post Carbon Institute and Physicians Scientists & Engineers for Healthy Energy. Drilling California: A Reality Check on the Monterey Shale, available at www.postcarbon.org/reports/Drilling-California_FINAL.pdf

[2] Telephone interview, July 29, 2013

[3] "Assessment of Petroleum Industry Economic Impact to the State of California," Purvin & Gertz, 2011. Available here.

[4] According to the economists consulted by Next Generation, the downstream sector, which comprises refineries, petrochemicals, wholesale and retail, is likely to remain unaffected by a boom in oil production in the Monterey Shale, for several reasons: A) As noted in Part 4 of our series, the state's 18 oil refineries have a total capacity of about 2 million barrels per day, of which California's current oil production supplies only about one-quarter, thus giving the state much excess capacity to absorb local production without building new refineries; B) given the state's political and regulatory climate, companies would find it extremely difficult to get regulatory approval to build new refinery capacity, as shown by Chevron's recent difficulties in trying to expand its Richmond refinery; C) federal law imposes a virtual ban on exports of crude oil to other nations; D) California has no significant pipelines that could be used for shipping to other U.S. states; E) California's retail gasoline prices are highly unlikely to be depressed by local fuel supply, just as the glut of crude in Cushing, Oklahoma, has not seriously affected gas prices elsewhere in the nation; F) California drivers are not going to drive more miles or buy more gas-guzzling cars just because their gasoline and diesel is locally pumped rather than being an import from Saudi Arabia or Ecuador; G) While roughly 50 percent of California's total refinery capacity is for production of gasoline, the rest is for diesel, aviation and bunker fuels, chemicals, asphalt and other products, none of which are likely to sell more just because the petroleum from which they are sourced is locally produced; H) California's exports of refined petroleum products, including petrochemicals, have fluctuated since the 1980s with no measurable decrease despite the 50 percent drop in the state's oil production during that period. Because of this de-linkage, it seems unlikely that exports of refined petroleum products would increase substantially if in-state crude production were to increase; I) California's refining capacity is configured for a wide range of oil viscosity, including heavy imported crude. So a switch from imports to local crude would not necessarily require significant equipment modifications.

[5] Personal email, July 10, 2013

[6] Personal email, July 18, 2013

[7] Personal email, July 30, 2013