

A Report from the *ENERGY AND THE WEST* Series by



Potential Impacts of Energy Development in New Mexico

With a Case Study of Otero County



April 2009

Potential Impacts of Energy Development in New Mexico

With a Case Study of Otero County

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ABOUT HEADWATERS ECONOMICS

Headwaters Economics is an independent, nonprofit research group. Our mission is to improve community development and land management decisions in the West.



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ABOUT THE *ENERGY AND THE WEST* SERIES

This report is the eighth in a series—*Energy and the West*—published by Headwaters Economics on the topic of fossil fuel energy development. This series is designed to assist the public and public officials in making informed choices about energy development that will benefit the region over the long term.

The reports in the *Energy and the West* series, listed below, cover the policy context for energy development in the West and the resulting impacts to states, counties, and communities viewed from the perspective of economic performance (i.e., jobs, personal income, wages) and fiscal health (i.e., state and county budgets, revenue, and expenses). The series also includes state and local area case studies, which highlight benefits and costs in greater detail.

Titles in the *Energy and the West* series:

- Energy Development and the Changing Economy of the West
- U.S. Energy Needs and the Role of Western Public Lands
- Fossil Fuel Extraction as a County Economic Development Strategy: Are Energy-focusing Counties Benefiting?
- Energy Revenue in the Intermountain West: State and Local Taxes and Royalties from Oil, Natural Gas, and Coal
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INTRODUCTION

This report explores the economic importance of oil and natural gas development in New Mexico and the potential significance of drilling on Otero Mesa in Otero County in south-central New Mexico. It also considers how New Mexico taxes mineral extraction and allocates this revenue, and evaluates the extent to which local government would capture revenue from proposed drilling in Otero County. Finally, this report asks whether proposed drilling on Otero Mesa would create more benefits than it would foreclose.

New Mexico was the largest fossil fuel energy producer in the Intermountain West in 2007. Yet even at the peak of the recent surge in energy activity, mining—which includes oil and natural gas development—remained a small part of New Mexico’s overall economy: 2 percent of total direct employment and 3 percent of total personal income in 2006.¹

Like the rest of the West, New Mexico’s economy modernized in recent decades and now more closely resembles the national economy, with a predominant mix of service and professional industries. Intensive oil and natural gas activity occurs in only two parts of the state—the San Juan Basin in the northwest and the Permian Basin in the southeast—both remote from the state’s major economic centers.

While the fossil fuel industry plays a modest economic role in terms of employment and personal income, oil and natural gas extraction is a major revenue source for New Mexico. In 2006, oil and natural gas revenue amounted to 17.9 percent of total state and local revenue and it is an important element of funding for public services such as education.²

As this report shows, New Mexico taxes the oil and natural gas industry effectively in general. However, because the industry and related revenue is so volatile and the state relies so heavily on this revenue stream, it can quickly put the state in a fiscal bind. The recent steep decline in drilling activity due to changed market conditions, for example, contributed to an estimated \$454 million state budget shortfall (7.5% of the state general fund) in fiscal year 2009.³

The federal Energy Policy Act of 2005, new drilling technologies, and a spike in energy prices in the early 2000s increased pressure to develop energy resources where they had not been tapped before. Otero Mesa in Otero County, New Mexico is one of these places. The Mesa, located west of the Guadalupe Mountains and southeast of Alamogordo, is one of the last remaining large expanses of Chihuahuan Desert grasslands. It is grazed by cattle from area ranches, provides hunting and other outdoor opportunities, and sits atop large groundwater aquifers.

In the late 1990s, a Roswell-based energy company discovered natural gas under Otero Mesa. Subsequently, the Bureau of Land Management’s (BLM) Resource Management Plan Amendment and Final Environmental Impact Statement proposed leasing about 1.4 million acres in Otero and Sierra counties, including Otero Mesa, for oil and natural gas drilling.⁴ This proposal provides an excellent opportunity to evaluate whether area communities and local governments would benefit from modest fossil fuel development in an area that is valuable for its other resources.

To structure our discussion on the impact of oil and natural gas development in New Mexico and the potential impact in Otero County, this report answers five questions.

Questions Answered in this Report:

1. How does fossil fuel energy development fit into today's New Mexico economy?
2. Is Otero County's economy well positioned to benefit from fossil fuel energy extraction on Otero Mesa?
3. Are New Mexico's state and local government mineral taxation and distribution policies working well?
4. How would drilling on Otero Mesa affect state and local revenue?
5. Would drilling on Otero Mesa create more benefits than it would foreclose?

SUMMARY FINDINGS

Jobs and personal income from industries associated with the extraction of fossil fuels are a small part of New Mexico's economy.

The contribution of mining, including energy development, to overall employment and personal income in New Mexico is relatively small. It represented 2 percent of total employment and 3 percent of total personal income in 2006. While a small part of the state's economy, mining and energy development jobs paid among the highest average wages in the state at \$60,700 in 2006.

New Mexico has been changing rapidly since 1970, adding almost a million people and nearly doubling in size. New Mexico's economy also has shown strong growth. The state added more than 700,000 jobs and \$41 billion in new personal income from 1970 to 2006. Employment grew faster than population, and personal income grew faster than employment. As a result, earnings and per capita income are on the rise.

During this time, New Mexico's economy diversified to incorporate a much wider range of services and professional industries as well as non-labor income related to retirement and investments. These sources of jobs and earnings accounted for 80 percent of all new income earned in the state between 1970 and 2000, and made up about 74 percent of total personal income in the state in 2006. The growth and diversification of New Mexico's economy has made it less responsive to the volatility of the mining and energy sectors.

Otero County's economy would see little to no benefit from projected fossil fuel extraction.

The economic impact of BLM-proposed fossil fuel development in Sierra and Otero counties is limited in scale—representing 1 percent of total employment in these counties for a period of only four years—and will have even less effect on Otero County when adverse impacts, employment leakages, and the recent downturn in energy prices are taken into account.

Otero County's population and employment grew by 50 percent while personal income grew by more than 100 percent from 1970 to 2006. The county's economy has largely been tied to the military, but starting in the 1980s, service and professional sectors along with retirement and investment income grew independently of military employment. By 2006, service and professional employment was 50 percent of all jobs, and non-labor income was 37 percent of total personal income in the county.

There is no current oil and natural gas production in Otero County. Mining and energy development jobs and income have been and remain exceedingly small in Otero County. In 2006, the industry accounted for 0.2 percent of total employment, and 0.1 percent of total personal income. These jobs paid \$15,455 on average in 2006, a quarter of the state average for mining and energy development and well below Otero County average wages (\$27,919).

New Mexico does a good job of capturing value from oil and natural gas resources. Nonetheless, the state remains exposed to future unpredictability in energy revenue. It also returns the lowest proportion of oil and natural gas revenue to local government in the Intermountain West.

New Mexico is the largest oil and natural gas producer in the Intermountain West, generating more than \$15 billion in oil and natural gas production value in 2007. The state does a good job capturing value from oil and natural gas extraction, mainly from production taxes and royalties. New Mexico's effective tax rate was 13.4 percent in 2007, ranking behind only Wyoming in the region. Oil and natural gas extraction generated 18 percent of all state and local government revenue in 2007.

Oil and natural gas revenue is highly volatile. New Mexico manages this volatility by investing a significant portion (22% or \$462 million in 2007) of its oil and natural gas revenue into two long-term investment funds: the severance tax permanent fund and the land grant permanent fund. Despite hedging strategies, funding for basic government services like education remains highly exposed to oil and natural gas revenue volatility and this contributes to periodic budget shortfalls.

New Mexico's revenue distribution scheme returns the lowest proportion of oil and natural gas revenue—6 percent—to local government in the Intermountain West. Local governments receive no production taxes or royalty payments, and instead rely on property and sales tax revenue from oil and natural gas activity. This small share of energy revenue may mean that municipal and county governments in New Mexico do not have the resources they need to deal with the impacts of extraction activities on local services such as roads, public safety, and social services.

Drilling Otero Mesa would have no discernable impact on New Mexico revenue and little impact on Otero County revenue.

We estimate the production value from proposed drilling in the BLM Planning Area (Sierra and Otero counties) at \$32 million annually and the Otero County portion at \$24 million annually. The Otero County figure represents 0.17 percent of New Mexico's total production value in 2007 from oil and natural gas (\$13.8 billion).

Proposed drilling in the Planning Area would net the state, in production taxes and royalties, approximately \$4.6 million in annual revenue, or 0.27 percent of all 2007 revenue from oil and natural gas production taxes and royalties. The Otero County portion by itself would net about \$3.4 million, or 0.2 percent of state totals in the same year.

The majority of expected local revenue from proposed drilling in Otero County would come from oil and natural gas property and equipment taxes, peaking at about \$285,000 in annual revenue, which amounts to 4.4 percent of all property tax revenue and 1.3 percent of total revenue from all sources for Otero County in 2007.

Drilling Otero Mesa would create few economic and fiscal benefits while potentially foreclosing future economic opportunities.

The employment impacts from proposed drilling are small—less than 1 percent of total county employment—and will last for only four years. These calculations are likely exaggerated as energy companies and workers are expected to come from outside Otero County.

At peak production, revenue from proposed oil and natural gas development in Otero County would be similarly small—about 1.3 percent of Otero County’s total revenue—and may not cover the county’s share of infrastructure and service costs. For example, the BLM estimates an additional 6,000 annual trips related to oil and natural gas development on Otero Mesa, much of it with heavy trucks and machinery that will require road improvements and maintenance. In addition, the delay in property tax revenue could mean that Otero County would have to raise taxes on other rate payers or reduce the current level of service it offers businesses and residents.

Economic sectors that could be negatively affected by drilling include agriculture, which is small in scale, and travel and tourism industries, which are relatively large (about 6% of current employment) in Otero County. The large water resources in the Salt Basin, which lies under Otero Mesa, will become more valuable over time as population growth continues and could be threatened by drilling activities.

Another key consideration is whether maintaining the assets of Otero Mesa in de facto wilderness will support greater longer-term value than the one-time wealth that would be extracted as oil and natural gas. There is a case to be made that the fragile nature of these unique desert grasslands has intrinsic value and could not be remediated after disturbance.

Qualities like low crime rates, friendliness, affordability in communities, and attractive landscapes such as White Sands National Monument are key assets in the competition for people and business in today’s West. During the last 20 years, the Otero County economy has diversified into a range of service and professional industries, and fast-growing retirement-related income. These sectors are associated with above average economic performance in rural, public land counties in the West, and they have provided the county with a complementary economic alternative to area military bases.

METHODS

Definition of Mining

When we use the term “mining” in our *Energy and the West* series, we refer primarily to jobs and personal income associated with the development and extraction of oil, natural gas, and coal (fossil fuels). Because of restrictions placed on the level of detail available from the U.S. Department of Commerce and the Bureau of the Census, it is sometimes not possible to separate minerals mining from fossil fuels mining. In the five energy development states—Colorado, Montana, New Mexico, Utah, Wyoming—mentioned in this report, the bulk (over 80%) of “mining” is related to energy development. For more information, refer to [Appendix](#).

This report employs a combination of approaches including analysis of published social and economic data; research in secondary literature, government documents, and the regional press; and qualitative interviews with local people.

Published data were obtained from:

- U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (BEA/REIS).
- U.S. Department of Commerce, Bureau of the Census: 1990 and 2000 Census of Population and Housing (Census).
- U.S. Department of Commerce, Bureau of the Census: County Business Patterns (CBP).
- U.S. Department of Labor, Bureau of Labor Statistics (BLS).

Using the Economic Profile System (EPS), we produced detailed socioeconomic profiles for New Mexico and Otero County.³ These profiles are available for download from our web site: www.headwaterseconomics.org/energy.

In addition, Headwaters Economics staff conducted interviews with local leaders, government staff, elected officials, and others knowledgeable about Otero County.

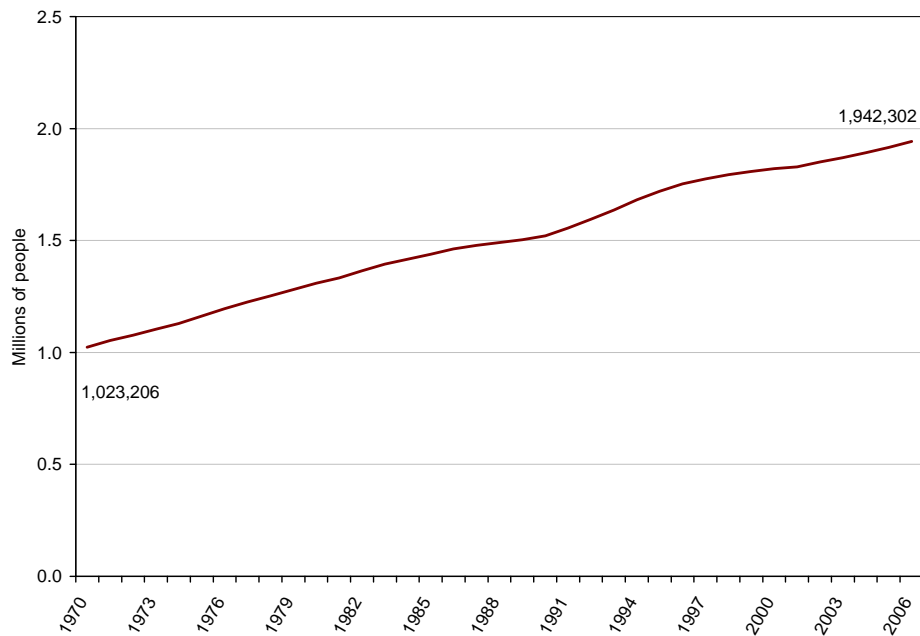
HOW DOES FOSSIL FUEL ENERGY DEVELOPMENT FIT INTO TODAY'S NEW MEXICO ECONOMY?

In order to understand the role of energy development in New Mexico's economy, it is useful to consider the broader economic history of the state over the past few decades. Here we provide a snapshot of key trends in demographics, employment, and personal income, performance by sector, and earnings by industry that offer a context for understanding the role of energy development at the state level.

Demographics

Figure 1 shows that the total population of New Mexico has almost doubled over the last 36 years, adding just under a million new people between 1970 and 2006. The state's annual growth rate (1.8%) was much faster than the nation's (1.1%) for this period.

Figure 1. Population Growth in New Mexico, 1970–2006⁵



New Mexico's population has grown strongly and steadily in recent decades, with the exception of the early 1980s and again in the early 2000s, coinciding with national recessions.

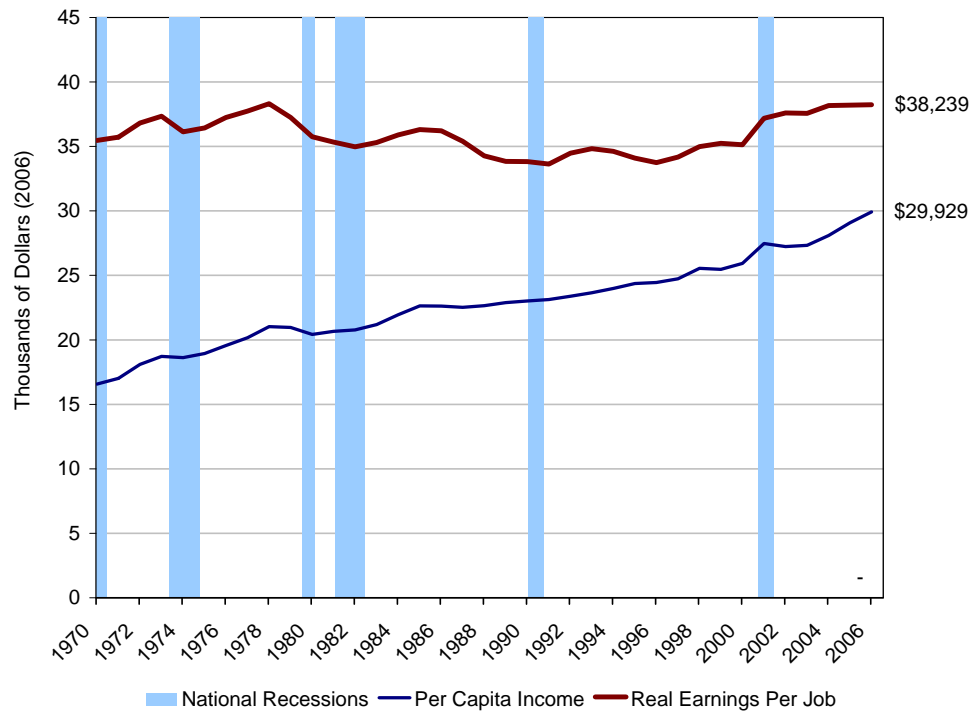
Employment and Personal Income

The New Mexico economy during the last 30 years has been a strong performer, surpassing the nation in the growth rate for jobs and personal income. The state added more than 700,000 jobs and \$41 billion in new personal income from 1970 to 2006. Employment grew faster than population, and personal income grew faster than employment.

As Figure 2 shows, state earnings per job declined in the late 1970s and late 1980s, and have risen since the mid-1990s. In inflation-adjusted dollars, average earnings were \$35,467 in 1970 and \$38,239 in 2006. Despite recent gains, they remain well below the national average of \$45,817.⁶

Per capita income in the state has increased, in real terms, from \$16,564 in 1970 to \$29,929 in 2006, reflecting the growth in non-labor income which is mainly a mix of investment and retirement-related income. Per capita income has grown steadily with the exception of periods of national recession (vertical blue lines). It remains well below the national average of \$34,471.

Figure 2. Earnings Per Job and Per Capita Income in New Mexico, 1970–2006⁷



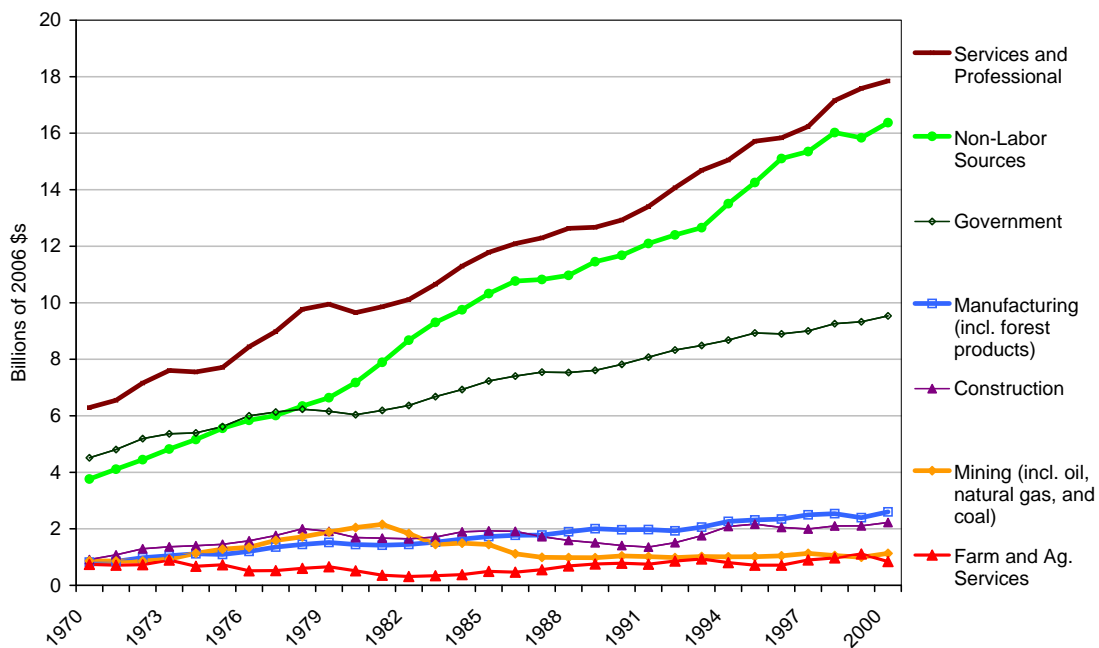
Performance by Sector

The mix of industries in the state has changed dramatically in recent decades, mirroring broader regional and national trends. In effect, New Mexico has developed a thriving services and knowledge-based economy, and benefited from increases in retirement and investment income. See our companion report—*Energy Development and the Changing Economy of the West*—for more on the broader economic transformation of the region.⁸

Here we present trends on the types and volume of personal income in New Mexico from the period 1970 to 2000, and for 2006 (latest data available). The break represents a change in way income data have been collected and reported at the industry level in 2001, from the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS), by government agencies.

Figure 3 shows personal income trends by major sector from 1970 to 2000. The two fastest growing and largest sectors were non-labor income along with service and professional industries. Non-labor income accounted for 42 percent of all new personal income from 1970 to 2000 and was 35 percent of total personal income in 2000. Service and professional sectors generated 38 percent of all new personal income over the thirty years and made up 38 percent of total personal income in 2000.

Figure 3. Historical Trends in Personal Income by Source in New Mexico, 1970–2000 (SIC)⁹



Key Terms:**Services**

Much of the growth in labor earnings in the U.S. economy over the last two decades has been in “services,” a term defined in various ways by different researchers and organizations. Historical data organized by the U.S. Department of Commerce according to the Standard Industrial Classification (SIC) did a poor job of describing the growth in services, particularly many of the modern, high-tech and knowledge-based occupations. When using historical data (1970–2000), we define services broadly as “Services and Professional” to underscore that service occupations consist of a combination of high-paying and low-paying professions, mixing physicians with barbers, and chambermaids with architects and financial consultants.

After 2000, the U.S. Department of Commerce switched to the North American Industrial Classification System (NAICS). Part of the reason government agencies switched classification systems was to develop a better structure for reporting the rapid growth in service sectors. When using recent data, we display information on services the same way the U.S. Department of Commerce does, by each of its subcategories: Information, Finance and Insurance, Professional, Scientific and Technical Services, etc.*

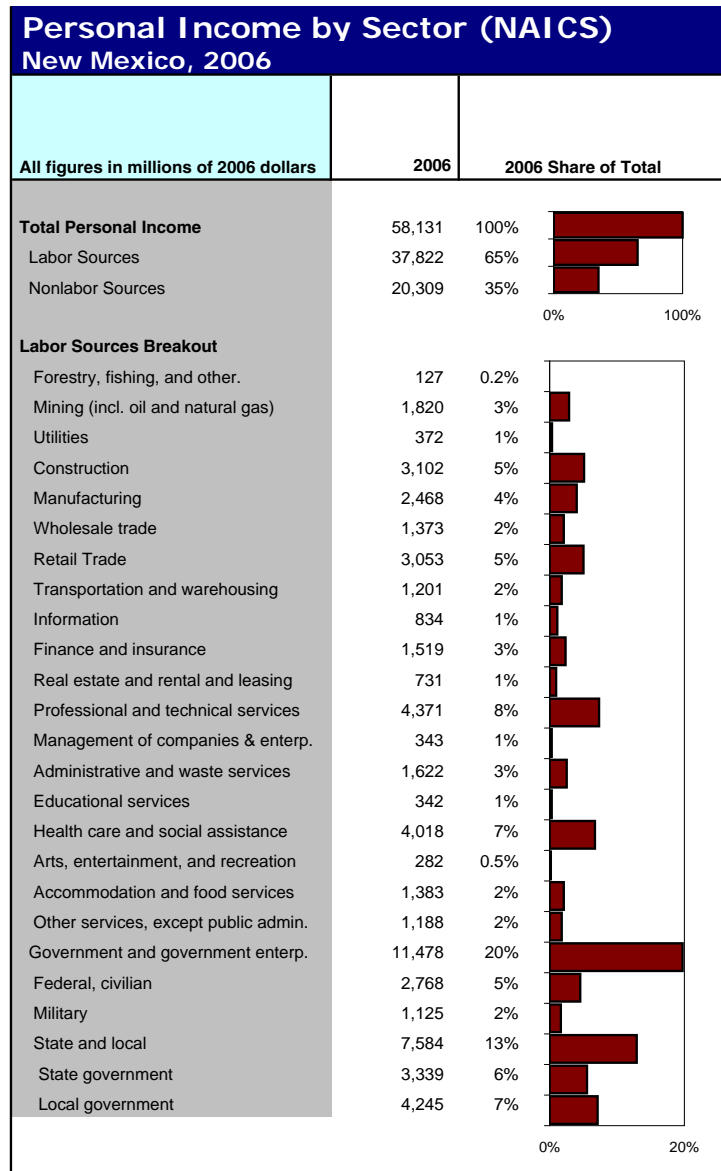
Non-labor Income

Non-labor income consists of transfer payments, and dividends, interest, and rent. Transfer payments are commonly referred to as retirement money because the majority of transfer payments nationwide consist of retirement and age-related payments. It also includes public assistance, medical benefits, and veterans benefits, among others. Dividends, interest, and rent are referred to as money earned from investments. Dividends consist of payments by corporations to stockholders; interest is money earned from mutual funds, municipal bonds, private pension funds, and other earnings from deposits in financial institutions; and rent includes income from rental property, imputed rent for owners of farm dwellings, royalties from patents, and other similar income.

* See U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS) 2006 CD for definitions.

In 2006, the overall industry picture had not changed, though the U.S. Department of Commerce now uses the new industry classification system which more accurately tracks trends in the services sector. As a whole, the New Mexico economy employed 1.1 million people and generated \$58 billion in personal income in 2006.¹⁰

The contributions of various sectors to total personal income in 2006 are shown in Table 1. Service-related sectors made up about 39 percent and non-labor sources about 35 percent of total personal income in 2006.

Table 1. Sources of Personal Income in New Mexico, 2006 (NAICS)¹¹

Note: Industry totals do not add to 100 percent because of Bureau of Economic Analysis adjustments made for commuting and contributions for government social insurance.

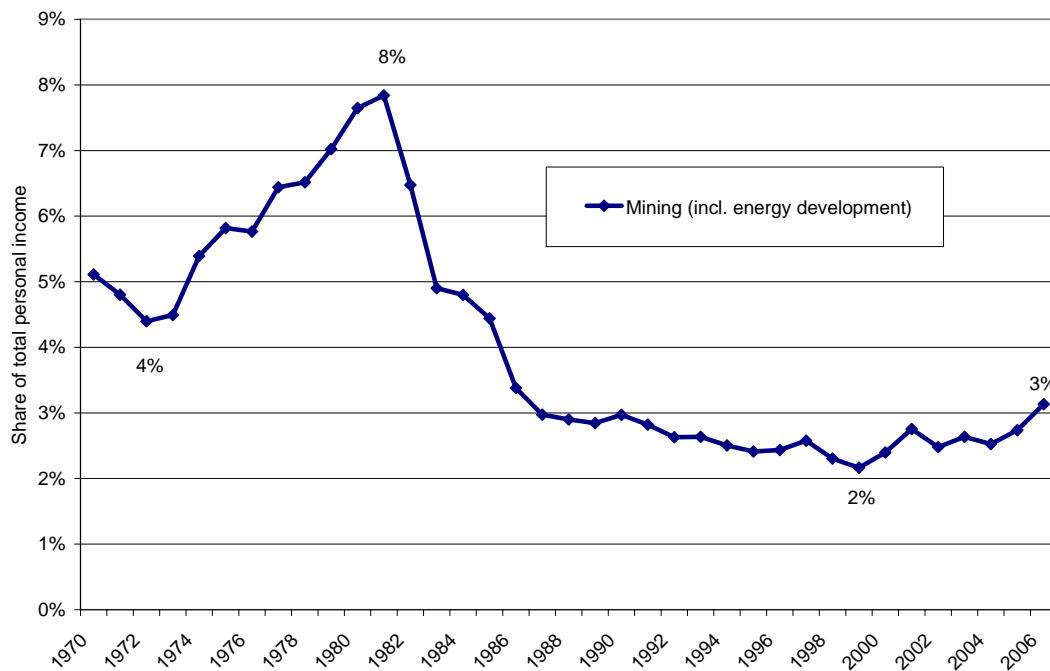
The contribution of mining, including energy development, to overall employment and income in the state is relatively small—2 percent of total employment and 3 percent of total personal income in 2006.¹² In contrast, mining and energy extraction generate substantial tax revenue for the state—see state fiscal section below for more details.

The diminished economic significance of energy development as a share of total economic activity is consistent with findings in our companion report—*Fossil Fuel Extraction as a County Economic Development Strategy: Are Energy-Focusing Counties Benefiting?*³

Over time, mining and energy development have fluctuated as a share of total economic activity in New Mexico. Figure 4 shows this sector's contribution to total personal income in New Mexico from 1970 to 2006. Mining and energy sectors have ranged from a high of 8 percent of total personal income in 1981 at the peak of the last energy boom to 2 percent in 2000 at the end of the ensuing bust. This industry volatility is consistent with trends in other western states.

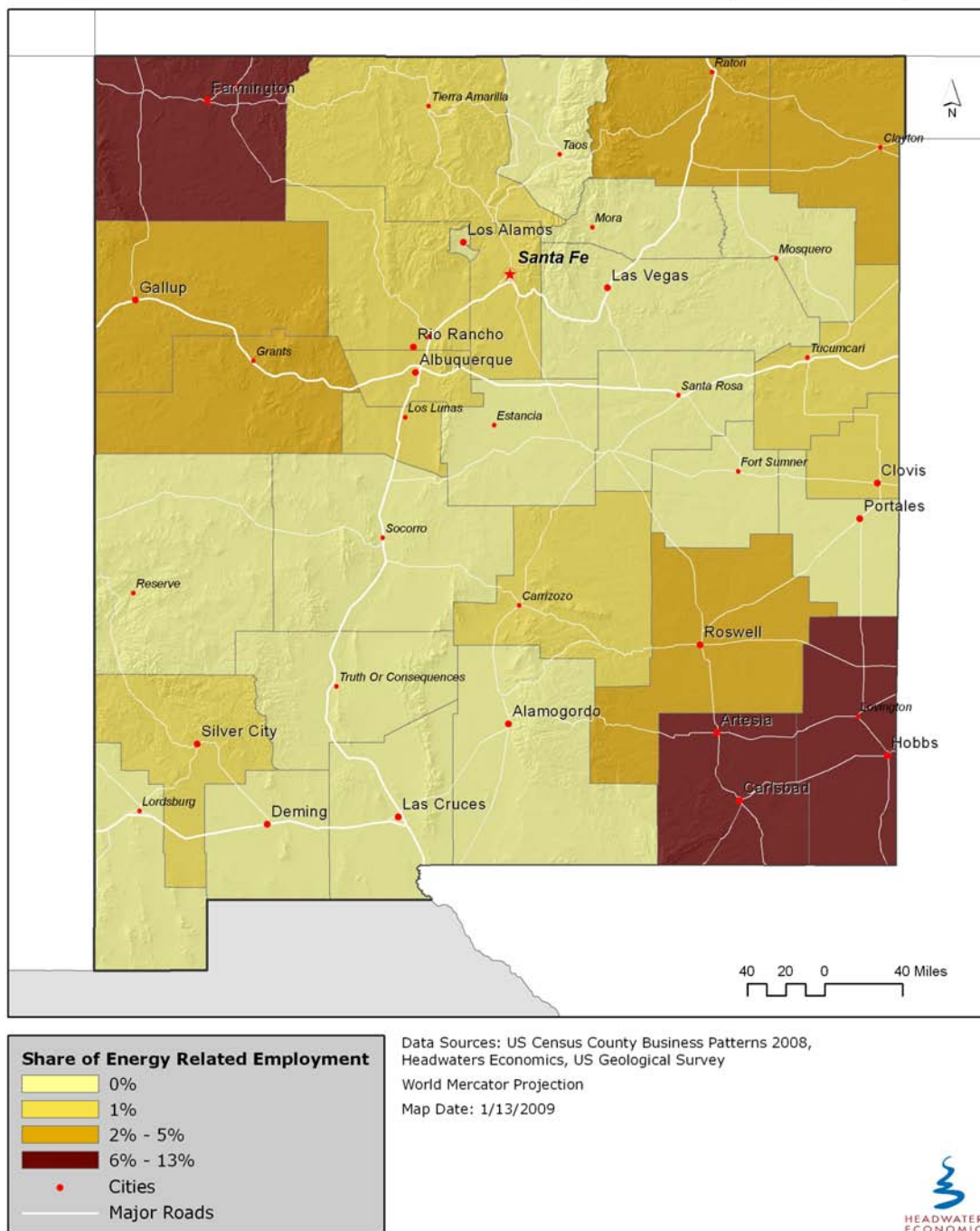
The state economy as a whole has been successful at avoiding the volatility that affects the mining and energy industries because these sectors are not large enough to alter the state's economic fortunes, and because the state economy is relatively well diversified.

Figure 4. Mining as Share of Total Personal Income in New Mexico, 1970–2006¹⁴



As the New Mexico economy grew in recent decades, mining and energy development became a smaller share of all economic activity, even during an energy development surge. In 1972, before the energy boom began in that decade, mining and energy sectors amounted to 4 percent of total personal income, higher than it was in 2006 (latest data available) near the peak of the most recent energy surge at 3 percent of total personal income.

Map 1. Energy Jobs as a Share of Total Private Wage and Salary Employment, 2006¹⁵

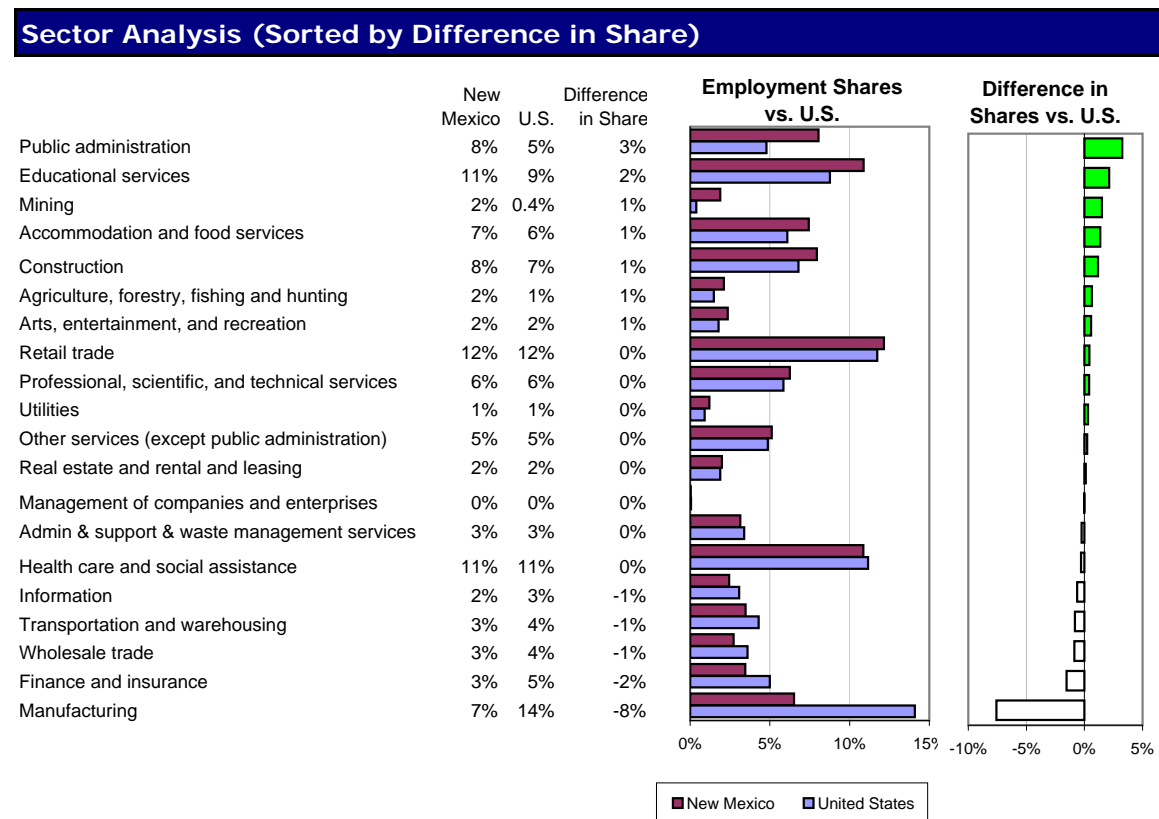


As Map 1 shows, energy development is a significant economic activity (i.e., more than 6% of total county employment) in only two areas of New Mexico: the San Juan Basin in the northwest part of the state and the Permian Basin in the southeast part of the state. This translates into only three county economies in the state where energy has a large economic significance. In San Juan County (San Juan Basin) direct fossil fuel energy jobs were 10.4 percent of private wage and salary employment in 2006. And in Eddy and Lea counties (Permian Basin), the comparable figures were even higher—12.9 percent and 12.5 percent, respectively.¹⁶ For most of the state, however, energy development is a modest component of the economy.

As the state's economy has grown, it has become more diverse. Since the 1970s, New Mexico's industrial structure has come to more closely resemble the industry mix of the nation, which is typically used as a benchmark for economic diversity. An industrial structure index calculated by the U.S. Federal Reserve shows that New Mexico's diversity has steadily increased—from a score of 52.7 in 1970 to 22.8 in 1995 (a lower score indicates a more diverse economy).¹⁷

Table 2 shows New Mexico's industry mix in 2000 compared to the nation. The state is over-weighted in public administration and educational services, and under-weighted in manufacturing, and finance and insurance.

Table 2. New Mexico's Industry Mix Compared to the United States, 2000¹⁸



Earnings by Industry

Looking at average wages by industry is a useful way to see if New Mexico is succeeding at generating higher-paying jobs. Table 3 shows wages for major industries sector in 2006. The employment figures only count wage and salary employees (i.e., not proprietors) and exclude the value of benefits such as health care. Sectors with wages that are 20 percent above or 20 percent below average wages across all sectors are marked by green and red highlighting, respectively.

Table 3. Wages and Employment by Sector in New Mexico, 2006 (NAICS)¹⁹

New Mexico Wages and Employment in 2006			
	Employment	% of Total	Average Annual Wages
Total Private & Public	807,063	100%	34,567
Total Private	623,628	77%	33,397
Goods-Producing	126,816	16%	40,201
Natural Resources and Mining	29,966	4%	45,635
Agriculture, forestry, fishing & hunting	11,342	1%	20,896
Mining	18,624	2%	60,700
Construction	59,191	7%	34,964
Manufacturing (Incl. Forest Products)	37,659	5%	44,107
Service-Providing	496,812	62%	31,661
Trade, Transportation, and Utilities	139,875	17%	30,128
Information	15,859	2%	37,858
Financial Activities	33,870	4%	40,047
Professional and Business Services	102,361	13%	45,085
Education and Health Services	96,060	12%	33,498
Leisure and Hospitality	86,621	11%	13,551
Other Services	21,817	3%	24,589
Unclassified	350	0.04%	44,225
Total Public	183,436	23%	38,544
Federal Government	30,500	4%	59,384
State Government	50,393	6%	40,312
Local Government	102,543	13%	31,476

Although New Mexico wages are low compared to the U.S. as a whole (\$34,567 compared to \$42,535), the state is capturing higher paying service-providing jobs. Professional and business services, for example, paid \$45,085 on average in 2006, and represented 13 percent of all wage and salary jobs in the state. However, service-providing jobs still pay less—\$8,540 on average—than goods-producing sectors in the state (the service-providing average is pulled down by low-wage service categories such as leisure and hospitality services). Mining, though small at 2 percent of all wage and salary employment, paid the highest average wages (\$60,700) in 2006.

Summary Findings

New Mexico's population has grown strongly in recent decades, adding almost a million new people and nearly doubling in size since 1970. The state has grown significantly faster than the nation as a whole—1.8 percent as compared to 1.1 percent annual growth.

The state's economy has also shown strong growth, outpacing the nation in the rate of job creation and personal income growth. New Mexico added more than 700,000 jobs and \$41 billion in new personal income from 1970 to 2006. Employment grew faster than population, and personal income grew faster than employment.

As a result, earnings per job and per capita income have both increased, though they remain below comparable national figures. In inflation adjusted dollars, earnings rose from \$35,467 in 1970 to \$38,239 in 2006. Per capita income has seen a much greater increase, rising in inflation adjusted dollars from \$16,564 in 1970 to \$29,929 in 2006.

Mirroring trends in the nation and the West as a whole, New Mexico's economy has become significantly more diverse and is increasingly comprises a broad range of service and professional industries, and non-labor income related to retirement and investments. These sources of jobs and income accounted for 80 percent of all new income earned in the state between 1970 and 2000, and made up about 74 percent of total personal income in the state in 2006.

New Mexico is capturing higher paying service-providing jobs. Professional and business services, for example, paid \$45,085 on average in 2006, and represented 13 percent of all wage and salary jobs in the state. However, service-providing jobs still pay less—\$8,540 on average—than goods-producing sectors. Though small in size, mining and energy development jobs paid the highest average wages in the state at \$60,700 in 2006.

The contribution of mining, including energy development, to overall employment and income in the state is relatively small—2 percent of total direct employment and 3 percent of total personal income in 2006. In only 3 out of 33 counties—San Juan, Eddy and Lea counties—is fossil fuel energy development a significant share of total employment.

The growth and diversification of the state's economy has made New Mexico less responsive to the volatility of the mining and energy sectors. In the 1990s, for example, the New Mexico economy added 184,000 jobs and \$11 billion in new personal income while the mining and energy sectors lost 2,512 jobs and, in real terms, shrank by \$44 million in personal income.

IS OTERO COUNTY'S ECONOMY WELL POSITIONED TO BENEFIT FROM FOSSIL FUEL ENERGY EXTRACTION ON OTERO MESA?

Otero County is located in south-central New Mexico. Most people live in the northern part of the county in Alamogordo, the county seat and the largest city, with slightly more than 35,000 residents. Established in 1898 as a railroad terminal, the city is known for its quiet pace of life, pleasant climate, and convenience. It is a little more than an hour drive from Las Cruces, and 90-minute drive from El Paso, where the regional airport is located. Map 2 shows the county's location and major landowners.

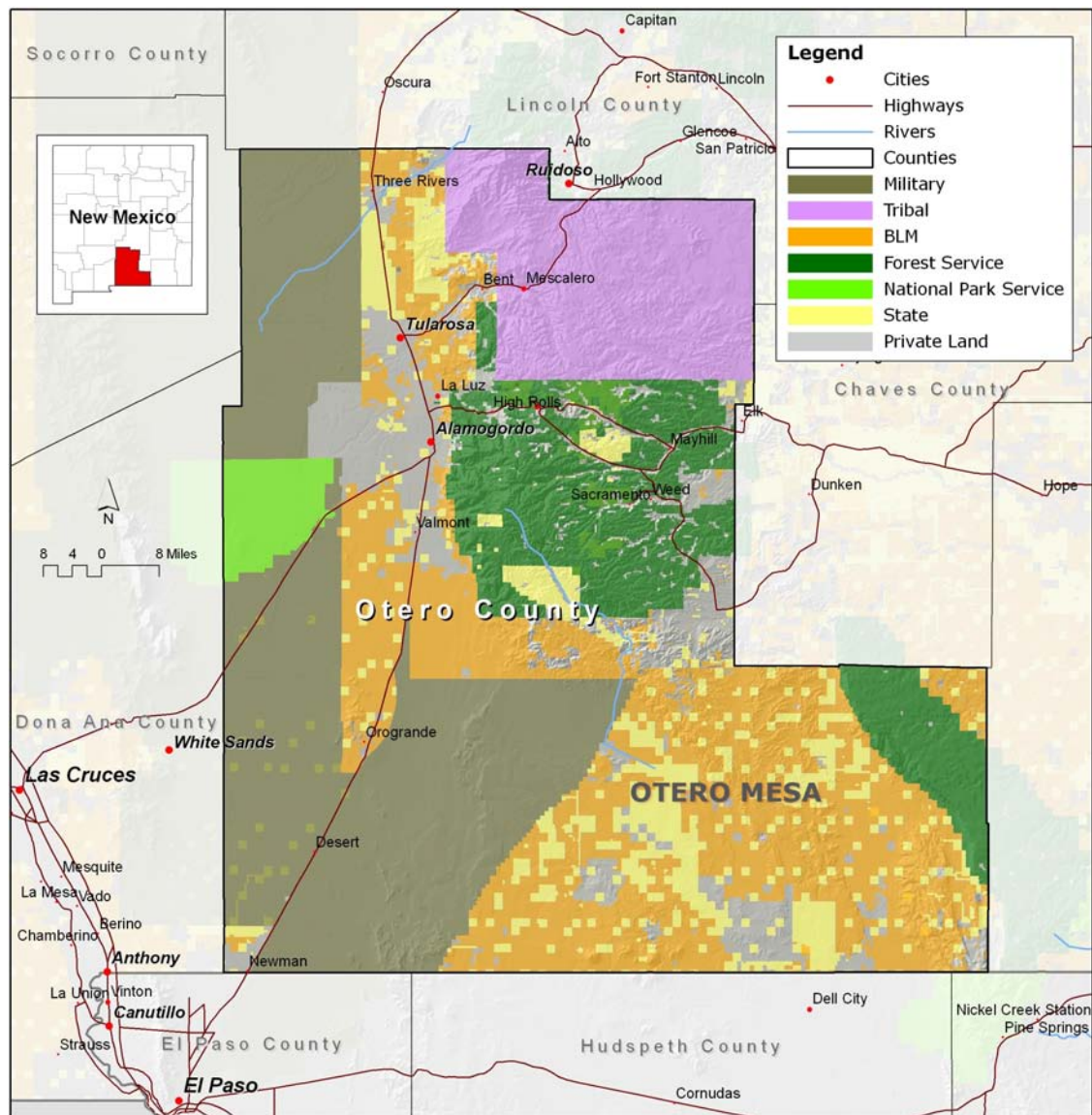
The federal government manages two-thirds (66%) of the land in the county. White Sands Missile Range (Holloman Air Force Base) and Fort Bliss McGregor Range (Fort Bliss itself is located in Texas adjacent to El Paso) make up 28 percent of the county, largely in the western and southern portions. The BLM administers another 25 percent of the land in the county, mainly to the south of Alamogordo and including much of Otero Mesa. The Lincoln National Forest covers 13 percent of county lands, including much of the Sacramento and Guadalupe mountains.

State lands account for 11 percent of the county and are mainly interspersed with BLM and Forest Service ownership. These lands also make up a significant portion of Otero Mesa. The Mescalero Apache Indian Reservation northwest of Alamogordo straddles the Sacramento Mountains to the north of the Lincoln National Forest and covers 11 percent of the county. Private lands account for 9 percent of the county.

Tourist attractions include the Inn of the Mountain Gods Resort and Casino and associated Ski Apache facility which is operated by the Mescalero Apache tribe, Ski Cloudcroft in the Sacramento Mountains, and White Sands National Monument, which straddles the Otero-Doña Ana county line to the west of Alamogordo.

Southern Otero County, where limited private in-holdings are scattered among BLM and state-owned desert lands, has fewer "discovered" places. Roads and water tanks developed by ranchers are the primary developments. At the core of this open landscape is a unique geologic formation known as Otero Mesa, comprising roughly 1.2 million acres to the east of Fort Bliss McGregor Range.

Despite its wild character and scenic nature, Otero Mesa is infrequently visited.²⁰ Just one county-owned, unpaved road offers the regional population centers access to this vast grassland.

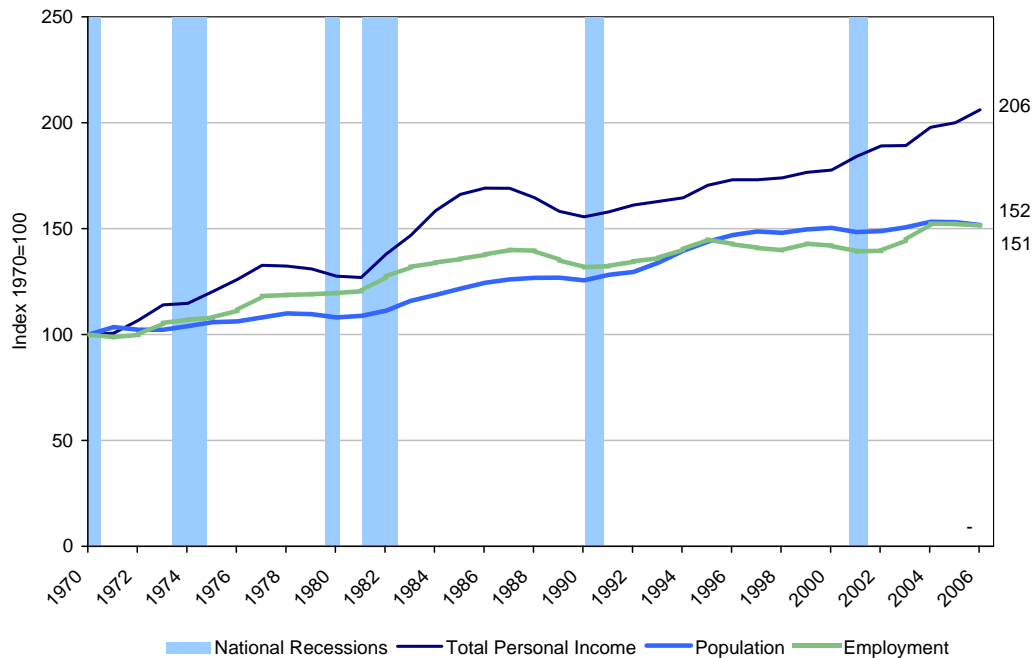
Map 2. Otero County, New Mexico²¹

Demographic and Economic Trends

Figure 5 shows that population, employment, and personal income have all grown since 1970. Population and employment grew by 50 percent while personal income grew by more than 100 percent from 1970 to 2006 (the figure is indexed to illustrate rates of change over time).²²

The population and economy of the county has been less affected by business cycles (national recessions are indicated by blue vertical bars) than by changes in federal military facilities and related employment. This volatility is most evident in the fluctuation of personal income in the 1980s.

Figure 5. Population, Employment, and Income in Otero County, 1970–2006 (Indexed)²³



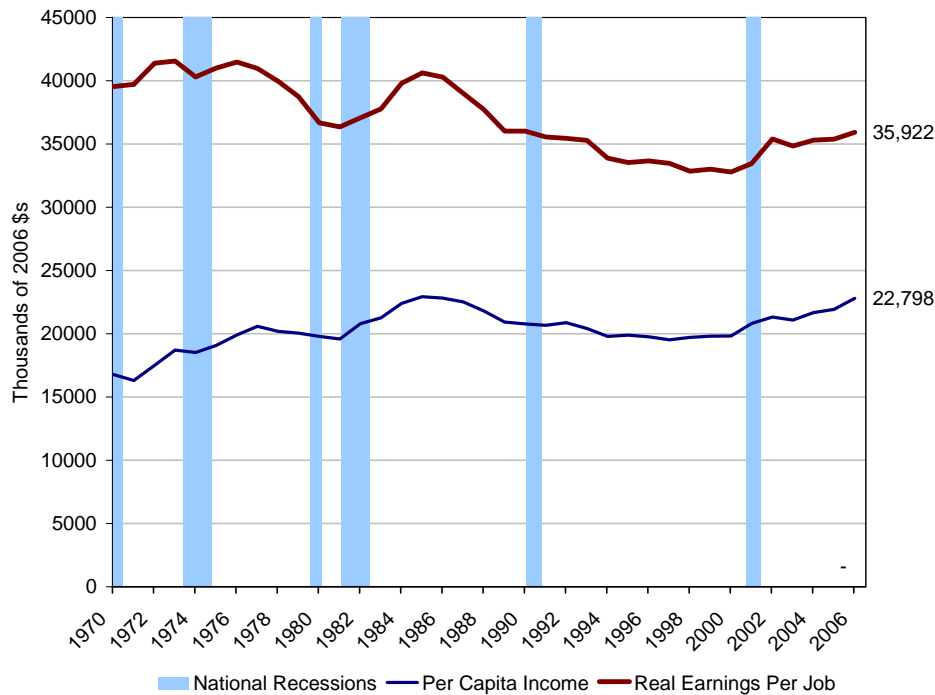
Population and employment trends tracked closely in recent decades. Personal income has grown much more quickly, especially since the early 1990s, reflecting the growing importance of non-labor income sources such as money earned from investments and government transfer payments to individuals, which is mainly retirement-related income.

In 2006, Otero County's population was 62,770. The county's population grew slower than the state but faster than the nation over the last 36 years. County population growth was especially strong in the middle 1980s and again in the middle 1990s, corresponding to increases in the military, and service and retirement economy, respectively.

Otero County's population is somewhat young but getting older, with a median age of 36.1 in the years 2005 to 2007. Fifty-four percent of the people in the county identify themselves as White non-Hispanic, while 34 percent of the people identify as Hispanic in these years. Among adults above the age of 25, 17 percent lack a high school degree, and 16 percent hold a college or graduate degree.²⁴

Unemployment has declined in recent years and in 2007 was 3.6 percent, below the nation (4.6%) and just above the state (3.5%). There is some seasonal variation in unemployment, which is higher in summer and lower in winter. The latest (unadjusted) figures from the Bureau of Labor Statistics indicate that unemployment was 4.1 percent in December 2008.²⁵

Figure 6. Earnings Per Job and Per Capita Income Trends in Otero County, 1970–2006²⁶



Earnings per job (red line), adjusted for inflation, have fallen from \$39,541 in 1970 to \$35,922 in 2006. This reflects the decline of higher-paying federal jobs as a share of total and the increase of lower-paying service employment as a share of total in these years. While on the rise in the early 2000s, Otero County continued to lag behind the state (\$38,239) and nation (\$47,206) in average earnings in 2006.²⁷

It is important to note that Otero County compares more favorably on earnings when looked at in relation to all other rural, or nonmetropolitan, counties in the West. The county's earnings per job were 7 percent higher than the average for all nonmetropolitan western counties in 2006.²⁸

Per capita income (blue line), adjusted for inflation, has risen from \$16,783 in 1970 to \$22,798 in 2006. This increase reflects the growing importance of non-labor income sources, mainly from investments and retirement, which have grown from 14 percent to 36 percent of total personal income from 1970 to 2006. Otero County's per capita income remained well below the state (\$29,929) and nation (\$36,714) in 2006.

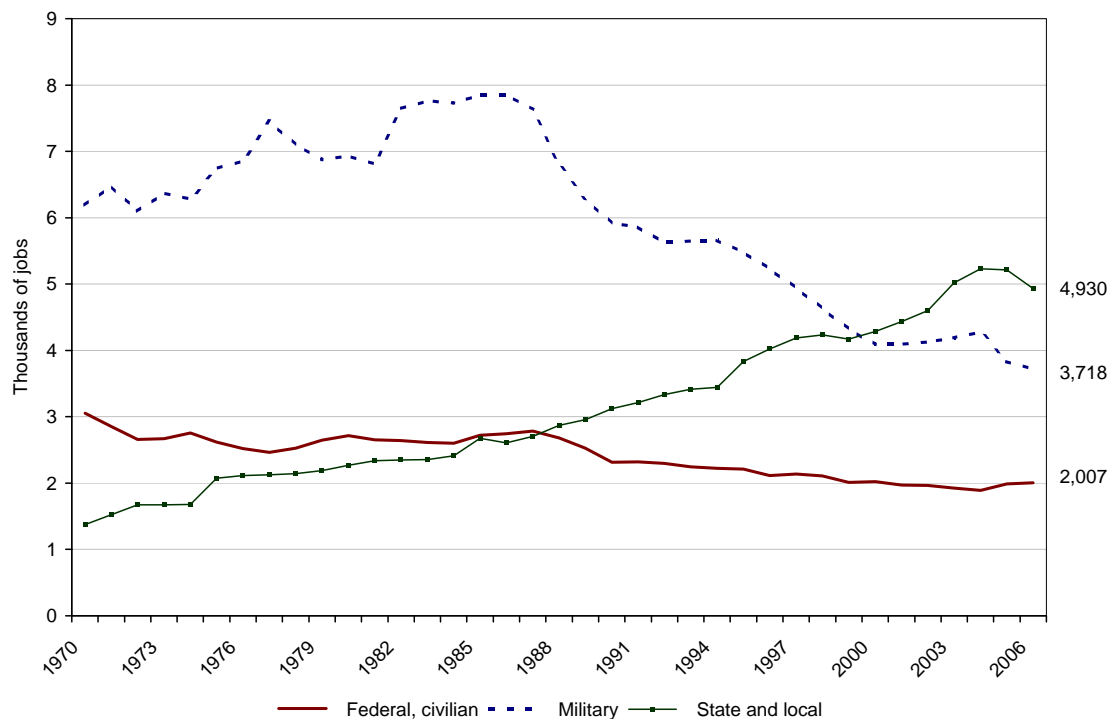
Employment, Personal Income, and Earnings Trends by Industry

The major change in the sectoral make up of Otero County's economy is the growth and subsequent decline of government employment, and the steady growth of service and professional employment.

Government employment peaked in 1987 at 13,249 jobs, or 49 percent of all jobs. By 2006 government leveled off at 10,655 jobs, or 37 percent of all employment. It is unusual for a county economy to be so heavily reliant on government employment. The county's economic fortunes have in large part tracked with this sector.

That said, the government sector is by no means monolithic. As Figure 7 shows, military jobs have declined significantly, federal civilian jobs have declined slightly, and state and local jobs have grown significantly in recent decades. Military jobs alone contracted from a high of 7,856 in 1986 to 3,718 in 2006. On the other hand, state and local jobs have risen steadily since 1970, and made up for more than half of military job losses in the last two decades.

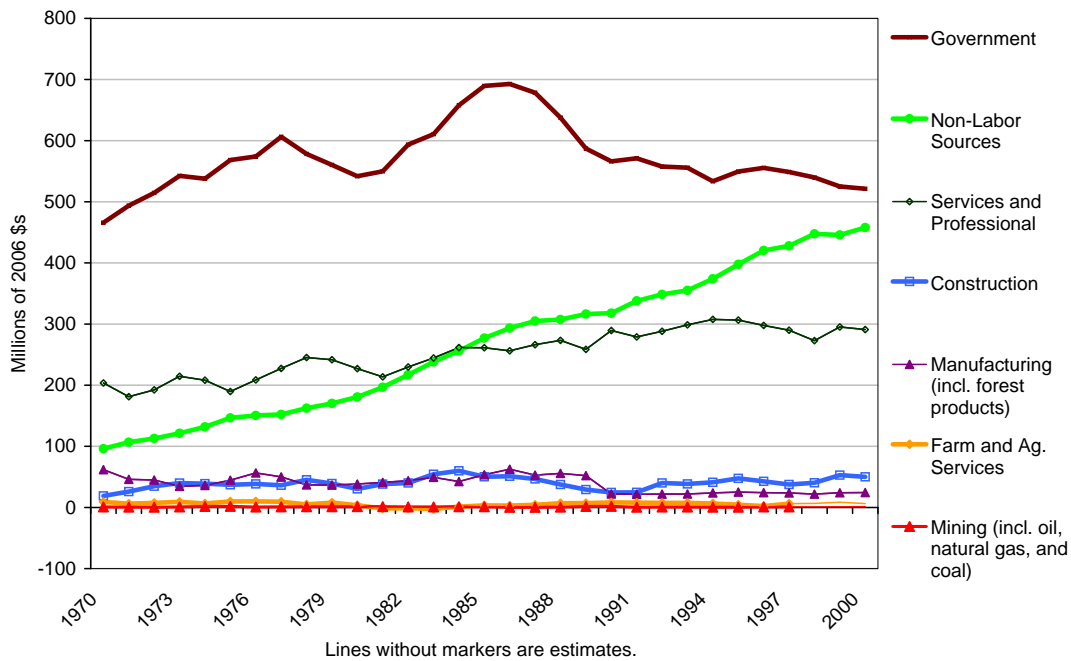
Figure 7. Government Employment by Type in Otero County, 1970–2006²⁹



The 2005 Base Realignment and Closure process had a significant effect on the region. Holloman Air Force Base, located on White Sands Missile Range and the county's largest employer, was largely unaffected by the realignment process. It will remain home to specialized air combat squadrons, a training center for the German Air Force, and a test track for high speed land vehicles. Fort Bliss (adjacent to El Paso), which is tied to the McGregor Range (in Otero County), on the other hand, was a beneficiary of the Base Realignment and Closure recommendations. It is expected to have more than 23,000 troops by 2011 and will become the U.S. Army's second largest post.³⁰ The scale of the military presence in and adjacent to Otero County means that the county's economy will remain closely tied to military bases, and their employment and spending.

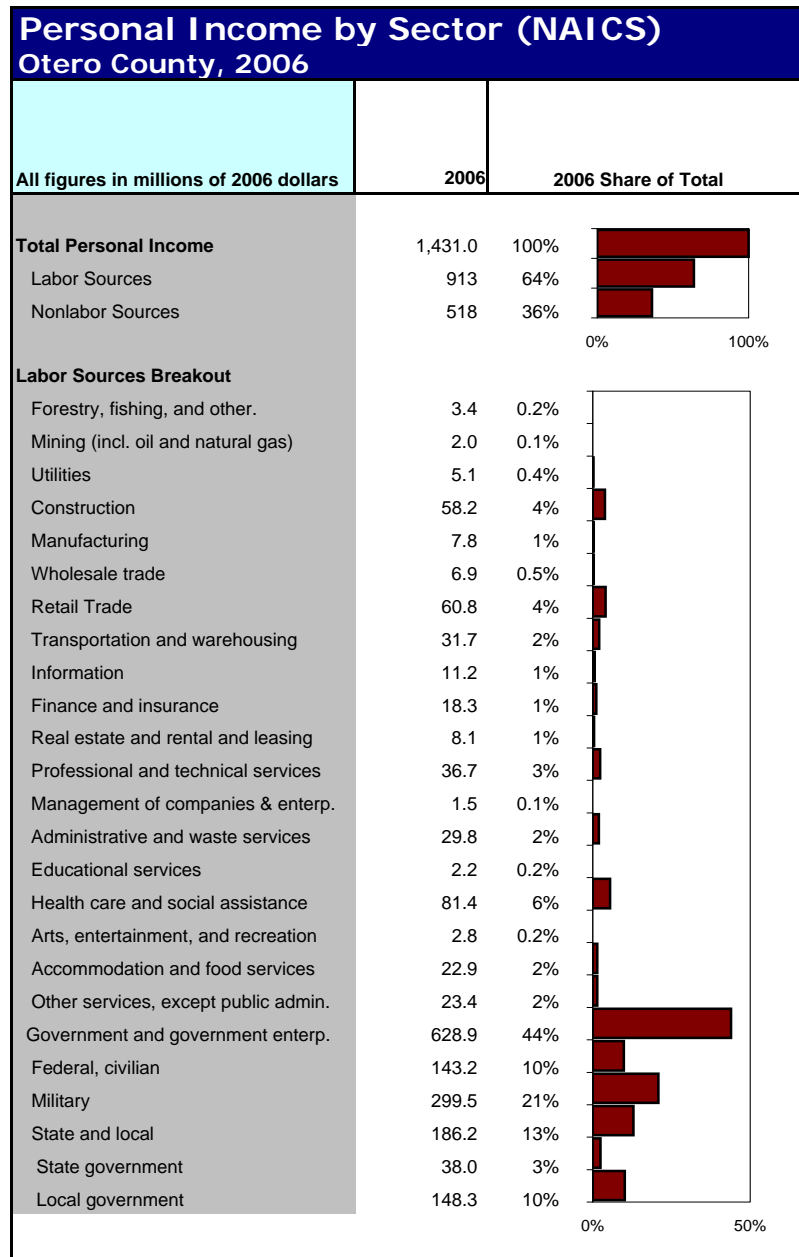
Service and professional sectors in the county increased significantly over the 30-year period from 1970 to 2000, growing from 34 to 50 percent of total employment. Beginning in the middle 1980s, service and professional employment grew while government employment as a whole declined. From 1985 to 2000, a period in which government lost 2,800 jobs, service and professional employment grew by 3,800 jobs, signaling a new and independent footing for the service economy in the county.³¹ These jobs encompass a mix of high-skill, high-paying jobs and low-skill, low-paying jobs. For more information on the evolving service economy of the West, see our companion report, *Energy Development and the Changing Economy of the West*.³²

Personal income trends by industry tell a similar story. The Otero County economy has been dominated by personal income from government employment, which peaked at \$693 million (59% of total) in 1986, and was \$521 million (42% of total) in 2000. Service and professional personal income grew steadily from \$204 million in 1970 to \$291 million in 2000. Despite this growth, its share of total personal income declined from 29 percent in 1970 to 24 percent in 2000. This was largely because of the strong growth of non-labor income, which increased from \$96 million in 1970 to \$458 million in 2000—contributing \$362 million in new income, or 67 percent of all new income earned in the county over these three decades.³³

Figure 8. Historical Trends in Personal Income by Source in Otero County, 1970–2000 (SIC)³⁴

The U.S. Department of Commerce changed industry classification systems in 2001, replacing the Standard Industrial Classification (SIC) system with the North American Industry Classification System (NAICS). This new system does a better job of classifying the service economy, but is not backward compatible. As a result, we show trends through 2000, and then the most recent data available, which is currently for 2006.

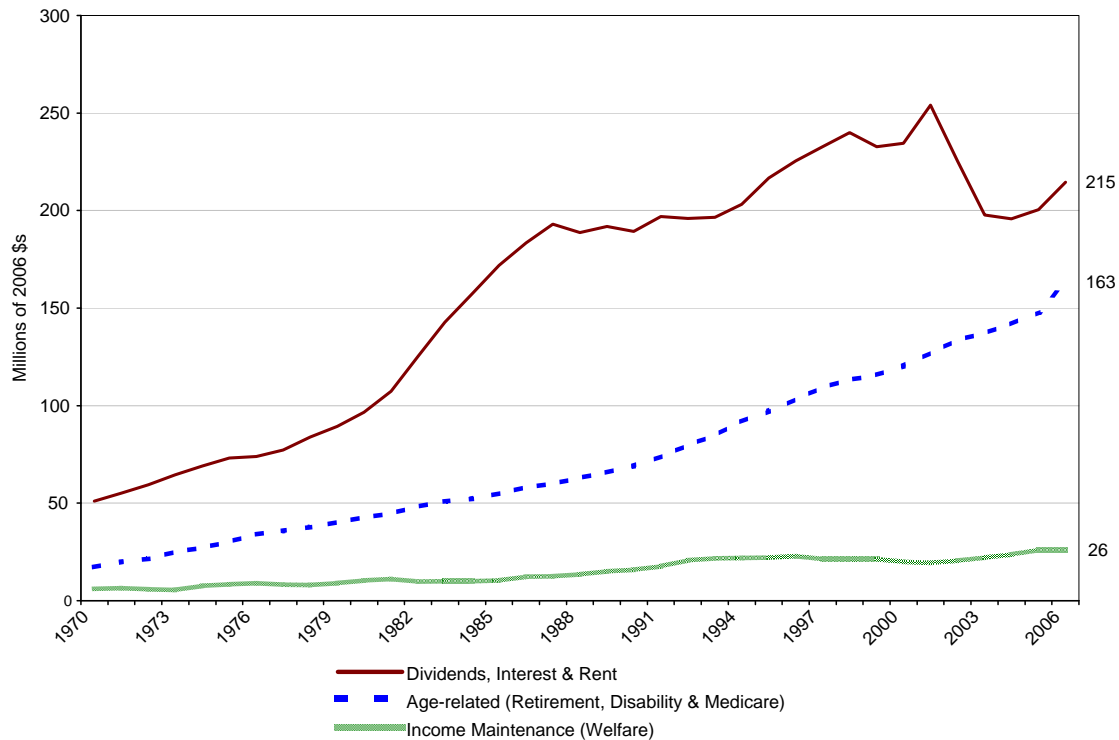
The personal income by sector picture did not change significantly between 2000 and 2006. Table 4 shows personal income broken out by industry sectors using the newer NAICS industry categories for 2006. Income from government was 44 percent of total personal income, with the military accounting for a little less than half of this. Service-related income made up for 24 percent of total personal income in 2006. Goods-producing sectors accounted for only 5 percent of all personal income.

Table 4. Sources of Personal Income in Otero County, 2006 (NAICS)³⁵

Note: Industry totals do not add to 100 percent because of Bureau of Economic Analysis adjustments made for commuting and contributions for government social insurance.

Non-labor income sources, which comprises money earned from investments and government transfer payments to individuals, continue to be significant in Otero County. As Figure 9 shows, they accounted for \$518 million in 2006, or 36 percent of total personal income. The largest source is investment income (\$215 million). Age-related transfer payments have been fast growing as well and are also large (\$163 million).

Figure 9. Trends in Non-Labor Income in Otero County, 1970–2006³⁶



The growth and scale of non-labor income has effectively diversified personal income in the county, and reflects the aging and growing affluence of the population. However, this income source is not immune to volatility, as the decline in investment income in the early 2000s related to the national recession and related decline in stock market valuation demonstrate.

Table 5. Wages and Employment by Sector in Otero County, 2006³⁷

County Wages and Employment in 2006			
	Employment	% of Total	Average Annual Wages
Total Private & Public	17,816	100%	27,919
Total Private	11,162	63%	24,244
Goods-Producing	1,698	10%	27,087
Natural Resources and Mining	126	1%	21,185
Agriculture, forestry, fishing & hunting	97	1%	22,961
Mining	30	0.2%	15,455
Construction	1,345	8%	27,849
Manufacturing (Incl. Forest Products)	227	1%	25,859
Service-Providing	9,465	53%	23,734
Trade, Transportation, and Utilities	2,868	16%	22,760
Information	235	1%	33,307
Financial Activities	598	3%	26,184
Professional and Business Services	1,654	9%	28,366
Education and Health Services	2,025	11%	31,026
Leisure and Hospitality	1,657	9%	10,928
Other Services	425	2%	18,784
Unclassified	3	0.02%	14,897
Total Public	6,653	37%	34,088
Federal Government	2,004	11%	45,368
State Government	801	4%	32,644
Local Government	3,848	22%	28,507

To understand the earnings picture in more detail, a look at wages by industry is instructive. The shift in employment from federal to state and local government, and the emergence of a service and professional economy has had an effect on wages.

Table 5 shows wages by industry for major industries in 2006. The employment figures only count wage and salary employees (i.e., not proprietors) and exclude the value of benefits such as health care. Sectors with wages that are 20 percent above or 20 percent below the average wages across all sectors are marked by green and red highlighting, respectively.

The highest paying sector is the federal government, which includes the military. This sector, as we have seen, is significant (11% of all wage and salary employment). The growing importance of state and local government as a share of total employment is bringing wages down. Local government pays just above average county wages at \$28,507, and is significant (22% of all wage and salary employment).

In the private sector, goods-producing industries, mainly construction jobs, pay slightly higher (\$27,087) than service-providing industries (\$23,734). There are more than five times as many wage and salary jobs in the service-providing sectors. The highest paying are information services (\$33,307 and 1% of wage and salary employment) and education and health services (\$31,026 and 11% of wage and salary employment). Some service jobs are especially low paying, such as leisure and hospitality jobs (\$10,928 and 9% of wage and salary employment). These are often seasonal and part-time jobs.

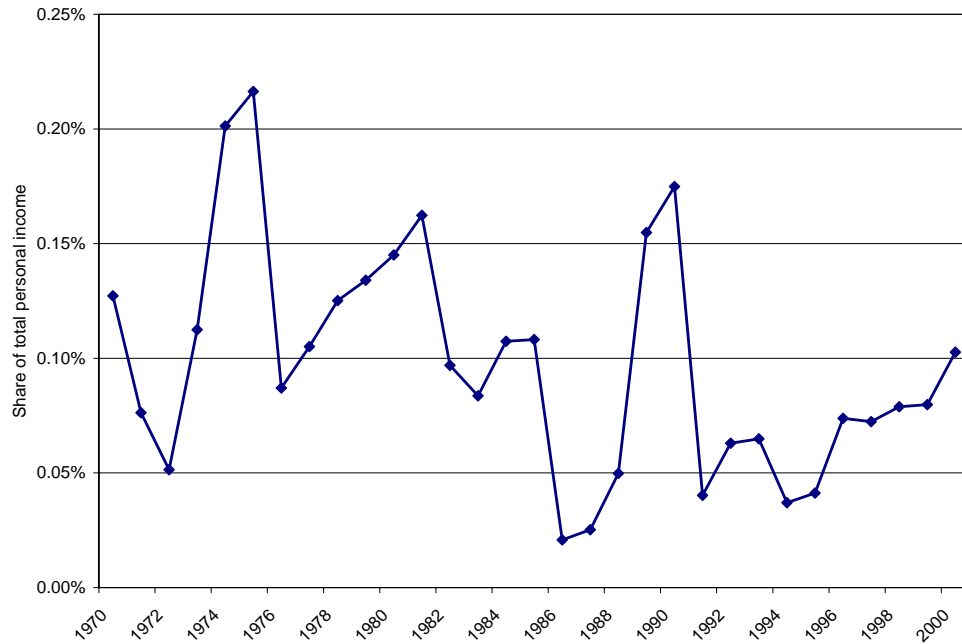
The Mining (and Energy Development) Sector

Currently, there is no significant energy development activity in Otero County. The U.S. Department of Commerce reports that all mining, including energy development, employment, and personal income in Otero County, from proprietors and wage and salary employment combined, was 0.2 percent of total employment, and 0.1 percent of total personal income, respectively, in 2006.³⁸

As of 2006, there were only 66 jobs in the entire mining sector. Most of these appear to be related to “oil and gas extraction.” According to County Business Patterns, these jobs paid \$15,455 on average in 2006, a quarter of the state average for mining and energy development.³⁹

Otero County oil and natural gas production was limited to “wildcat” exploratory wells throughout most of the 20th century. The majority of these wells were abandoned and never developed. Figure 10 shows personal income from mining and energy development compared to all other personal income from 1970 to 2000. The range was always below 0.25 percent of total personal income.

Figure 10. Mining (incl. Energy Development) as a Percent of Total Personal Income in Otero County, 1970–2000⁴⁰



When the BLM drafted its Resource Management Plan for Sierra and Otero counties in 2003, there were a total of 98 existing exploratory wells in Sierra (35) and Otero (63) counties. None of these were active producing wells. Approximately a quarter of the wells in both counties showed potential for production, with just four showing “significant gas production” potential. Of those, one with “significant” potential was located in Otero Mesa.⁴¹

The BLM’s Resource Management Plan estimated a “reasonable foreseeable development” projection for the two counties. This is based on “past and present leasing, exploration, and development activity as well as professional judgment on geological and technological and economic factors.” The resulting projection calls for 141 total wells. Fifty-one of these would be wildcat and appraisal wells. Thirty would be natural gas development wells, and 60 would be oil development wells over the next 20 years in Sierra and Otero counties. They are not proposed to be phased.⁴²

Using what the agency calls a “maximum development” scenario, the BLM estimates that two drilling rigs could drill the 141 wells over a four-year period. This period would feature the most significant economic benefits to Otero and Sierra counties. In these four years, the BLM estimates the exploration and development phase would generate 275 direct, and 105 indirect and induced jobs. All told, these short-duration jobs would represent 1.1 percent of total employment in Otero and Sierra counties.⁴³

The proposed development of fossil fuel reserves in Sierra and Otero counties would appear to have a minimal economic impact—even before considering adverse impacts, employment leakages, and the downturn in energy prices—because of its limited scale and duration.

For more information and discussion on the impacts of proposed oil and natural gas development, see the final section of this report. The next two sections of this report outline state and local mineral taxation.

Summary Findings

Otero County is a rural county with a majority (66%) of its land base owned and managed by the federal government. The county's population and economy grew slower than the state but faster than the nation in recent decades. Population and employment grew by 50 percent while personal income grew by more than 100 percent from 1970 to 2006.

The county's population and economy have largely been tied to the military, especially Holloman Air Force Base adjacent to Alamogordo and to a lesser extent Fort Bliss outside of El Paso and its McGregor Range in the southeast portion of Otero County. Military employment declined significantly beginning in the middle 1980s, and has since stabilized due to favorable decisions from the 2005 Base Realignment and Closure process.

The economy of the county is diversifying. While military employment declined in the 1980s, the rest of the economy grew, owing largely to a mix of service and professional industries, and the growing importance of non-labor income. By 2000, service and professional employment was 50 percent of all jobs, and non-labor income was 37 percent of total personal income in the county. These figures were virtually unchanged in 2006, the latest available figures.

Owing largely to the loss of higher-paying military employment, earnings per job declined in the late 1980s and 1990s. Along with a trend toward greater economic diversity, earnings rose in the 2000s. They were \$35,922 in 2006. Earnings in Otero County are higher than the average of all other rural counties in the West, and per capita income, which includes non-labor income, has followed the same trajectory.

Mining and energy development jobs and personal income have been consistently small in Otero County. In 2006, they accounted for 0.2 percent of total employment, and 0.1 percent of total personal income. In contrast to higher mining and energy development wages elsewhere in New Mexico and the West, in Otero County these jobs paid \$15,455 on average in 2006, a quarter of the state average for mining and energy development.

BLM-proposed development of fossil fuel reserves in Sierra and Otero counties would appear to have a minimal economic impact—even before considering adverse impacts, employment and service leakages, and the downturn in energy prices—because of its limited scale. The agency estimates that related employment would amount to 1 percent of total employment in the Planning Area for a period of four years.

ARE NEW MEXICO'S STATE AND LOCAL GOVERNMENT MINERAL TAXATION AND DISTRIBUTION POLICIES WORKING WELL?

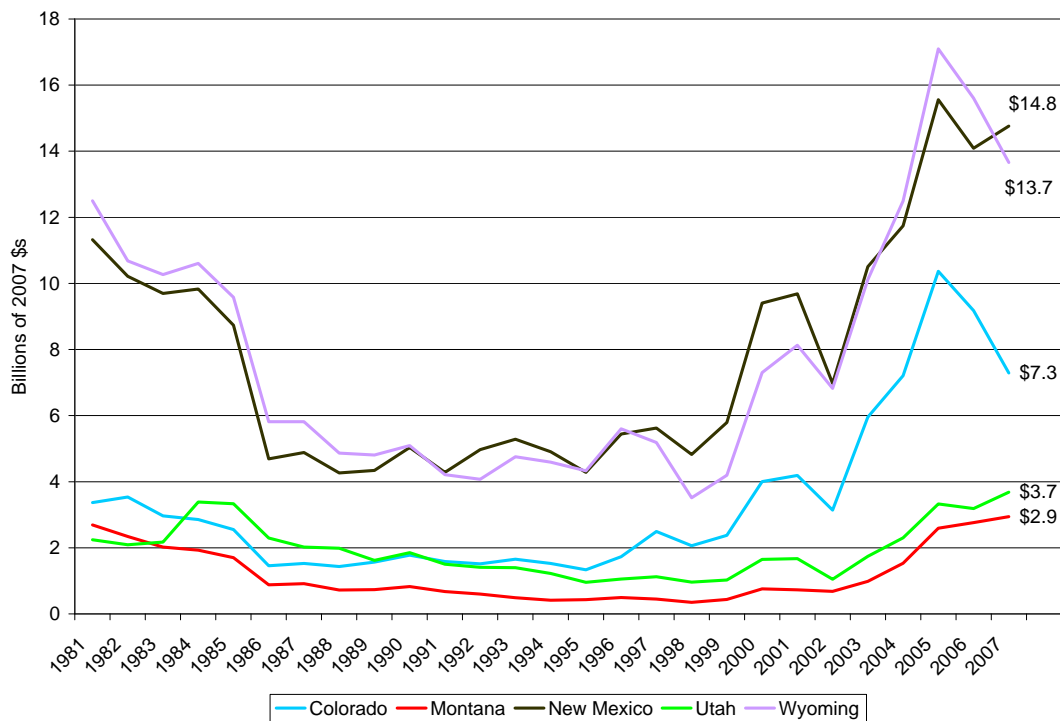
This section provides an overview of New Mexico's mineral taxation and distribution policies, along with historic production and revenue data. This policy and revenue background is intended to provide context for the following section in this report where we discuss how proposed drilling in Otero County would contribute to state and local government revenue.

Energy revenue should be spent for two basic purposes: to facilitate energy extraction and mitigate its impacts; and to ensure that wealth generated from the depletion of fossil fuels contributes to long-term economic prosperity. For more details on mineral taxation, see our companion report, *Energy Revenue in the Intermountain West*.⁴⁴

Production Value of Oil and Natural Gas

Production value is calculated by multiplying the volume of extracted oil and natural gas by price. It is the basis for most taxes and royalties, so understanding how production values change over time is the first indication of the revenue potential and volatility of oil and natural gas development.

Figure 11. Production Value of Oil and Natural Gas in Colorado, Montana, New Mexico, Utah, and Wyoming, 1981–2007⁴⁵



New Mexico Energy Tax Primer

Severance and Production Taxes

The severance tax is a tax on the value of oil and natural gas extracted, or “severed,” from the earth. The emergency school tax, processors tax, and conservation tax are also production taxes levied on oil and natural gas. Production value is the product of the amount of oil and natural gas extracted and price, so changes in production or price will cause tax revenue to rise or fall, sometimes dramatically.

New Mexico grants deductions for transportation and processing costs and federal mineral royalties paid from gross oil and natural gas production value to reach the net, or taxable, value. The base tax rate is 0.087 percent for all four taxes combined, against which incentives and exemptions are offered to stimulate production or promote best practices (such as horizontal drilling).

Property Tax

New Mexico’s property tax includes both a “production” tax on the value of oil and natural gas extracted, and an equipment tax on property. Property taxes are calculated by the formula:

$$\text{Market Value} \times \text{Assessment Rate} \times \text{Mill Levy} = \text{Tax Bill}$$

- The Assessment Rate is the percent of the market value subject to property taxation (or the net market value). New Mexico’s assessment rate is 50 percent on oil and natural gas production and 9 percent on oil and natural gas equipment.
- The Mill Levy is the “tax rate” levied by cities and counties. The New Mexico constitution limits the tax rate local governments can charge, and increases must be approved by a vote of the people.

Federal and State Royalties

Royalties are “production” taxes paid directly to the landowner where drilling takes place. Federal royalties are 12.5 percent and state royalties are 16.7 percent. Royalties are also paid to tribal governments and private landowners at varying rates. Roughly half of federal royalties are returned to New Mexico, while the other half is retained by the U.S. Treasury.

Fees and bonuses paid through the competitive leasing process (a premium paid by a company to win a leasing contract to drill in a specific area) are included in the federal and state royalty statistics we report.

Other Revenue

The oil and natural gas industry also pays sales tax on services and equipment directly associated with drilling activities, and corporate income tax on profits.

Effective Tax Rate

The effective tax rate is a ratio of actual tax collections to gross production value. The effective tax rate accounts for different tax structures, incentives, and deductions between states, allowing for tax rate comparisons between states. New Mexico’s effective tax rate is calculated on the basis of revenue from production taxes, property taxes, and royalties, but excludes sales tax, corporate income tax, and investment income that are not directly based on production value.

New Mexico is the largest oil and natural gas producer—on the basis of production value—in the Intermountain West. Figure 11 (page 30) shows that production value from oil and natural gas in New Mexico (\$14.8 billion) surpassed Wyoming (\$13.7 billion) in 2007.

Like all western states, production value in New Mexico began to grow around 2000 because of a rapid increase in fossil fuel prices, and significant new production of natural gas. The increase in production value has largely masked the inherent volatility of price, but this can be seen in the dramatic drop in production value in 2002 when prices for natural gas in New Mexico fell from \$4.73 per thousand cubic feet in 2001 to \$3.21 per thousand cubic feet in 2002. More recently, volatility has increased. From November 2007 to November 2008, natural gas prices fluctuated from a high of \$10.45 to a low of \$4.41 per thousand cubic feet.⁴⁶

Total Revenue from Oil and Natural Gas

In 2006, revenue from all oil and natural gas taxes, royalties, and income earned from investments accounted for about 18 percent of all state and local revenue in New Mexico.

Figure 12 shows that the relative importance of oil and natural gas has increased since 2000, growing from less than 9 percent of all state and local government revenue in 1999 to nearly 18 percent in 2006, as production values increased.

Figure 12. Total Oil and Natural Gas Revenue as a Portion of All State and Local Government Revenue in New Mexico, 1998–2006⁴⁷

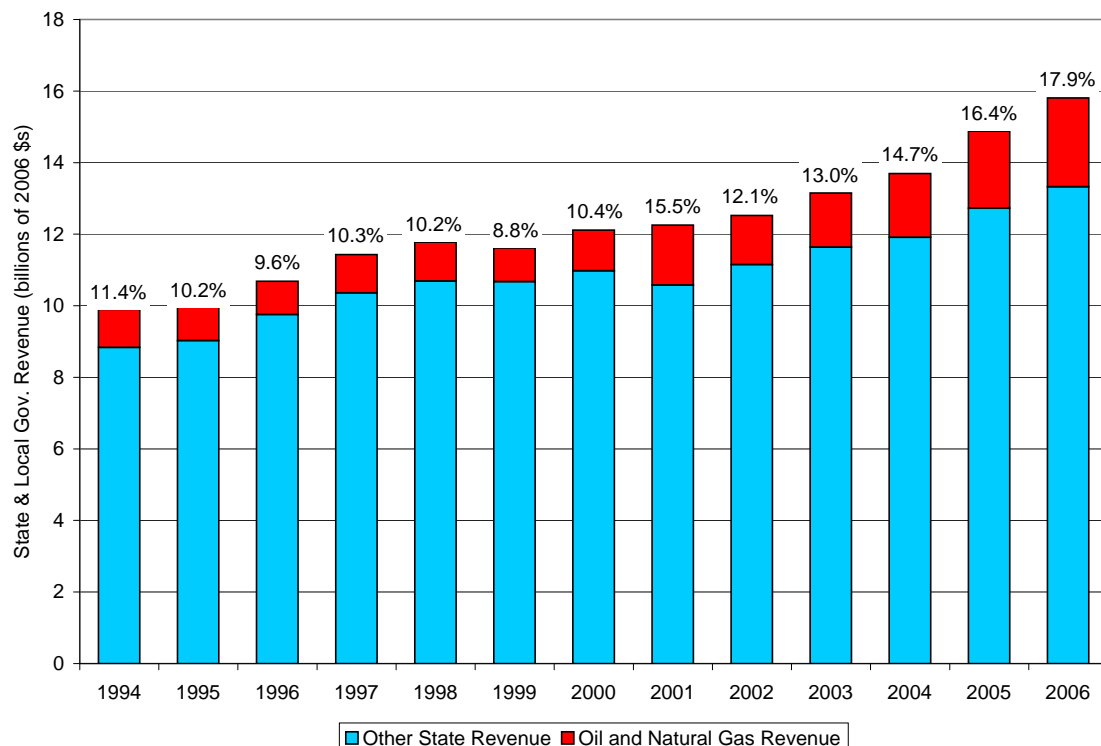
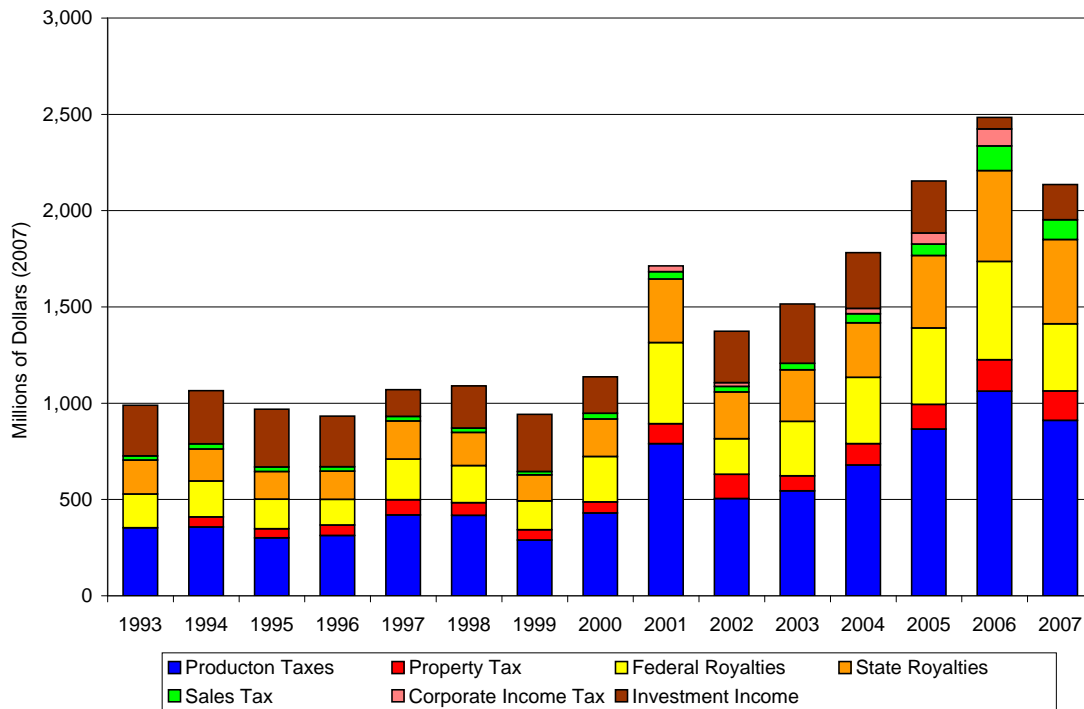


Figure 13 shows the main sources of oil and natural gas revenue included in the above calculations: production taxes collected by state government, royalties collected by state and federal governments, property taxes and sales taxes collected at the state and local level, and returns from state investments.

Figure 13. Total Oil and Natural Gas Revenue by Source in New Mexico, 1993–2007⁴⁸



In 2007, production taxes (severance, emergency school, conservation, and processors tax) together made up 43 percent of total oil and natural gas revenue in 2007. The next largest source was royalties from federal and state lands, which together accounted for 37 percent of total oil and natural gas revenue. Distributions from the state's two permanent funds, the severance tax and land grant funds, contributed 9 percent of all oil and natural gas revenue.* Property taxes collected by local governments accounted for 7 percent of revenue collected by all levels of government. Sales tax added 5 percent of all revenue from oil and natural gas in New Mexico. Corporate income tax accounted for 4 percent of total oil and natural gas revenue in 2006. (Data for 2007 were not yet available from the New Mexico Department of Taxation and Revenue.)⁴⁹

* Totals reported here represent all disbursements from the two permanent funds minus annual contributions. Annual contributions are subtracted from disbursements to avoid double counting of revenue.

Effective Tax Rate

The effective tax rate is a simple means of assessing how much value a particular tax, or suite of taxes, captures from gross production value. New Mexico's effective tax rate on oil and natural gas, which includes all production taxes and royalties but not corporate income and sales taxes, was 13.4 percent in 2007.⁵⁰

Table 6 shows that New Mexico's effective rate changes over time. This is due to the timing of assessments and incentives offered by the state (e.g., low well production incentives).

Table 6. Effective Tax Rate in New Mexico, 2000–2007⁵¹

Year	Production Value	Production Taxes and Royalties	Effective Tax Rate
2000	9,407,828,962	913,427,410	9.7%
2001	9,687,098,812	1,599,398,638	16.5%
2002	6,977,694,030	1,034,794,459	14.8%
2003	10,504,502,208	1,221,477,212	11.6%
2004	11,739,805,966	1,384,788,560	11.8%
2005	15,557,665,336	1,748,506,067	11.2%
2006	14,092,104,305	2,172,294,714	15.4%
2007	13,821,885,145	1,858,924,484	13.4%

New Mexico does a decent job of capturing revenue by maintaining a high effective tax rate. In our companion report *Energy Revenue in the Intermountain West*, we show that New Mexico's effective tax rate for all fossil fuels (oil, natural gas, and coal) was second only to Wyoming's effective tax rate in 2006.⁵²

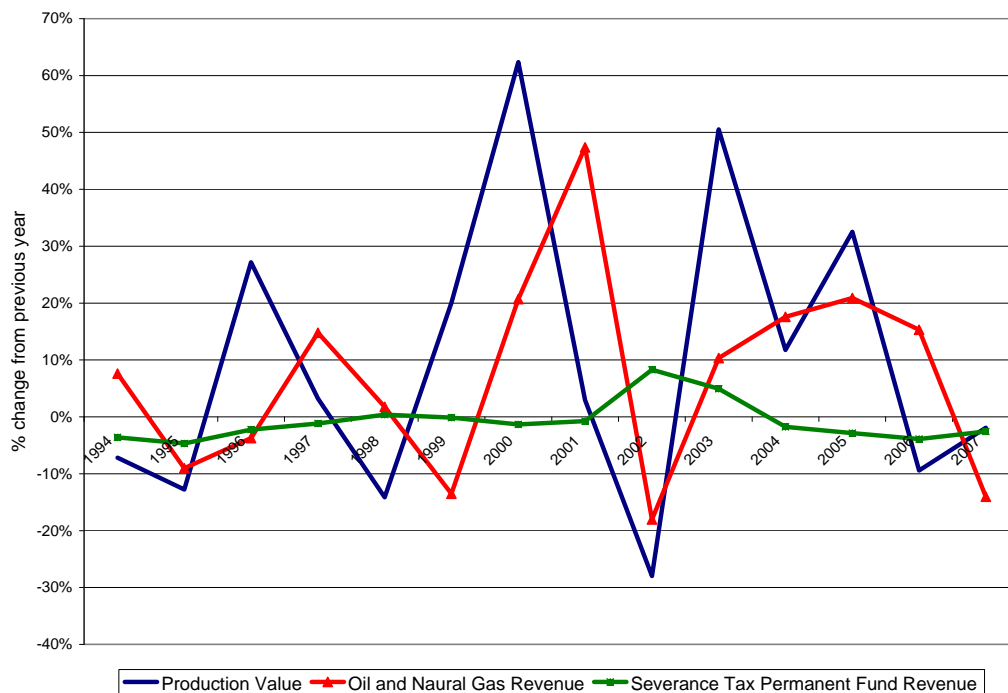
Another positive aspect of New Mexico's fiscal policy is the significant investment the state has made in dedicated funds like the severance tax permanent fund. Because of the scale of this investment (the severance tax permanent fund was worth \$4.6 billion in 2007), the annual interest earned on the fund's corpus is essentially another source of state revenue. In 2007, the severance tax permanent fund earned \$706 million and returned \$171 million to New Mexico's general fund. Distributions from the severance tax permanent fund alone increased the state's effective tax rate by more than a percent.

An important function of the state's permanent funds is smoothing the annual volatility of revenue generated from oil and natural gas extraction. We explore this issue below.

Oil and Natural Gas Volatility

New Mexico's reliance on oil and natural gas revenue to fund basic government services introduces a level of risk because of the inherent volatility of production value. Figure 14 shows the volatility of oil and natural gas production value (blue line) over time as a percent change from the previous year. A positive percent change means that production value increased from the previous year. A negative percent change means that production value decreased from the previous year.

Figure 14. Volatility in Oil and Natural Gas Production Value and Related State and Local Government Revenue in New Mexico, 1993–2007⁵³



Because most tax revenue from oil and natural gas is based on production value, which varies from year to year, state and local government revenue from oil and natural gas is highly uncertain. Taxation and distribution policies can have an impact on revenue volatility, however. New Mexico manages some of this revenue volatility by investing a portion of production taxes in the severance tax trust fund and state royalties in the land grant permanent fund.

Figure 14 (on the previous page) shows that oil and natural gas revenue volatility (red line) is dampened compared to production value. The much more stable trajectory of severance tax permanent fund revenue (green line) is one reason for this. However, only 29 percent of the state's oil and natural gas revenue to the general fund came from the severance tax permanent fund in 2007, leaving the general fund exposed to a highly volatile revenue source that amounted to \$445 million in that year.

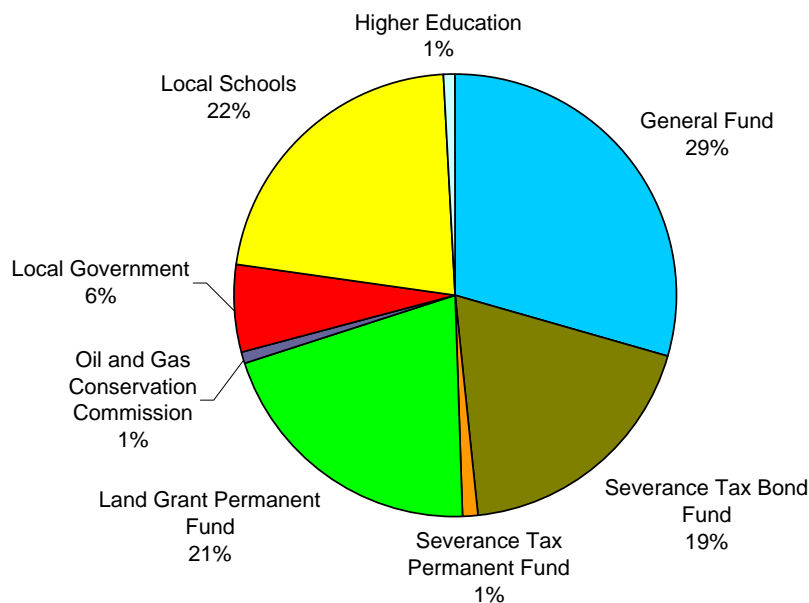
The recent downturn in the economy has highlighted this vulnerability. In early 2008, the governor and state legislature were discussing how to spend a projected \$392 million increase in state revenue from fossil fuel sources.⁵⁴ A year later, with a broad recession and energy prices in sharp decline, the state faces an estimated \$454 million budget deficit in fiscal year 2009 and is debating which essential government services to cut.⁵⁵

Unless predictable annual expenses can be paid for by a similarly stable revenue source, using for example, bonding authority or permanent fund distributions to hedge against volatility risk, government will struggle to provide ongoing services at both the state and local level.

Distribution of Oil and Natural Gas Revenue

This section details how New Mexico distributes energy revenue to the state's general fund and agencies, long-term investment funds, and local government. It also provides a functional classification of spending across four broad categories, including direct spending on energy activities, long-term investments, general government activities, and education.

Figure 15. Distribution of Oil and Natural Gas Revenue in New Mexico, 2007⁵⁶



Oil and natural gas revenue directed to the general fund comes from production taxes, federal royalties, distributions from the severance tax permanent fund, and corporate income tax. Figure 15 shows that 29 percent of all oil and natural gas revenue (\$628 million) went to the state general fund in 2007. This revenue was 13 percent of all general fund revenue in 2007.⁵⁷

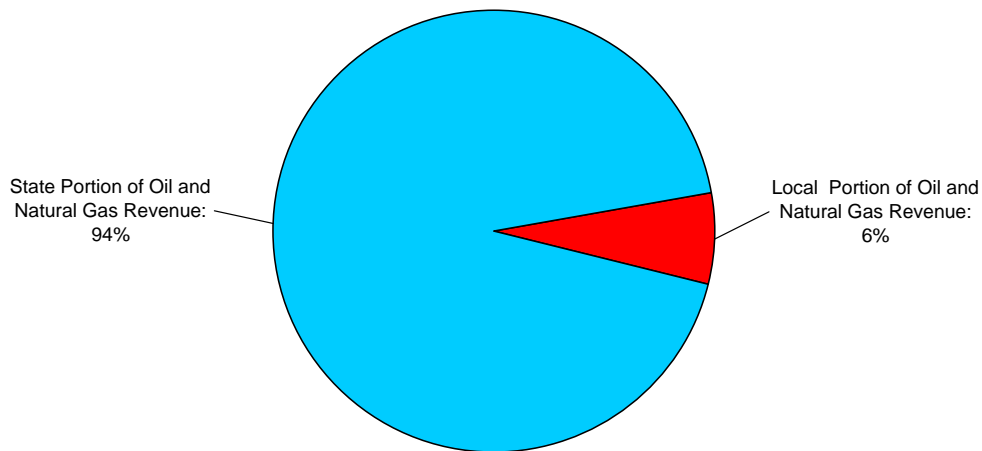
The second largest oil and natural gas revenue beneficiaries are the two state permanent funds, the severance tax permanent fund and the land grant permanent fund. Together, these two funds received 22 percent of all oil and natural gas revenue (\$462 million) in 2007. In different ways, these two funds support broader economic well-being in the state. They also have a stabilizing effect on energy revenue (see Figure 14).⁵⁸

The severance tax permanent fund pays down bonds issued by the legislature to finance state infrastructure projects. After meeting bond obligations, the severance tax permanent fund distributes 5 percent of the principal value (interest earnings plus annual distributions) to the state's general fund to cover a range of government services. The severance tax permanent fund contributed \$171 million to the general fund in 2007.⁵⁹

The land grant permanent fund receives a fixed percent of all income generated from activities on state owned lands, including oil and natural gas leases and royalties. This fund distributed \$439 million in 2007, primarily to support education in the state. In addition, local schools received 22 percent of all oil and natural gas revenue (\$473 million) in 2007. This state spending on education increases human capital and broader economic well being in New Mexico. Unfortunately, more than half of this education revenue comes from oil and natural gas sources that are highly volatile from year to year.⁶⁰

No oil and natural gas production taxes go directly to local jurisdictions. For local governments in New Mexico, property and sales taxes—including from energy development—are the main source of revenue. Local governments include municipalities, counties, and special districts (e.g., hospital districts and fire districts).

Figure 16 illustrates the relative contribution of oil and natural gas revenue (property and sales taxes) to state and local government. Despite the fact that oil and natural gas extraction generates significant wealth for state government and schools, local government received only 6 percent of this revenue (\$133 million) in 2007. This represents the lowest proportion of oil and natural gas revenue returned to local government in the Intermountain West.⁶¹

Figure 16. Local Share of Total Oil and Natural Gas Revenue in New Mexico, 2007⁶²

Even though the vast majority of oil and natural gas revenue does not go to local government, it does benefit local residents. For example, this revenue from the state does fund local public schools. However, state distribution of energy revenue does not necessarily go to areas where oil and natural gas extraction is taking place. This means that affected municipalities and counties may not be receiving the resources they need to deal with the impacts of extraction activities and population growth on local services, including roads, public safety, and social services.

Summary Findings

Energy revenue should be spent for two basic purposes: to facilitate energy extraction and mitigate its impacts; and to ensure that wealth generated from the depletion of fossil fuels contributes to long-term economic prosperity.

New Mexico is the largest oil and natural gas producer in the Intermountain West. The state generated over \$15 billion in oil and natural gas production value in 2007.

New Mexico does a good job capturing value from oil and natural gas extraction, mainly from production taxes and royalties. The state's effective tax rate was 13.4 percent in 2007, ranking behind only Wyoming in the region. Oil and natural gas extraction generated 18 percent of all state and local government revenue in 2007.

Oil and natural gas revenue is highly volatile. New Mexico manages this volatility by investing a significant portion of its oil and natural gas revenue into long-term investment funds (the severance tax permanent fund and the land grant permanent fund). The state invested 22 percent of all oil and natural gas revenue (\$462 million) into these funds in 2007.

Despite hedging strategies, New Mexico's funding of basic government services remains highly exposed to oil and natural gas revenue volatility. This leaves government services like education exposed to risk, and in the current economic downturn has exacerbated the current budget shortfall—estimated at \$454 million in fiscal year 2009.

Local governments in New Mexico receive a small share (6%) of oil and natural gas revenue. They receive no production taxes or royalty payments, and instead rely on property and sales tax revenue from oil and natural gas activity. New Mexico's revenue distribution scheme returns the lowest proportion of oil and natural gas revenue to local government in the Intermountain West.

This small share of energy revenue may mean that municipal and county government in New Mexico do not have the resources they need to deal with the impacts of extraction activities and population growth on local services, including roads, public safety, and social services.

HOW WOULD DRILLING ON OTERO MESA IMPACT STATE AND LOCAL GOVERNMENT REVENUE?⁶³

This section projects state and local government revenue from proposed oil and natural gas development production on Otero Mesa in Otero County.

Projected Production Value

The BLM’s “reasonable foreseeable development” scenario in the Resource Management Plan and Final Environmental Impact Statement for Sierra and Otero Counties projects that 60 oil development wells and 30 natural gas development wells will be drilled over the next 20 years. It also estimates that 3 wildcat and 12 definition wells will become successful producers.⁶⁴

The BLM estimates that each *oil* well will generate on average 3,107 barrels of crude and 10,597 thousand cubic feet of natural gas annually. It also estimates that each *natural gas* well will generate on average 75,530 thousand cubic feet of natural gas and 595 barrels of crude annually.⁶⁵

The Energy Information Administration estimates the price of crude oil and natural gas in 2009 to be \$54.40 per barrel and \$5.58 per thousand cubic feet.⁶⁶ At these prices, the total production value for oil and natural gas combined for the Planning Area of Sierra and Otero counties would be \$32 million per year. This is substantially higher than the BLM’s 2003 estimate of \$11 million per year, which used lower price inputs to calculate production value.⁶⁷ This discrepancy points out the volatility of oil and natural gas prices. In the current economic climate, prices are being revised substantially downward.

Approximately 75 percent of the Planning Area identified by the BLM with “medium potential” for oil and natural gas development lies within Otero County.⁶⁸ Using this percentage we estimate the Otero County portion of total production value at \$24 million per year. This represents 0.17 percent of New Mexico’s total production value in 2007 from oil and natural gas (\$13.8 billion).

Projected State and Local Revenue

Table 7 delineates production value and associated tax revenue for the Planning Area (Sierra and Otero counties) and for Otero County alone.

Table 7. Projected Annual Production Value and Taxes and Royalties⁶⁹

	Production Value	State Production Taxes	Federal Royalties (NM share)	Local Property Taxes
Planning Area	\$31,854,533	\$2,097,572	\$2,468,726	na
Otero County	\$23,890,900	\$1,573,179	\$1,851,545	\$285,411

To determine the fiscal contributions of proposed development to the state, we applied the statewide effective tax rate to the projected production values calculated above. Figures are presented for production taxes only, and for royalties (most drilling will take place on BLM lands, so royalties will be returned to the state from the U.S. Treasury). These two revenue sources represent the lion's share of potential state revenue.

Proposed drilling in the Planning Area would net the state, in production taxes and royalties, approximately \$4.6 million in annual revenue, or 0.27 percent of all 2007 revenue from oil and natural gas production taxes and royalties in New Mexico. The Otero County portion by itself would net about \$3.4 million, or 0.20 percent of state totals in the same year.⁷⁰

Local government in New Mexico receives no direct revenue from production taxes or royalties. The majority of revenue from oil and natural gas extraction that accrues to local government in New Mexico is generated by local property taxes.

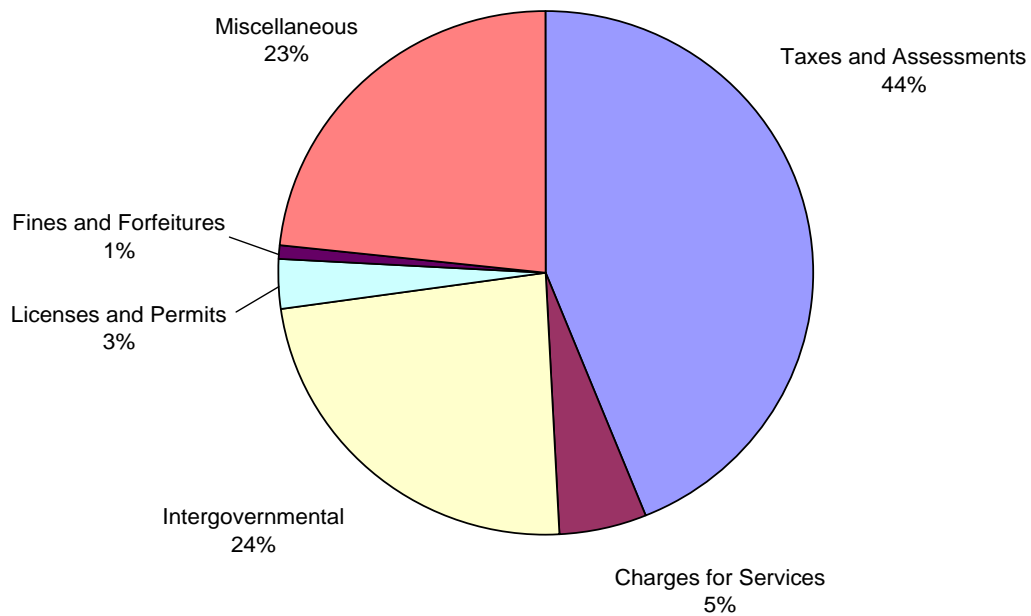
Otero County levies an oil and natural gas production property tax and an oil and natural gas equipment property tax. We calculate total expected revenue by determining the taxable value of production and equipment, and applying the local mill levy (tax rate).

The taxable value of oil and natural gas property in Otero County is effectively 48.33 percent of market value (the sum of the production and equipment effective taxable value rates), and Otero County's mill levy in 2007 was 11.850 mills (or a tax rate of 1.185 percent). Applying these figures to estimated production value of \$24 million, Otero County would be able to levy taxes against a taxable value of \$11.35 million and would generate about \$285,000 in annual revenue from new property taxes.⁷¹

Below we explore the magnitude of this increase in property tax proceeds in the context of Otero Mesa's overall revenue.

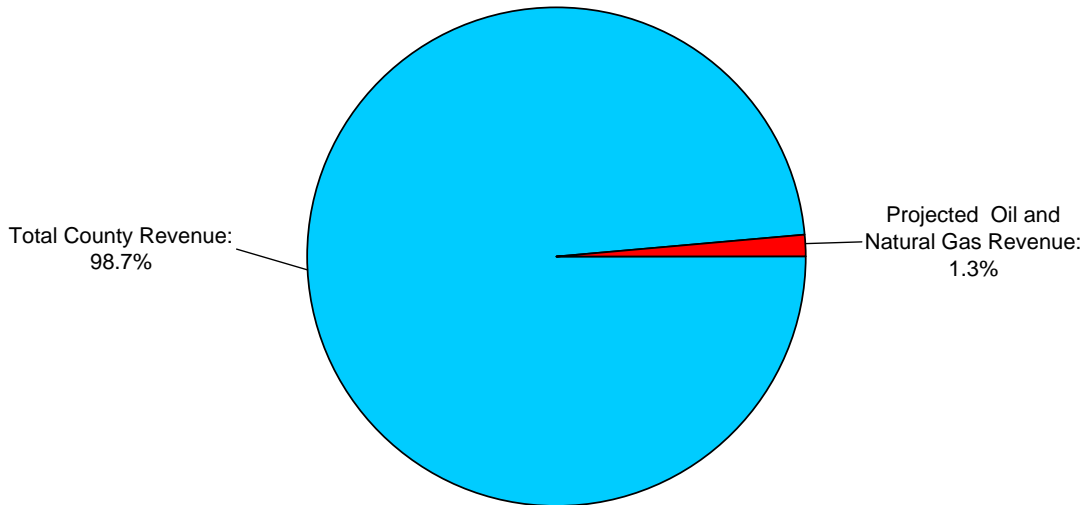
Otero County's Overall Revenue Picture

Otero County government's revenue comes from a variety of sources. Figure 17 shows that 44 percent of Otero County revenue in 2007 came from taxes and assessments (\$9.7 million), the largest of which is property taxes (\$6.4 million) followed by sales tax revenue (\$1.9 million). Intergovernmental revenue makes up the next largest source of county revenue at 24 percent (\$5.3 million) in 2007. These transfer payments do not include any oil and natural gas revenue.⁷²

Figure 17. Total Revenue by Source in Otero County, 2007⁷³

The \$285,411 in projected oil and natural gas revenue from proposed drilling in Otero County would represent 4.4 percent of all property tax revenue and 1.3 percent total revenue from all sources for Otero County in 2007. Figure 18 shows the latter comparison.

Figure 18. Projected Oil and Natural Gas Property Tax Revenue as a Portion of Total Otero County Revenue, 2007⁷⁴



Oil and natural gas extraction could have fiscal benefits beyond direct property tax revenue. Some small amount of revenue will be generated from sales tax on the industry. For New Mexico as a whole, sales tax revenue from mining, including energy development, amounted to about a half of one percent of total revenue in 2007.⁷⁵

For Otero County, sales tax revenue is likely to be limited because of the short duration of anticipated drilling, the remoteness of proposed drilling from the county's population center in Alamogordo, and the expectation that drilling and related service companies from the Permian Basin will successfully compete for the work. For more on the economics of proposed drilling, see the next section in this report.

Summary Findings

Using BLM proposed drilling and well yield figures along with Energy Information Administration price forecasts for oil and natural gas, we estimate the production value from proposed drilling in the Planning Area (Sierra and Otero counties) at \$32 million annually, and in the Otero County portion of the Planning Area at \$24 million annually.

The Otero County figure represents 0.17 percent of New Mexico's total production value in 2007 from oil and natural gas (\$13.8 billion).

Proposed drilling in the Planning Area would net the state, in production taxes and royalties, approximately \$4.6 million in annual revenue, or 0.27 percent of all 2007 revenue from oil and natural gas production taxes and royalties in New Mexico.

The Otero County portion by itself would net about \$3.4 million, or 0.2 percent of state totals in the same year.

The majority of expected local revenue from proposed drilling in Otero County would come from oil and natural gas property and equipment taxes. These taxes would generate about \$285,000 in annual revenue.

Together, these property taxes amount to 4.4 percent of all property tax revenue and 1.3 percent of total revenue from all sources for Otero County in 2007.

WOULD DRILLING ON OTERO MESA CREATE MORE BENEFITS THAN IT WOULD FORECLOSE?

In this section we consider the potential impacts of proposed oil and natural gas development on Otero Mesa.

Potential Economic Impacts

According to the BLM's assessment, the economic magnitude of proposed drilling is limited. The agency's planning document states that "the total positive benefits are not anticipated to produce a significant impact."⁷⁶ The reason for this is the small scale of "reasonable foreseeable development" over a 20-year period: 90 oil and natural gas development wells, and another 15 wildcat and "development" wells that are expected to produce in the Planning Area of Sierra and Otero counties.⁷⁷

The BLM further estimates that two drilling rigs could drill these wells over a four-year period during which the main employment and earnings benefits would occur. And the agency estimates this four-year drilling phase would result in 275 direct jobs, and 105 indirect and induced jobs.⁷⁸

To put this economic activity into perspective, and evaluate whether it would play to economic strengths or remedy competitive weaknesses, it is helpful to appreciate that these projected employment figures amount to 1 percent of the current employment base in Sierra and Otero (i.e., the Planning Area) counties for a period of four years. If three-quarters of these jobs were associated with Otero County drilling activity, they would represent just less than 1 percent of total employment in the county for a period of four years.⁷⁹

It appears employment benefits actually would be much smaller. The BLM estimates that local businesses would not secure contracts and that these jobs would not go to residents in Sierra and Otero counties. Rather, "the exploration of development activities would be carried on largely by nonlocal contractors (none are located in either Sierra or Otero Counties), which would bring in their workers from centers of oilfield activity in the Permian basin."⁸⁰ Martin Moore, Otero County Administrator, "anticipate[d] significant bleed-off"—and estimates "El Paso would reap most of the benefits."⁸¹

The oil and natural gas company that has expressed interest in drilling in Otero County is HEYCO Energy Group (Harvey E. Yates Company) of Roswell, New Mexico. As the BLM notes, HEYCO would likely import drilling crews and hire locals for less technical and lower-paying jobs. This scenario appears to be what already has taken place in previous exploration phases in Otero County where oil and natural gas extraction employment paid on average \$15,455 in 2006—a quarter of the industry figure for the state as a whole, and little over half of the average annual wages for all wage and salary employment in the county.⁸² This type of oil and natural gas employment could negatively affect private sector wages (\$24,244 in 2006).

In addition, employers in lower-paying sectors, such as restaurants, already have difficulty filling positions. Steve Brocket, Alamogordo Mayor and owner of a local, family-owned waffle and pancake house, cites this challenge in his business. According to him, dishwashers and cooks often “leave for construction jobs.”⁸³ Proposed drilling is modest enough that it would not appreciably draw workers from other sectors, as has happened in surging energy economies, but neither would it offer an alternative career (because of short employment duration) or support higher wage opportunities (because of low wages).

The “leakage” of economic benefits would be further exacerbated because of the remote location of most proposed drilling. According to the RMP, “the well sites mostly would be in remote areas, where contractors would have to provide transient living accommodations for workers, thus isolating the activities.” The isolated nature of proposed wells in Otero County would likely keep workers from acquiring housing and spending their paychecks in Alamogordo. In fact, given the proximity to Roswell (for HEYCO and its contractors) and El Paso (big box retail), it would seem unlikely that there would be significant housing and spending impacts.

This may be good news from a housing perspective, as Alamogordo has a relatively tight housing market. According to Mayor Steve Brocket, the city’s rental housing is scarce. This is partly due to housing demand for off-Base housing by Holloman’s active duty personnel and their families, and several thousand German trainees on the Base at any one time and their generous housing stipends from the German government. In addition, the large expansion at Fort Bliss is anticipated to increase demand for housing north of El Paso.⁸⁴

Otero County boasts low unemployment, even in the current recession. The latest seasonally unadjusted figures from the Bureau of Labor Statistics show 4.1 percent unemployment for the county in December 2008.⁸⁵ A modest increase in temporary jobs could reduce unemployment but may also make it more difficult for employers to fill low-wage jobs and would not meaningfully diversify the economy.

Potential Fiscal Impacts

Expected local government revenue generated directly from oil and natural gas development would be modest at about \$285,000 annually during the period of peak production. This revenue would come from property taxes. Sales tax revenue is expected to be minimal because of the remote location of proposed drilling and employment leakages.

Employment leakages will also mean reduced costs to local government associated with public safety, social services, and other government services that are typically stressed during the drilling phase of well development and population growth. Impacts to the county’s road system, however, will occur and may outstrip the modest revenue generated by development.

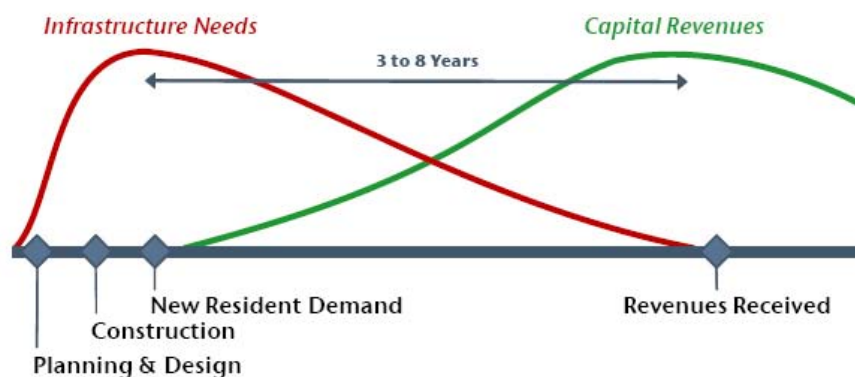
For example, a single county road serves as the main access to the remote locations on Otero Mesa where drilling is projected to take place. The BLM estimates about 6,000 trips will be generated annually on county roads from drilling and production activities, a significant increase over current traffic levels.⁸⁶ County roads are not typically designed to withstand the weight of big drilling rigs and industrial truck traffic, and resulting wear and tear would be substantial.

Because of disproportionate impacts on county roads, energy development counties across the West are pursuing impact fees, special assessments, and agreements with industry to pay for road maintenance.⁸⁷ Without such fees and agreements in place, the maintenance of the primary access road could easily outstrip all revenue derived from oil and natural gas extraction on Otero Mesa.

In addition, to the extent that the workforce commutes from outside Otero County, vehicle miles traveled by industry and support employees will place new unfunded demands on county roads and public safety services.

The gap between when impacts are sustained and when new revenue is available to manage these impacts is also a significant challenge for counties, especially those that rely on property taxes, due to the lag between assessment and revenue collection. Figure 19 depicts this lag.

Figure 19. Timing of Infrastructure Needs vs. Availability of Revenue from Property Taxes⁸⁸



Communities in Wyoming and Colorado have had to raise property and sales taxes to meet ongoing debt and infrastructure obligations brought on by oil and natural gas development. Some larger cities and counties have the flexibility to avoid issuing debt by spending down reserves or borrowing from internal enterprise funds, but this is rarely a luxury available to rural counties. More commonly, communities and counties simply allow the level of their services to decline.⁸⁹

In the case of Otero County, projected revenue is so small (1.3% of all county revenue) that it is hard to foresee any significant revenue benefit. On the other hand, there is the very real danger of having to divert existing revenue to cover the unfunded costs of facilitating oil and natural gas extraction on Otero Mesa.

Opportunity Cost and Otero Mesa

Most resources have alternative uses. A decision or action that precludes another use or value has a consequence, known as “opportunity cost,” or the value of the next best alternative forgone. Below we discuss possible opportunity costs of developing Otero Mesa for oil and natural gas.

Grasslands and Wildlife

The proposed drilling on Otero Mesa raises the question of whether and to what extent alternative economic uses and values would be forgone because of this activity. Governor Bill Richardson raised just this prospect when he described Otero Mesa as the Alaska National Wildlife Refuge of the Southwest, suggesting that keeping the assets of this de facto wilderness intact will support greater longer-term value than the one-time wealth that would be extracted as oil and natural gas.⁹⁰

Otero Mesa is the largest remaining grassland in New Mexico and contains one of the largest remaining black grama grasslands in the Chihuahuan Desert. This scale is important because other smaller remnants of this ecosystem type do not support the rich mix of wildlife that can be found on Otero Mesa. This includes pronghorn antelope and black-tailed prairie dogs, and hoped-for restoration of big horn sheep and the endangered Northern Aplomado Falcon.⁹¹

The BLM has proposed drilling on 95 percent of federal lands on Otero Mesa’s 1.1 million acres, affecting areas where sensitive plant and animal species are found.⁹² Desert grasslands are fragile and difficult to restore once disturbed.

The BLM maintains that for all but 5 percent of federally owned and managed lands on Otero Mesa, where special stipulations to control surface use would be mandated, “standard lease terms and conditions” coupled with “reclamation of the land re-vegetation” will offer adequate protection.⁹³

The U.S. Fish and Wildlife Service, however, believes that fragmentation would permanently disrupt habitat for endangered species like the Northern Aplomado Falcon and re-vegetation efforts would be unlikely to succeed: “healthy remnant desert grasslands are rarely, if ever, restored.”⁹⁴

This warning shows a high potential opportunity cost if oil and natural gas development on Otero Mesa harms the value of a rich, largely undisturbed habitat that is unique and difficult if not impossible to restore once disturbed. This cost also would include the wildlife species found there, or that could be reintroduced, and potential damage from noxious weeds, soil erosion, and other natural resource impacts.

Agriculture and Tourism

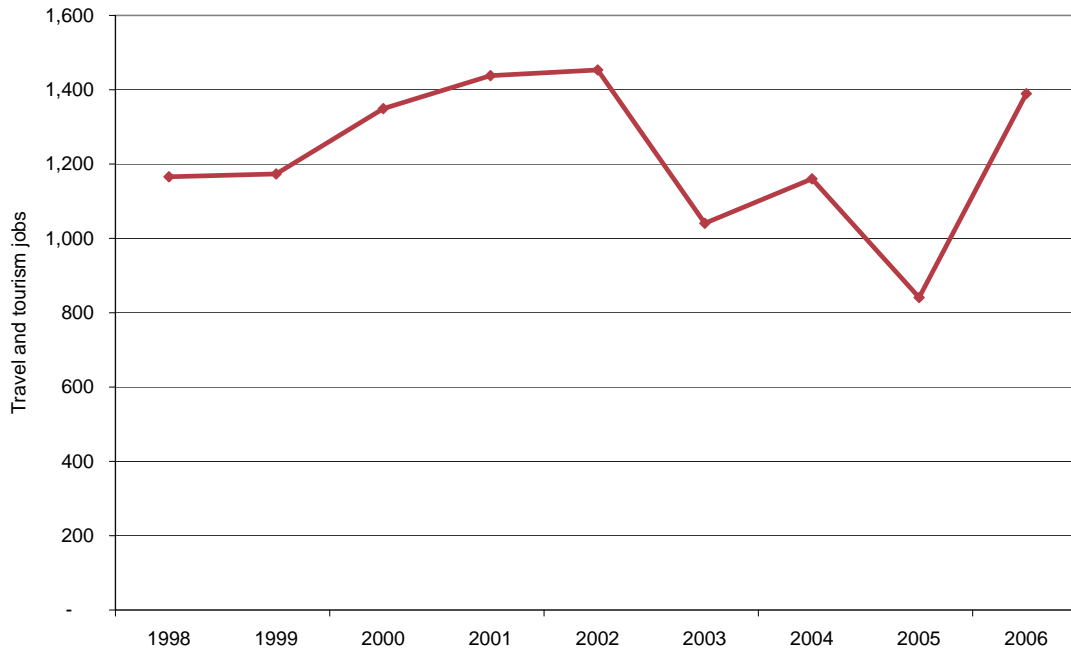
The BLM notes that “Current uses of such lands [i.e., federal lands proposed for exploration and development of fluid minerals] would be displaced, including livestock grazing, hunting, and recreational uses.”⁹⁵

Agriculture is a longstanding but small component of the regional economy today. Farm and ranch employment in Otero County was 2 percent of total employment and generated less than 1 percent of all earnings in 2006.⁹⁶ Agricultural businesses in Otero County are not doing well. Their current gross income only just exceeds production expenses.⁹⁷ Comments submitted by area ranchers to the BLM as part of the planning process frequently raised the issue of conflicts with livestock operations on Otero Mesa as a concern.⁹⁸

Recreational uses may lose the most from proposed development. Because Otero Mesa is remote, little known by the general public, and has limited access, it is not widely visited today. Its scenic nature, however, holds potential for various types of low-impact tourism ranging from hunting to ecotourism.

Part of Otero County’s growing service economy already is tied to tourism. This industry trades heavily on the uniqueness of the landscape and outdoor recreation opportunities, especially related to White Sands National Monument, and the Sacramento and Guadalupe mountains.

Tourism is notoriously difficult to measure because there is no single industry classification that captures all related activities. The Bureau of Economic Analysis has developed an accepted methodology that measures tourism’s share across a range of sectors. Using this approach, travel and tourism in Otero County employed 1,389 wage and salary employees in 2006. This was 11.5 percent of all private and 6.1 percent of total (i.e., including government) wage and salary employment in the county.⁹⁹

Figure 20. Travel and Tourism Jobs in Otero County, 2006¹⁰⁰

These figures are corroborated by the New Mexico Tourism Department. Its annual Travel Economic Impact Model estimates 1,610 employees worked in tourism in Otero County in 2006. This Impact Model also estimates that visitors spent \$137 million locally, while paying \$2.1 million in local taxes in 2006.¹⁰¹

Quality of Life as an Economic Advantage

If Otero Mesa were protected, managed, and branded as a unique and highly scenic landscape within easy reach from already established destinations, it is hard not to see its appeal to visitors. There is a growing body of evidence that protected public lands are economic assets that give rural counties an economic boost. Rural counties with attractive social and natural amenities are among the fastest growing rural counties in the West.¹⁰²

The benefits of amenities to rural counties extend well beyond tourism. The growth and diversification of the Otero County economy in the last 20 years is a good example of a more diverse set of service and professional activities in the regional economy. The link between quality—in the community and on the landscape—is well understood in Alamogordo.

Alamogordo is especially proud of its low crime rates and its “clean and efficient image.” The city

outperforms peer cities in New Mexico in city beautification and crime prevention. Alamogordo has the lowest violent crime and second lowest property crime among peers in New Mexico.¹⁰³ Economic development” campaigns, such as the successful drive to attract a new call center for “1-800-Flowers.com in the early 2000s trade heavily on this image.¹⁰⁴ The lifestyle and affordability of Alamogordo and surrounding suburbs are also attractive to retirees.

Similarly, local leaders trade on the county’s natural assets in their efforts to attract visitors, businesses, and retirees. Local marketing and promotional web sites—for example, Otero County’s Economic Development Council web site—feature the iconic White Sands National Monument and popular Lincoln National Forest.¹⁰⁵

These assets have helped to diversify the economy away from its historic reliance on the military. It is unclear whether oil and natural gas development would negatively affect either Alamogordo’s reputation as “the friendliest place on earth” or Otero Mesa’s attractive landscape. If this were the case, the county’s much larger and growing service economy would have to be considered a major opportunity cost.

Water

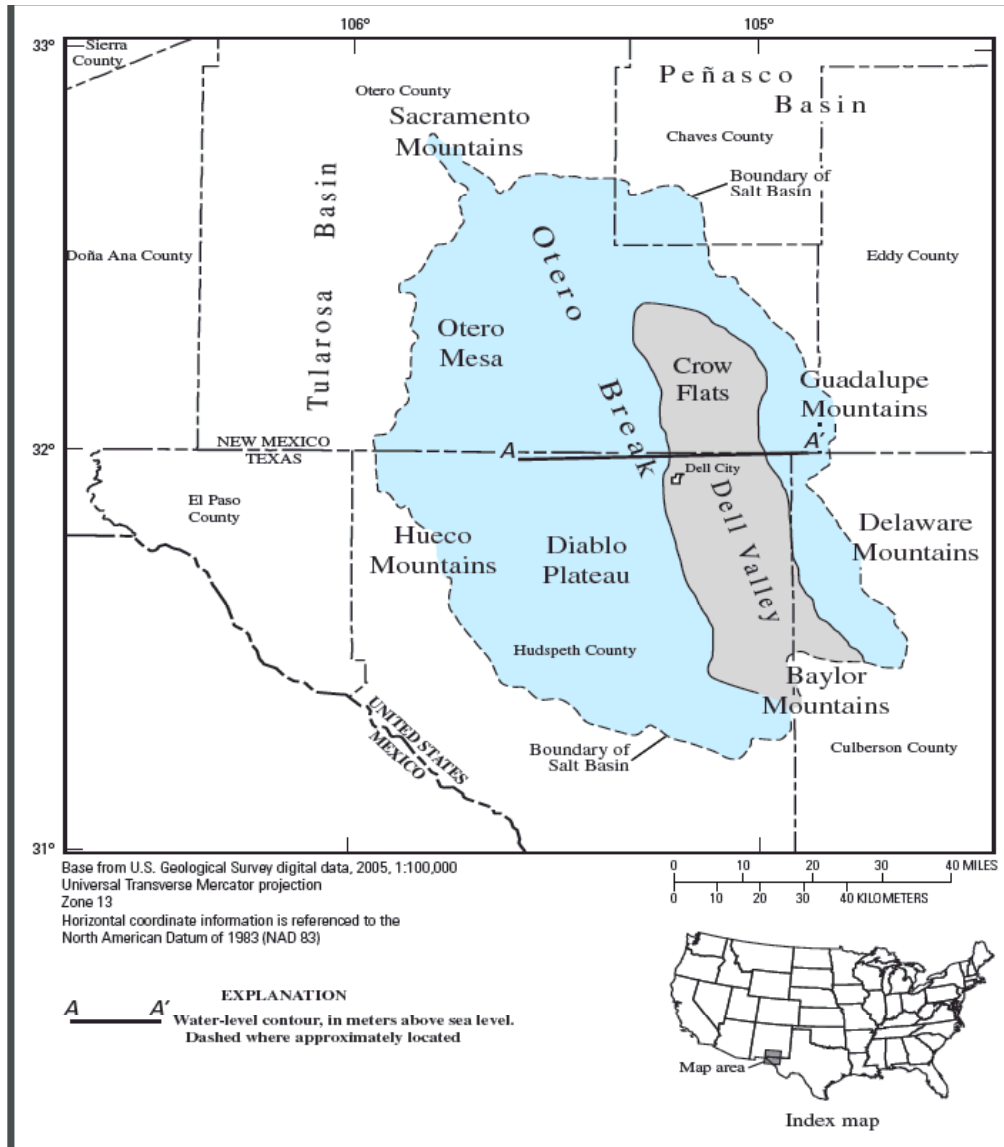
Another potential opportunity cost is the value of groundwater reserves that lie underneath Otero Mesa in the Salt Basin Aquifer shown in Map 3. Southern New Mexico is an arid landscape. Water is scarce. Alamogordo has outgrown its freshwater supply and, with federal agency partners, is in the midst of planning for a major groundwater pumping and desalinization project.¹⁰⁶

A recent U.S. Geological Survey report on the hydrology of the Salt Basin estimates that “as much as 57 million acre-feet of groundwater may be stored within the New Mexico part of the Salt Basin of which 15 million acre-feet are potentially potable and recoverable.” The report calls for further research into this resource and points out that “[r]ecent works suggest that the volume of groundwater storage within the New Mexico portion of the Salt basin may be substantially greater than 57 million acre-feet.”¹⁰⁷

Otero Mesa is an important area of “distributed recharge” for the Salt Basin Aquifer.¹⁰⁸ Currently, groundwater withdrawal is used mainly for agricultural irrigation. This is a relatively low-value use when compared to the value of drinking water for a rapidly growing regional population and is one of the principal reasons the cities of Las Cruces and El Paso both passed unanimous resolutions opposing energy development on Otero Mesa.¹⁰⁹

Future population growth in the region could be constrained by the lack of potable water resources. From an economic perspective, this would represent a large opportunity cost. The BLM promises not to contaminate or deplete this resource.¹¹⁰ However, given the complexity and poorly understood nature of the geology and the small amount of proposed new energy activity, it would seem unwise to risk this valuable asset.

Map 3. Salt Basin Aquifer (blue)¹¹¹



Summary Findings

To determine whether benefits from planned drilling on Otero Mesa exceed negative impacts and forgone future opportunities, this section looked at the economic and fiscal dimensions of projected drilling, and employed a straightforward opportunity cost analysis.

The economic impacts from proposed drilling in Otero County are small. BLM estimated jobs amount to 1 percent of total Planning Area jobs, and less than 1 percent of total employment in Otero County.

However, even these calculations are exaggerated. As the BLM notes, Otero County businesses and workers will not be involved in the labor of drilling and extracting oil and natural gas from Otero Mesa. Companies and workers will come from established areas in the Permian Basin to the east and possibly from El Paso to the south.

Finally, the development phase for proposed drilling is anticipated to last four years. Even if locals could compete for drilling related jobs, they would not last. And, in contrast to much of the West, energy development jobs in Otero County pay well below current average earnings per job. As a result, they could reduce average wages in the county.

The burden on local government to supply infrastructure and services could easily outstrip modest revenue (\$285,000 annually) from proposed oil and natural gas development. The BLM estimates an additional 6,000 annual trips related to oil and natural gas development on Otero Mesa, much of it with heavy trucks and machinery, which will require road improvements and maintenance.

The lag in property tax revenue will challenge Otero County as it deals with upfront drilling impacts. Over time, if the county cannot increase fees, it will either have to raise taxes on other rate payers or reduce the current level of service it offers businesses and residents.

The question of possible forgone opportunities as a result of fossil fuel development on Otero Mesa comes down to whether keeping the assets of this de facto wilderness intact will support greater longer-term value than the one-time wealth that would be extracted as oil and natural gas.

There is a case to be made that the fragile nature of this unique desert grasslands has intrinsic value and cannot be remediated after disturbance. The potable water resources in the Salt Basin, which could be threatened by drilling activities, are large and in a region defined by lack of water, and with population growth will become more valuable over time.

Economic sectors that could be negatively affected include agriculture, which is small in scale, and travel and tourism industries, which are relatively large (about 6% of current employment).

Over the last 20 years, the Otero County economy has diversified into a range of service and professional industries, and fast-growing retirement-related income. This development is significant for two main reasons: the county has a viable economic alternative to military bases, and one complementary to their presence; and these are sectors that are associated with above average economic performance in rural, public land counties in the West.

Qualities like low crime rates, friendliness, affordability in communities, and attractive landscapes that are protected, such as White Sands National Monument, are key assets in the competition for people and business in today's West.

CONCLUSIONS

New Mexico's economy is much larger and diverse today than several decades ago. It has added more than 700,000 jobs and \$41 billion in new personal income from 1970 to 2006. This diversity has made the state less dependent on any single industry. In 2006, the contribution of mining, including energy development, to overall employment and personal income in the state was relatively small: 2 percent of total employment and 3 percent of total personal income. Fossil fuel extraction, however, remains high paying and is focused in three of New Mexico's 33 counties—San Juan, Eddy and Lea.

New Mexico is the largest oil and natural gas producer in the Intermountain West and has a high effective tax rate. However, energy revenue is highly volatile. While the state's permanent funds help to smooth this somewhat, government budgets and services remain exposed to this volatility. Local governments, where many of the impacts of energy development are managed, receive the smallest share (6%) of oil and natural gas revenue of any state in the Intermountain West.

The revenue from oil and natural gas development on Otero Mesa in Otero County would be small, representing 0.27 percent of all oil and natural gas production taxes and royalties in New Mexico and 1.3 percent of total revenue from all sources for Otero County in 2007. The economic outlook is similar. Proposed energy development on Otero Mesa is insignificant at the state level, and would account for less than 1 percent of total employment in Otero County for a period of four years. Few of these jobs would go to workers in the county.

This analysis reviewed how energy policy could direct revenue toward two basic purposes: to facilitate energy extraction and mitigate its impacts; and to ensure that wealth generated from the depletion of fossil fuels contributes to long-term economic prosperity.

In this context, it is difficult to see how the limited revenue and economic activity generated by proposed energy development in Otero County would benefit the state or region in net terms. The costs of mitigating drilling impacts and providing infrastructure and services could easily wipe out modest revenue gains. Other more significant economic sectors may be adversely affected. And foregone future opportunities that could sustain growth and further economic diversification would be placed at considerable risk.

The question of how New Mexico and Otero County will best develop energy policy remains is important and open. With ongoing economic turmoil, the stakes are even higher. Government is not a passive player, and should consider steps to ensure the public benefits from energy extraction. These include:

1. Further delink essential annual government services from highly volatile revenue sources such as oil and natural gas revenue.
2. Utilize more aggressive saving and hedging strategies to manage revenue risk.
3. Provide larger and more predictable intergovernmental transfers of energy revenue to local government to help mitigate the impacts of industry activities without harming economic development opportunities in other sectors.
4. Support more detailed study of the Salt Basin Aquifer and guard this resource for measured future use.
5. Protect and brand landscapes like Otero Mesa to build on the region's tourism industry and, more importantly, to cultivate a growing service and retirement economy as a diversification strategy.

APPENDIX

NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS) DEFINITIONS

The language below is copied verbatim from the U.S. Census Bureau's 2002 NAICS Manual, which is available online: <http://www.census.gov/epcd/naics02/index.html>

211 Oil and Gas Extraction

Industries in the Oil and Gas Extraction subsector operate and/or develop oil and gas field properties. Such activities may include exploration for crude petroleum and natural gas; drilling, completing, and equipping wells; operating separators, emulsion breakers, desilting equipment, and field gathering lines for crude petroleum and natural gas; and all other activities in the preparation of oil and gas up to the point of shipment from the producing property. This subsector includes the production of crude petroleum, the mining and extraction of oil from oil shale and oil sands, and the production of natural gas, sulfur recovery from natural gas, and recovery of hydrocarbon liquids.

Establishments in this subsector include those that operate oil and gas wells on their own account or for others on a contract or fee basis. Establishments primarily engaged in providing support services, on a fee or contract basis, required for the drilling or operation of oil and gas wells (except geophysical surveying and mapping, mine site preparation, and construction of oil/gas pipelines) are classified in Subsector 213, Support Activities for Mining.

213111 Drilling Oil and Gas Wells

This U.S. industry comprises establishments primarily engaged in drilling oil and gas wells for others on a contract or fee basis. This industry includes contractors that specialize in spudding in, drilling in, redrilling, and directional drilling.

213112 Support Activities for Oil and Gas Operations

This U.S. industry comprises establishments primarily engaged in performing support activities on a contract or fee basis for oil and gas operations (except site preparation and related construction activities). Services included are exploration (except geophysical surveying and mapping); excavating slush pits and cellars, well surveying; running, cutting, and pulling casings, tubes, and rods; cementing wells, shooting wells; perforating well casings; acidizing and chemically treating wells; and cleaning out, bailing, and swabbing wells.

2121 Coal Mining

This industry comprises establishments primarily engaged in one or more of the following: (1) mining bituminous coal, anthracite, and lignite by underground mining, auger mining, strip mining, culm bank mining, and other surface mining; (2) developing coal mine sites; and (3) beneficiating (i.e., preparing) coal (e.g., cleaning, washing, screening, and sizing coal).

213113 Support Activities for Coal Mining

This U.S. industry comprises establishments primarily engaged in providing support activities for coal mining (except site preparation and related construction activities) on a contract or fee basis. Exploration for coal is included in this industry. Exploration includes traditional prospecting methods, such as taking core samples and making geological observations at prospective sites.

ENDNOTES

- ¹ Bureau of Economic Analysis, Regional Economic Information System (REIS), Washington, DC, 2006. Table CA25N and CA05N. 2006 is the latest data available for annual demographic, employment, and personal income data from the U.S. Department of Commerce.
- ² **For state and local government revenue, see:** U.S. Census Bureau, Census of Governments, "State and Local Government Finances by Level of Government and by State, 2006," <http://www.census.gov/govs/www/estimate06.html>.
For Federal mineral royalty distributions to states, see: U.S. Department of the Interior, "Mineral Management Service Disbursement Tables," <http://www.mrm.mms.gov/MRMWebStats/Home.aspx>.
For revenue information for New Mexico, see: Production taxes, gross receipts tax, and state royalties from New Mexico Oil Conservation Division Annual Natural Resources Report, "State Revenue from Oil and Gas Production" <http://www.emnrd.state.nm.us/OCD/Publications.htm>; Property Taxes from State of New Mexico Department of Taxation and Revenue, Tax Research and Statistics "Property Tax Facts" <http://www.tax.state.nm.us/pubs/taxresstat.htm>. Corporate income tax from State of New Mexico Department of Taxation and Revenue, Tax Research and Statistics, "Corporate Income Taxes" <http://www.tax.state.nm.us/pubs/taxresstat.htm>. Income from state investments from New Mexico State Investment Council Annual Report, 2007. http://www.sic.state.nm.us/PDF%20files/NMSICAR_2007_Final.pdf.
- ³ E. McNichol and I. J. Lav, "State Budget Troubles Worsen." Center on Budget and Policy Priorities. Online Report, updated January, 29, 2009. Available at: www.cbpp.org/9-8-08sfp.htm.
- ⁴ U.S. Department of the Interior, Bureau of Land Management (BLM), Draft Resource Management Plan Amendment and Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, 2000. Las Cruces Field Office.
- ⁵ BEA REIS 2006 Table CA30.
- ⁶ Ibid.
- ⁷ Ibid.
- ⁸ Available at: www.headwaterseconomics.org/energy.
- ⁹ BEA REIS 2006 Table CA30.
- ¹⁰ BEA REIS 2006 CD Table CA25N and CA05N.
- ¹¹ BEA REIS 2006 CD Table CA05N. Industry totals do not add to 100% because of BEA adjustments made for commuting, and contributions for government social insurance. For more information on these adjustments, see BEA's Local Area Personal Income Methodology: www.bea.gov/regional/docs/lapi2006.
- ¹² BEA REIS 2006 CD Table CA25N and CA05N.
- ¹³ Available at: www.headwaterseconomics.org/energy.
- ¹⁴ BEA REIS 2006 CD Table CA05 and CA05N.
- ¹⁵ County Business Patterns 2008; Headwaters Economics.
- ¹⁶ Ibid.
- ¹⁷ T. R. Smith, "The Relationship between the Tenth District Economy and the National Economy", *Federal Reserve Bank of Kansas City Economic Review Fourth Quarter*, 81 (1996): 77–90. www.kc.frb.org/publicat/econrev/pdf/4q96smit.pdf.
- ¹⁸ Census 2000 SF3 Table P49. The index was calculated by summing the squares of the difference in shares between the state economy and the US for the 20 sectors.
- ¹⁹ BLS 2006 Quarterly Census of Employment and Wages (QCEW).
- ²⁰ W. Whitford and K. Bixby, "The Last Desert Grasslands: The biological case for protecting Otero Mesa". Las Cruces, N.M.: The Southwest Environmental Center, 2007. www.wildmesquite.org/otero/TheLastDesertGrasslands.pdf.
- ²¹ U.S. Census, U.S. Geological Survey, Conservation Biology Institute, New Mexico State Land Office.
- ²² BEA REIS 2006 Table CA30.
- ²³ Ibid.

- ²⁴ U.S. Census Bureau, 2005-2007 American Community Survey. For more detailed information, see: http://factfinder.census.gov/servlet/ADPTable?_bm=y&-context=adp&-qr_name=ACS_2007_3YR_G00_DP3YR2&-ds_name=&-gc_url=&-tree_id=3307&-redoLog=false&-geo_id=05000US35035&-format=&-lang=en.
- ²⁵ Bureau of Labor Statistics, Local Area Unemployment Statistics, 2009. See also p. 19 of our socioeconomic profile for Otero County, available at: www.headwaterseconomics.org/energy.
- ²⁶ BEA REIS 2006 Table CA30.
- ²⁷ Ibid.
- ²⁸ BEA REIS 2006 Table CA30. Rural, or nonmetropolitan, counties are all counties that are not classified as Metropolitan. Metropolitan areas are defined by the U.S. Office of Management and Budget and are the result of the application of published standards to Census Bureau data. For more information on the metropolitan areas, see: www.census.gov/population/www/metroareas/metrodef.html.
- ²⁹ BEA REIS 2006 Table CA25 and CA25N.
- ³⁰ See www.holloman.af.mil/library/factsheets/index.asp and www.globalsecurity.org/military/facility/fort-bliss.htm.
- ³¹ BEA REIS 2006 CD Table CA25.
- ³² Available at: www.headwaterseconomics.org/energy.
- ³³ BEA REIS 2006 Table CA30.
- ³⁴ Ibid.
- ³⁵ BEA REIS 2006 CD Table CA05N. Industry totals do not add to 100% because of BEA adjustments made for commuting, and contributions for government social insurance. For more information on these adjustments, see BEA's Local Area Personal Income Methodology: www.bea.gov/regional/docs/lapi2006.
- ³⁶ BEA REIS 2006 Table CA35.
- ³⁷ BLS 2006 Quarterly Census of Employment and Wages (QCEW).
- ³⁸ BEA REIS 2006 CD Table CA25N and CA05N.
- ³⁹ BLS 2006 Quarterly Census of Employment and Wages (QCEW).
- ⁴⁰ BEA REIS 2006 CD Table CA05.
- ⁴¹ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003 Vol. 1: 3-8; see also Appendix A, Reasonable and Foreseeable Development, pp. 1-5.
- ⁴² Ibid. See Appendix A, pp. A-7 to A-10, and Table A-5.
- ⁴³ Ibid. See Chapter 4: Environmental Consequences, pp. 4-51 to 4-54; BEA REIS 2006 CD Table CA25N.
- ⁴⁴ Available at: www.headwaterseconomics.org/energy.
- ⁴⁵ **Oil Production:** U.S. Department of Energy, Energy Information Administration, Crude Oil Production by State, Annual-Thousand Barrels, 1981-2007 http://tonto.eia.doe.gov/dnav/pet/pet_crd_crpdn_adc_mbbbl_a.htm.
Oil Price: Energy Information Administration, Domestic Crude Oil First Purchase Price by Area (Dollars per Barrel), 1981-2007. http://tonto.eia.doe.gov/dnav/pet/pet_pri_top.asp
Natural Gas Production: Energy Information Administration, Natural Gas Gross Withdrawals and Production by State (Volumes in Million Cubic Feet), 1981-2006. http://tonto.eia.doe.gov/dnav/ng/ng_prod_sum_dcu_NUS_a.htm. 2007 natural gas production figures from New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division. Statewide Natural Gas and Oil Production Summary by Month. <http://www.emnrd.state.nm.us/ocd/Statistics.htm>.
Natural Gas Price: Energy Information Administration, Natural Gas Wellhead Prices by Area (Dollars per Thousand Cubic Feet), 1987-2007. (2007 price is average annual U.S. price) http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_a_EPG0_FWA_DMcf_a.htm.
http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SNM_m.htm.
- ⁴⁶ http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SNM_m.htm.
- ⁴⁷ See footnote 2 above.
- ⁴⁸ Ibid: Revenue information for New Mexico.
- ⁴⁹ Ibid.

- ⁵⁰ See footnotes 2 and 45 above.
- ⁵¹ Ibid.
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- ⁵⁴ Associated Press. New Mexico enjoying revenue windfall from oil, gas. July 9, 2008, Santa Fe New Mexican. www.santafenewmexican.com/Local%20News/Oil-gas-prices-boost-state-s-revenue.
- ⁵⁵ Center on Budget and Policy Priorities. State Budget Troubles Worsen. Elizabeth McNichol and Iris J. Lav. Updated January, 29, 2009. Available at: www.cbpp.org/9-8-08sfp.htm.
- ⁵⁶ See Footnote 2 above.
- ⁵⁷ State of New Mexico Treasurer's Office 2007 Annual Report. Statement of Revenues, Expenditures and Changes in Fund Balances, General Fund. http://www.stonm.org/files_uploads/1400.pdf
- ⁵⁸ See Footnote 2 above.
- ⁵⁹ Ibid.
- ⁶⁰ Ibid.
- ⁶¹ *Energy Revenue in the Intermountain West*, Headwaters Economics, p. 24-25. Available at: www.headwaterseconomicsl.org/energy.
- ⁶² 2007 natural gas production figures from New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division. Statewide Natural Gas and Oil Production Summary by Month. <http://www.emnrd.state.nm.us/ocd/Statistics.htm>.
Natural Gas Price: Energy Information Administration, Natural Gas Wellhead Prices by Area (Dollars per Thousand Cubic Feet), 1987-2007. (2007 price is average annual U.S. price) http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_a_EPG0_FWA_DMcf_a.htm.
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- ⁶⁴ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties. Bureau of Land Management. 2003. Chapter 4, p. 4-56. http://www.blm.gov/nm/st/en/fo/Las_Cruces_District_Office/white_sands_otera.html.
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- ⁶⁶ U.S. Energy Information Administration, Forecasts and Analyses, Report #:DOE/EIA-0383(2009). Release date, December 2008. Figures shown in 2007 dollars. www.eia.doe.gov/oiaf/forecasting.html.
- ⁶⁷ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties. Bureau of Land Management. 2003. Chapter 4, p. 4-56.
- ⁶⁸ Draft Resource Management Plan Amendment and Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties. US Department of Interior, Bureau of Land Management, Las Cruces Field Office, October 2000, Chapter 3, pp.3-10 to 3-12, Map No. 3-3, and Chapter 4, pp. 4-55 to 4-65.
- ⁶⁹ See footnotes 2 and 45 above; Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties. Bureau of Land Management. 2003. Chapter 4; we did not analyze property taxes in Sierra County.
- ⁷⁰ Ibid.
- ⁷¹ Ibid.
- ⁷² New Mexico Department of Finance and Administration, Budget and Finance Bureau 2007 Annual Report, County Government Receipts and Disbursements by Fund. <http://fmb.nmdfa.state.nm.us/content.asp?CustComKey=334109&CategoryKey=335559&pn=Page&DomName=fmb.nmdfa.state.nm.us>.
- ⁷³ Ibid.
- ⁷⁴ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for

Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties. Bureau of Land Management. 2003. Chapter 4; U.S. Energy Information Administration, Forecasts and Analyses, Report #:DOE/EIA-0383(2009). Release date, December 2008. www.eia.doe.gov/oiaf/forecasting.html; 2007 natural gas production figures from New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division. Statewide Natural Gas and Oil Production Summary by Month. <http://www.emnrd.state.nm.us/ocd/Statistics.htm>.

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⁷⁵ See footnote 2 above.

⁷⁶ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003 Vol. 1: Chapter 4, p. 4-64.

⁷⁷ Ibid., Chapter 4, p. 4-56.

⁷⁸ Ibid., Chapter 4, p. 4-53.

⁷⁹ BEA REIS 2006 CD Table CA25N.

⁸⁰ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003 Vol. 1: Chapter 4, p. 4-53.

⁸¹ Martin Moore, Otero County Administrator (active at time of interview, now resigned). Headwaters Economics interview. Summer 2007.

⁸² Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW).

⁸³ Steve Brocket, Alamogordo Mayor. Headwaters Economics interview. Summer 2007.

⁸⁴ Steve Brocket, Alamogordo Mayor. Headwaters Economics interview. Summer 2007; In 2005, military stipends (Basic Housing Allowance or BAH—intended to cover 100% of housing costs for authorized U.S. Department of Defense employees) in Alamogordo ranged from \$534 to \$984, depending on rank and number of dependents. See <http://usmilitary.about.com/library/milinfo/2006bah/enlnodep/blnm.htm>.

⁸⁵ BLS 2009 Local Area Unemployment Statistics.

⁸⁶ Bureau of Land Management PRMPA/FEIS for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, Chapter 4—Environmental Consequences. Table 4-5 Total Trips Generated by RFD (Reasonably Foreseeable Development). December 2003. Chapter 4, pp. 4-7.

⁸⁷ We address this issue in more detail in our companion report, *Impacts of Energy Development in Colorado*. Available at: www.headwaterseconomics.org/energy.

⁸⁸ *Northwest Colorado Socioeconomic Analysis and Forecasts*, prepared for Associated Governments of Northwest Colorado by BBC Research and Consulting, 2008, p. 13.

⁸⁹ See our Colorado and Wyoming reports for more details: www.headwaterseconomics.org/energy.

⁹⁰ “Bush Drilling Plan Brings Foes Together...” *LA Times*, Feb. 11, 2004.

⁹¹ *The Last Desert Grasslands: The Biological Case for Protecting Otero Mesa*, Walt Whitford and Kevin Bixby. Southwest Environmental Center. January 2006. Available at: www.wildmesquite.org/otero.htm.

⁹² See www.oteromesa.org/blmanalysis.htm. See also Map 3-8, BLM Proposed RMP and Final EIS for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, Vol. 1 (Dec. 2003). The majority of special status plant and animal species in the larger planning area are found on Otero Mesa.

⁹³ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003 Vol. I: Chapter 2 – Proposed Plan; Chapter 4 – Environmental Consequences.

⁹⁴ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003 Vol. II: p. G-I-30, Letter 24.

⁹⁵ Ibid., Volume I: Chapter 4 – Environmental Consequences, p. 4-51.

- ⁹⁶ BEA REIS 2006 CD Table CA25N.
- ⁹⁷ BEA REIS 2006 CD Table CA45.
- ⁹⁸ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003, Vol. 2.
- ⁹⁹ Bureau of Economic Analysis tourism methodology description is available at: www.bea.gov/scb/pdf/2004/09September/0904_TTSAs.pdf. County Business Patterns total wage and salary employment in 2006 for Otero County is 12,128; U.S. Bureau of the Census. County Business Patterns 2008. Bureau of Economic Analysis government employment in 2006 for Otero County is 10,655; BEA REIS 2006 Table CA25 and CA25N.
- ¹⁰⁰ U.S. Bureau of the Census. County Business Patterns 2008.
- ¹⁰¹ See New Mexico Economic Impact of Travel (FY2006) at: www.newmexico.org/departments/research/research_documents.php.
- ¹⁰² See, for example, R. Rasker, "An Exploration into the Economic Impact of Industrial Development Versus Conservation on Western Public Lands." *Society and Natural Resources* 19 (2006): 191–207; and McGranahan, David. 1999. Natural Amenities Drive Rural Population Change, USDA, Economic Research Service, Report No. AER781, available at: www.ers.usda.gov/Publications/AER781.
- ¹⁰³ UCR crime data puts Alamogordo at index (rate per 100,000 people) of 321.2 for violent crime versus national average for "Cities outside Metropolitan areas" of 382.4; property index 2490.6 v. national index 3849.3. (FBI, Uniform Crime Reports, 2006, <http://www.fbi.gov/ucr/cius2006/>).
- ¹⁰⁴ Otero County Economic Development Council Newsletter, July 2001.
- ¹⁰⁵ See: www.occidc.com/index.php.
- ¹⁰⁶ Current water supply for Alamogordo is drawn primarily from the nearby Sacramento Mountains. Together with the City of Alamogordo, the Bureau of Land Management (BLM) Las Cruces Field Office and the Bureau of Reclamation (Reclamation) are in the midst of NEPA procedures (scoping and EIS) regarding a proposal from the City of Alamogordo to develop a well field, construct a pipeline, and construct a desalination water treatment facility in the Tularosa Basin, New Mexico. (BLM web site: http://www.blm.gov/nm/st/en/fo/Las_Cruces_District_Office/alamogordo_regional.html) The proposal has generated local controversy, with affected area ranchers and water users concerned about the project's impacts on groundwater and well supplies (Alamogordo Regional Water Supply Environmental Impact Statement Public Scoping Document, SWCA Env'tl Consultants for US BLM and US BurRec April 2005: 6. www.swca.com/arwsp/documents/Final_PublicScopingReport_000.pdf).
- ¹⁰⁷ Huff, G.F., Chace, D.A., 2006, Knowledge and Understanding of the Hydrology of the Salt Basin in South-Central New Mexico and Future Study Needs: U.S. Geological Survey Open-File Report 2006-1358.
- ¹⁰⁸ Ibid., p. 15.
- ¹⁰⁹ Las Cruces Resolution Number 09-048, A Resolution in Support of Permanent Protection of Otero Mesa's Land, Wildlife, and Water Resource from Oil and Natural Gas Drilling, by unanimous approval, August 18, 2008; El Paso Resolution Number Reso-08-Otero Mesa Wildlife, Doc #39628, unanimous approval, June 3, 2008.
- ¹¹⁰ Proposed Resource Management Plan Amendment and Final Environmental Impact Statement for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties, U.S. Department of Interior, BLM Las Cruces Field Office, December 2003 Vol. I: Chapter 3, Section 3.7 Groundwater.
- ¹¹¹ *Knowledge and Understanding of the Hydrology of the Salt Basin in South-Central New Mexico and Future Study Needs*: U.S. Geological Survey Open-File Report 2006-1358.



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