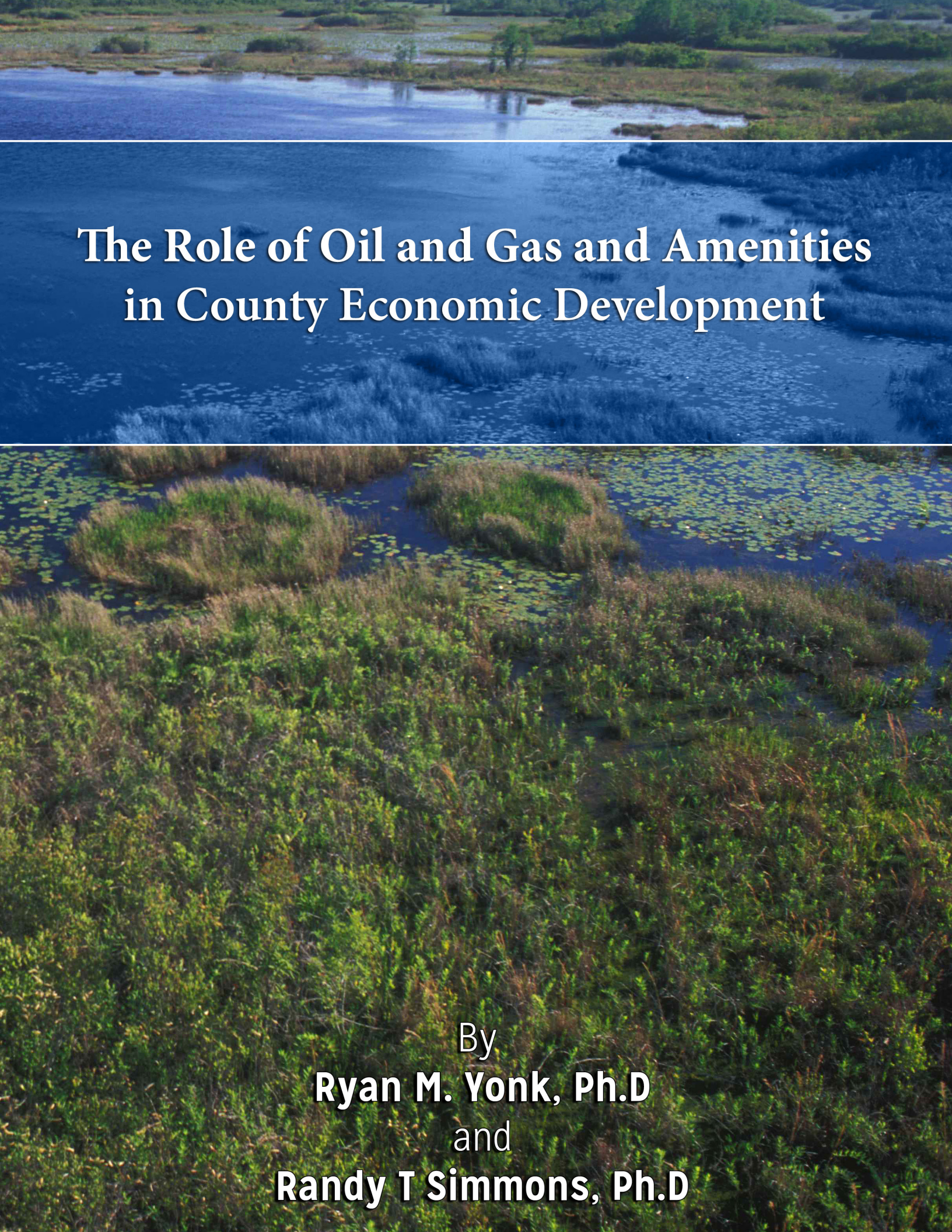

The Role of Oil and Gas and Amenities in County Economic Development

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Executive Summary

This study explores the diversification of economic development portfolios in 15 counties in 5 regions in the western United States.[1] It proceeds by examining how counties balance energy extraction and development of amenities on their lands. It is important to note, however, that a county possesses only limited authority with respect to development issues; many dimensions of development lie outside of the county domain at the state or national levels.

This study found the following:

- Counties tend to develop both energy and amenity resources when possible.
- In cases in which a county focuses exclusively on either energy extraction or amenity development, it is usually because of constraints beyond the control of that county (e.g., a lack of natural resources or land-use policy that prohibits energy exploration) and not because the county considers exclusivity the best option.
- Throughout the western United States, energy extraction and amenities both play integral roles in economic growth for county development.
- Energy extraction can directly advance the development of amenities.
- The energy and amenity sectors can both be cyclical, although they tend to follow different cycles.
- High value amenity development and high value energy development can increase property values, raise the cost of living, and result in inter-county migration.
- Energy extraction operations offer higher-paying jobs, while hospitality and recreation operations employ greater numbers of people. A county's economic well-being depends on having both high-paying jobs and a large number of jobs.

These findings are consistent with the general findings of the literature. Several authors find that counties with a more balanced approach to the development

[1] Including Bradford County, Pennsylvania, which was also examined, the total is 16 case studies.

of amenities and energy are better off than those counties that develop either amenities or energy at the expense of the other (Lorah & Southwick, 2003; McGranahan, Wojan, & Lambert, 2011; Krannich & Petrzelka, 2004).

Part I: Overview

Many areas of the United States are being transformed by national population growth and by increases in the U.S. production of oil and natural gas resulting from technological advances in energy extraction. As a result of population increases cities have grown and expanded and are now abutting areas set aside for forests, national parks, and areas meant to "be held in public ownership because of their other resource values" (BLM, 2011; BLM, n.d.). This expansion has contributed to growing levels of recreation on many public lands, which often fosters economic expansion based on amenities. At the same time, advances in energy extraction, particularly hydraulic fracturing,[2] have made it possible to extract oil and gas from many areas that were previously not economically or technologically feasible, generating needed energy for the nation, and creating jobs and tax revenue. This broad combination of developments is bringing significant economic benefits to many local communities.

Throughout this document the terms "energy extraction," "energy resources," and "energy development" are used to refer to the exploration and/or production of oil and natural gas. The term "amenity development" was chosen to describe a variety of activities that contribute to and/or may derive from the natural attractiveness and value of a given area, including wilderness or other designated lands, recreation opportunities in those areas, and agricultural activity. The use of the term "amenity" as a means to describe areas with a high quality of life due to the presence of natural features comes from the Natural Amenities Scale created by the U.S. Department of Agriculture (USDA), which originally guided the authors' decisions regarding what amenities to describe in this report (USDA, 2012, July 5). The term "amenities" is also commonly used to refer to the types of areas and activities discussed in this report, such as "clean beaches, hunting and fishing opportunities, forests to hike in, the view of green farmlands, and clean rivers for recreating in" (Crandall, 2008).

Some view energy development and amenity development as mutually exclusive, though this view is by no means dominant. This study explores the degree to which the two activities can coexist and make positive contributions to a county's economic well-being. It does so through a series of case studies that explore land use and economic outcomes across the spectrum of the energy/amenity plane.

[2] In hydraulic fracturing, "fracturing fluids" consisting primarily of water and sand are injected under high pressure into the producing formation, creating fissures that allow resources to move freely from rock pores where they are trapped. It is also known as "hydraulic fracking" or simply "fracking."

Counties were selected by region (the composition of these regions will be explained below) and their blends of energy extraction and amenity development. Some counties were chosen because their cases aptly illustrated the choices and trade-offs encountered when deciding whether to develop energy, amenities, or both (e.g., Moffat County, Colorado). Some of the findings are qualitative observations.[3] However, the research team believes that the general results would hold under more rigorous analysis.

Discussion of Results

The factors that lead to economic growth at the county level are not always easy to identify or explain, though surely both energy and amenity resources can influence county growth. However, there are many other factors that can also influence growth, such as amenities in surrounding counties, the specifics of oil and gas development, and land-use policies. In examining the factors that affect county economic growth, several key findings emerge:

- Counties tend to develop both energy extraction and amenity resources when possible.

  County officials understand that both energy and amenity development add value to the county, and so they tend to develop both when possible. The Executive Director of the Colorado Department of Resources explained that "a balanced approach to development would allow for Moffat [County] … to experience significant economic benefits from gas development, and, at the same time, protect one of the most unique landscapes found anywhere in the state." This idea of balance is also the approach in other counties (e.g., Sublette County, Wyoming, and Garfield County, Colorado) where county officials are working to develop their oil and gas resources while maintaining the traditional amenity activities that residents and visitors enjoy.

  Dual growth is often facilitated by the physical separation of energy and amenity resources. For example, in Kern County, California, most oil and gas activity occurs in the western part of the county, away from the recreation activities of the Sequoia National Forest located in the East. By maintaining distance between the amenity lands in Kern County and the

[3] Detailed data on specific industrial sectors at the county level is very difficult to consistently obtain, which precludes a more rigorous approach. Recognizing the data limitations and biases presented with poor-quality data, a more qualitative approach was taken. See "discussion of data" for a more detailed explanation of methodology.

county's oil and gas extraction, both are able to continue to develop without hindering the progress of the other.

While most counties with available amenity and energy resources tend to develop both, not all counties choose to do so. While Monterey County, California, has significant amenity opportunities and energy resources, to-date the county has chosen to focus mainly on amenity development as a basis for their economy.

- In cases in which a county focuses exclusively on either energy or amenity development, it is usually because of constraints beyond the control of that county (e.g., a lack of natural amenities or land-use policy that prohibits energy exploration) and not because the county considers exclusivity the best option.

  Neither Eagle County in Colorado nor Teton County in Wyoming has any significant oil or natural gas resources and, as a result, both have focused their economic development efforts solely on increasing tourism.[4] Other counties have limited opportunities to develop amenities (e.g., Sheridan County, Montana) or face competition with nearby areas (e.g., the Highline Trail in Duchesne County, Utah)[5]. Monterey County, California is again an exception here: Monterey County deliberately focuses on amenity development over energy development due to county preferences rather than in response to outside constraints.

- Throughout the western United States, energy extraction and amenities both play integral roles in economic growth for county development.

  The integration of these two industries and their mutual importance to economies is clear in California. Known internationally for its natural beauty, California has cultivated a tourism industry that is important, if not vital, to local communities around the state. As the third-largest petroleum producing state in the United States, California communities also rely on the high-paying jobs and valuable revenue streams that come from the oil and gas industry.

[4] In some cases, like that of Eagle County, even if they had energy resources, they may not choose to develop them given their unique natural amenities.
[5] The Highline Trail in Duchesne County, Utah receives fewer than 50 thru-hikers as "it's overshadowed on a regional menu that includes the Tetons, Sawtooths, Wind Rivers, and Colorado's Fourteeners." (Howe, 2011).

As a mineral rights owner in Uintah County, Utah, the School and Institutional Trust Lands Administration receives payment from the extraction of its resources there. Those funds are used to provide financial support to Utah public education and other public institutions.

- Energy extraction can directly advance the development of amenities.

  Many counties are currently enjoying the economic benefits of a booming oil and natural gas industry and use those benefits to advance their amenity offerings. For example, Bradford County in Pennsylvania, Moffat County in Colorado, and McKenzie County in North Dakota all use tax revenues related to the energy extraction industry to fund projects such as museum renovations, maintenance of recreational paths, and historic associations. In Uintah County, money from mineral lease fees was used to construct a facility to store and display 30,000 dinosaur bones. Also in Uintah County, the roads established for upstream oil and gas development facilitate hunting opportunities. Other counties (e.g., Renville County, North Dakota) market their hunting opportunities to incoming oil and gas workers. In other counties (e.g., Monterey County and Bradford County), payments to land owners have allowed farmers and ranchers to keep their land and their lifestyle. The economic growth resulting from extractive industries allows counties to diversify their economic portfolios that include both energy extraction and the development of amenities.

- The energy and amenity sectors can both be cyclical, although they tend to follow different cycles.

  Energy extraction can be cyclical as market prices fluctuate or as reservoirs are depleted (e.g. Sheridan County, Wyoming). Amenity-related jobs can be cyclical because of seasonal recreation activities (e.g., Eagle County, Colorado) or because of sensitivity to economic cycles (e.g., the recession of 2009). By developing both resources, communities can be more resilient to cyclical downturns in either type of development.

- High value amenity development and high value energy development can increase property values, raise the cost of living, and result in inter-county migration.

  In the state of Wyoming, Teton County—an area with abundant and widely-known amenity attractions such as Yellowstone National Park—has the highest cost of living of any county in the state. Sublette County, WY—a county with extensive and increasing energy development—has the second highest cost of living. High cost of living in one county can cause people to relocate to other counties. For example, the high cost of living in Eagle County, CO, a county known for its high-end amenity development such as luxury ski resorts, has driven individuals who work in Eagle County to move to neighboring Garfield County where the cost of living is lower.

- Energy extraction operations offer higher-paying jobs, while hospitality and recreation operations employ greater numbers of people. A county's economic well-being depends on having both high-paying jobs and a large number of jobs.

  For the 10 counties that developed resources in both sectors in 2011, average annual pay in the upstream oil and gas sector was almost five times higher than in the hospitality and recreation sector ($76,000 vs. $16,000), but the hospitality and recreation sector employed three times more people per county (6,000 vs. 2,000) (BLS, 2011).

Overall, the cases presented in this study show that energy and amenity development are not mutually exclusive, though there are exceptions; the development of either sector does not inherently limit growth in the other sector. Because both energy and amenity resources provide value to a county, when counties have both resources they tend to develop both, and in a way that allows both sectors to grow. Further, energy development can directly promote the amenity sector by providing counties the funding necessary to develop and market available amenities. Together, these two sectors can comprise an integral part of a county's economy. They provide an employment base with diverse pay and employment levels, and they expand local revenue streams, which help furnish needed local resources like infrastructure and improved government services.

Literature Review: Understanding Divergent Claims about Economic Development

There has always been debate about how best to develop energy and amenity resources together within a county. Opponents of energy development often argue that the oil and gas industry cannot coexist with amenity-based industries. Further, some argue that amenity activities create better economic and employment opportunities than do extraction activities on public or protected lands.

This view of amenities and energy extraction is based on research that finds positive correlations between amenity resources and economic growth. For example, using the USDA's Natural Amenities Scale, Gebremariam et al. (2007) finds a positive although not statistically significant relationship between employment growth rates and a county's amenity rating. Research also finds that "footloose" entrepreneurs are moving to areas with access to outdoor recreation (Rudzitis, 1993; Nelson 1999; Fuguitt & Beale, 1996; Beyers & Lindahl, 1996; McGranahan, Wojan, & Lambert, 2011).

Yet, the evidence is far from conclusive on the role amenities play in economic growth. One widely cited article found no evidence that federal wilderness designations within a county affected population-density or total employment-density growth in the Intermountain West during the 1980s (Duffy-Deno, 1998, p. 110; see also Deller et al., 2001). Further, counties with designated wilderness areas appear to be held back by relatively low-wage and seasonal service-sector jobs (Holmes & Hecox, 2002; Krannich & Petrzelka, 2004).[6] Perhaps because of this, counties with primarily amenity-based growth rarely develop into economically and socially vibrant communities (Krannich & Petrzelka, 2004, p. 197).

In fact, research by Yonk, Simmons, and Steed (2011) finds "a significant negative relationship between the presence of [designated wilderness lands] in county total payroll, county tax receipts, and county average household income." Despite these findings, several authors both ignore the costs of wilderness designation to a county's economic growth and base broad conclusions on outliers. For example, Rasker often cites data from the Greater Yellowstone area—a wilderness area known

[6] Resource extraction also faces cyclical employment, though some view the problem as much more severe with amenity jobs (Krannich & Petrzelka, 2004).

worldwide and heavily visited—and concludes that because conservation has led to positive economic impacts there, conservation (to the exclusion of energy extraction development) is the preferred economic choice for all counties with public lands (Rasker 1994; Rasker & Glick, 1994; Rasker 1993; Rasker & Hansen, 2000; Rasker and Hackman, 1996; Rasker, 2006).

Though some research promotes one type of development as preferable to another, a more nuanced reading of the literature suggests that counties that try to balance energy extraction activities and amenity development have healthier economies (Lorah & Southwick, 2003; McGranahan, Wojan, & Lambert, 2011; Krannich & Petrzelka, 2004).

By examining 16 case studies, this report seeks to further the understanding of the relationships between energy development, amenity development, and county economic growth.

Methodology

Because of recent increases in energy extraction in the western United States, it is the primary geographic focus of this study. Following a dramatic drop in oil prices in 1986, local economies that had traditionally focused on energy extraction found themselves struggling to diversify and stay economically viable. More recently, however, the energy industry in the western United States has seen a significant resurgence. This study examines in part the impacts of this development on local economies.

In conducting this research, the following five states/regions were identified as having counties with varying levels of energy and amenity development: California, Colorado, Utah, the Northern Rockies,[7] and the Northern Plains.[8] In addition, Bradford County, Pennsylvania, is included to assess the economic effects of the petroleum boom in the eastern United States.

From each of these five states/regions, three counties have been selected to represent various combinations of amenities and energy extraction. After a general review of each region, the development of both the energy and amenity sectors within each county are discussed. Counties generally work to develop the resources available to them, whether they are energy based, amenity based, or

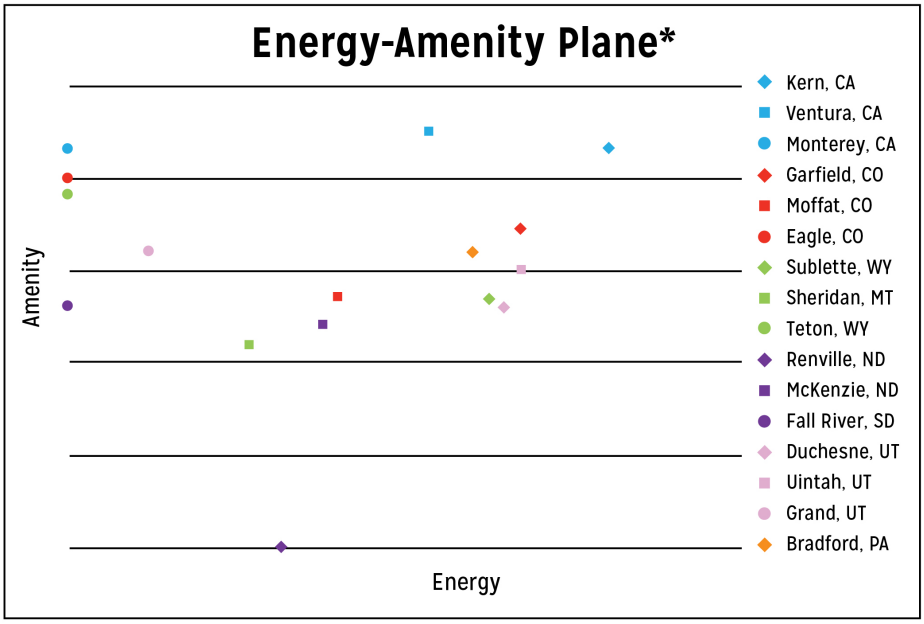
[7] The Northern Rockies includes Teton and Sublette counties in Wyoming and Sheridan County in Montana.
[8] The Northern Plains consists of Renville and McKenzie counties in North Dakota and Fall River County in South Dakota.

some combination of the two. Economic indicators for each county are outlined. These indicators are affected by a combination of factors. For example, government entities, private industry, and nonprofits must navigate federal, state, and local regulations, public opinion, economic expectations, and politics to effectively achieve their objectives.

Explaining the factors that contribute to economic growth at the county level is further complicated as counties are often dependent on one another. This was found to be the case in Garfield and Eagle counties in Colorado, which are discussed later in this report. Because of the difficulty in disentangling the effects of a single county on traditional indicators of overall economic health (e.g., median household income) this study focuses on data specific to the industries of interest, such as average annual pay for those working in the housing and recreation sector. The research team believes that these data provide a better understanding of how the energy and amenity sectors affect local economies.

Exhibit 1.1 shows the diversity in development between different counties across these regions. Each county is plotted according to its relative degree of focus on amenities or energy extraction. For example, Grand County, Utah, a county whose economic portfolio is heavily dependent on amenities, with little focus on energy, is placed far along the y-axis (the amenity axis) and low on the x-axis (the energy axis). This graph is based on employment in the two sectors to rank them comparatively, and is more useful as a method for comparing counties and contrasting development strategies than as a definitive quantitative tool. Further, this graph is intended as a tool for comparisons within regions and states; it is not designed to facilitate cross-state and region comparisons as the size of the state/region and the overall size of its economy can skew cross-section comparisons.

Exhibit 1.1



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

Data

Quantitative data used in this analysis came primarily from both the U.S. Census Bureau and the Bureau of Labor Statistics (BLS). For each case study, data from 2001 through 2011 were compiled on a variety of economic indicators ranging from average annual pay to employment by industry sector. Data were also gathered from the U.S. Geological Survey (USGS), U.S. Energy Information Agency (EIA), and USDA. Other quantitative data, such as tax revenues raised from energy extraction industries, were collected by placing calls to county officials and accessing data on state and county websites.

Of special note is the BLS data. The data is from the Quarterly Census of Employment and Wages and covers the time period from 2001 to 2011 (the most recent available). Data on employment and average annual pay were gathered for the following sectors:

- Oil and gas extraction (NAICS code 211)
- Drilling oil and gas wells (NAICS code 213111)
- Support for oil and gas operations (NAICS code 213112)

- Agriculture, forestry, fishing, and hunting (NAICS code 11)
- Arts, entertainment, and recreation (NAICS code 71)
- Accommodation and food services (NAICS code 72).

The data for the first three categories were combined to form "Upstream Oil and Gas," and the last two were combined to form "Hospitality and Recreation." [9]

County-level BLS data provides much insight but does have limitations.[10] The first limitation is that the BLS does not disclose employment or pay if doing so would reveal information about employers who provided data. For example, if there is only one company in a county who employs well drillers, disclosing the employment and pay data would reveal sensitive information about that company and thus would not be disclosed. The second limitation in BLS data is the potential discrepancy between "place of work" and where the work actually occurred. If a company that drills wells has offices in Houston, Texas, but deploys a team to drill a well in Pennsylvania, in some instances those employees may not show up as Pennsylvania workers. Lastly, county-level BLS data excludes self-employed workers, proprietorships, and most agricultural workers on small farms. Due to these limitations, some counties that have recently had significant oil and gas development show limited employment in the oil and gas sector as reported by the BLS.[11] In cases such as these, the data has the potential to be highly misleading.[12] In addition, the agriculture sector employment data is likely much lower than the actual number of people working in agriculture.

Qualitative data were gathered from a variety of sources including local newspapers, environmental group publications, and county websites. Personal interviews of local residents were also used when possible to explore local reactions to development in each county over time and to illustrate how development has influenced the lives of residents.

[9] It is likely that only a fraction of the jobs in the "Hospitality and Recreation" category are "amenity-based;" however, it would be somewhat arbitrary to narrow the category further.
[10] See Quarterly Census of Employment and Wages – Frequently Asked Questions. Available at www.bls.gov/cew/cewfaq.htm
[11] This is not to say that the drilling activity hasn't had a large impact on local employees. Jobs such as road construction (to drill sites) and ground preparation are stimulated when drilling occurs.
[12] For the counties where the BLS employment data is potentially very misleading, that data is excluded from the county section.

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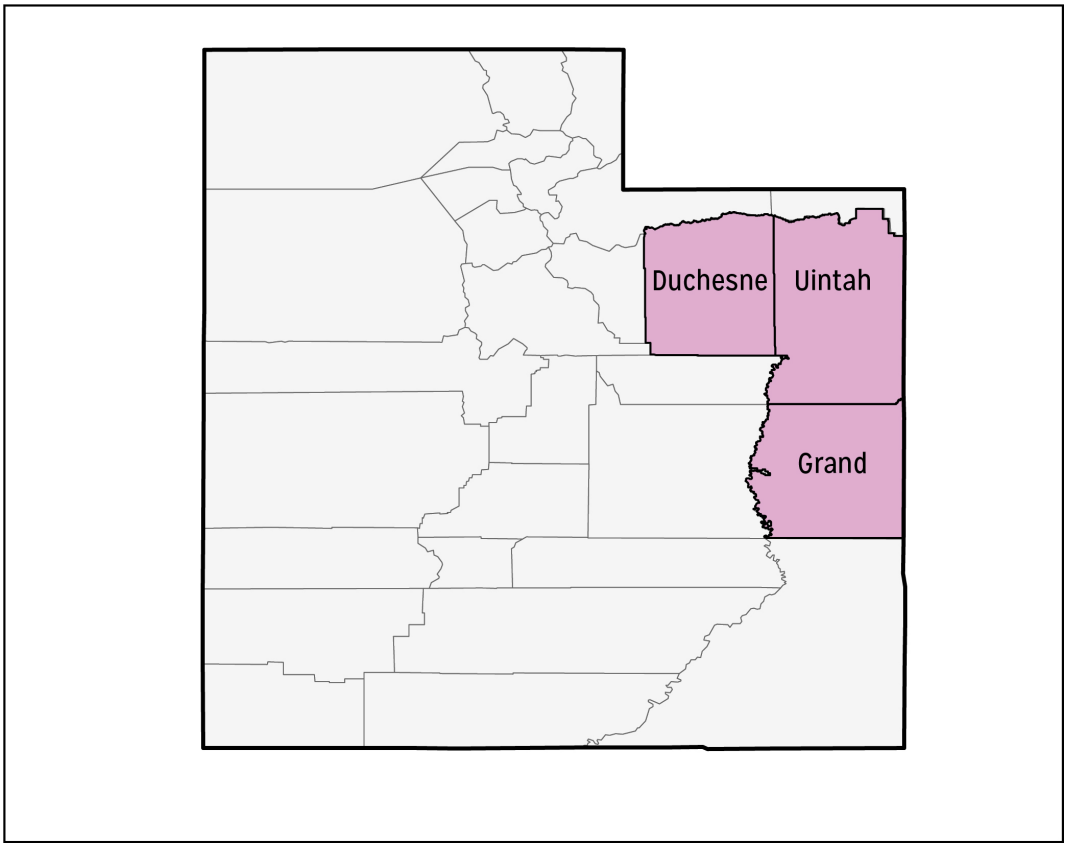
Part II: Case Studies
Utah

This section examines three counties in Utah—Grand, Uintah, and Duchesne—and considers how each has balanced energy production and amenities in their local economies. These counties can be seen in the state map in Exhibit 2.1. With the complexity and interconnectedness of any economic system, teasing out the individual effect of an industry on an economic indicator is difficult. Rather, the ways amenities and energy extraction fit into these counties' economies will be examined.

Exhibit 2.1 Map of the State of Utah with Select Counties



Utah's economy relies on extensive energy extraction and amenity development. In 2010 Utah ranked 11th in the United States for crude oil production and 9th in natural gas production (Utah Oil and Gas, 2013). This production brings numerous economic benefits in the form of tax revenues and jobs in the energy sector. Utah also has many

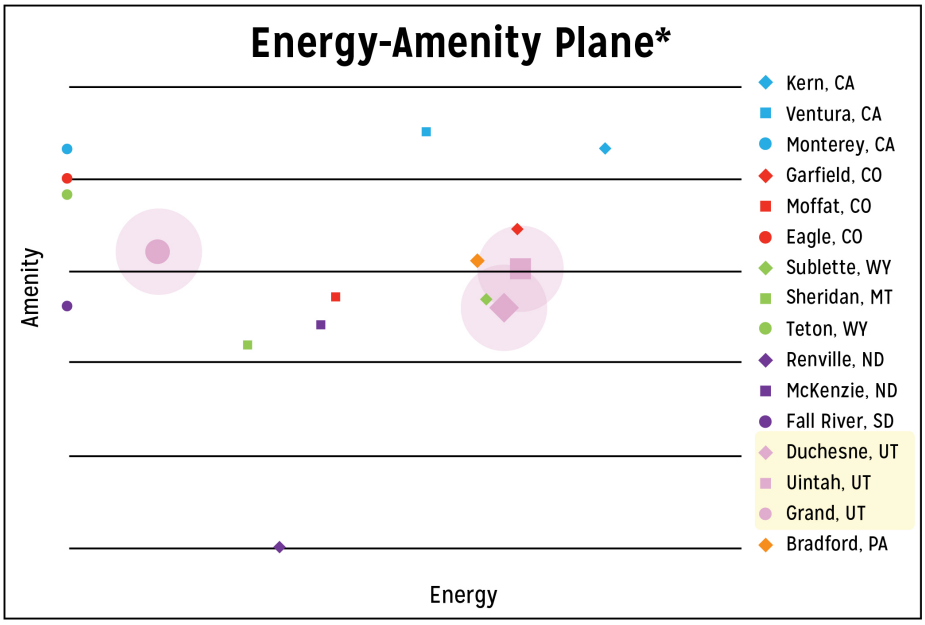
amenities (including five national parks, more than any other state) and is considered a gateway to nearby attractions such as Grand Canyon National Park and Yellowstone National Park (Utah National Parks, 2013).
In Utah 78,425 jobs were supported[13] by the oil and natural gas industry in 2009. Extractive industries supported $3.8 billion in labor income and $8 billion overall to the state's economy as a whole that year. In addition, the average salary for oil and natural gas workers in Utah is $73,186, nearly double the state's average salary of $38,936 (AmericanEnergyWorks.org, 2012).

Utah counties receive oil and gas revenues directly (e.g. through local taxes) and indirectly (e.g. through lease and royalty payments from production on federal land that are paid to the federal government and are then funneled to the state and local communities). In the past, mineral lease money has been used to pay for improvements such as a new fire truck in San Juan County, renovation of the Garfield County Courthouse, and a library in Tooele County (O'Donoghue, 2013, March 28). Without mining revenues, local projects like these would be difficult to fund.

Exhibit 2.2 shows that Duchesne County is the most focused on energy extraction, Uintah County has the most mixed economy, and Grand County is the most focused on amenities. Both Duchesne and Uintah counties have significant opportunities for energy extraction, falling far to the right on the energy-amenity graph. Uintah County lies above Duchesne County in the graph, indicating that it has more opportunities for amenity development. Grand County falls far to the left of the other counties as it primarily relies on its amenities and has limited energy extraction development.

[13] This support includes direct, indirect, and induced jobs.

Exhibit 2.2



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

In Duchesne County, the lands used for energy extraction and amenities generally do not overlap, though there are exceptions. Nine Mile Canyon, for example, is home to ancient rock art, but energy extraction activities also occur there. Energy companies that lease land in the area provide funds that support preservation and anthropological studies of the art in Nine Mile Canyon. Similarly, in Uintah County, energy development has provided better access to once-remote hunting areas, providing additional opportunities for sportsmen. Grand County is home to some of Utah's most iconic national parks, but the county has relatively few opportunities for energy development.

Exhibit 2.3 shows employment and annual average pay in Duchesne, Uintah, and Grand counties. Employment is broken down by sector and, as the table shows, average annual pay is much higher in all three counties in the upstream oil and gas sector than in the hospitality and recreation or agriculture sector. Average annual pay (reported in nominal dollars) in the upstream oil and gas industry is comparable across these counties. Grand County, which has the most employment in hospitality and recreation, also has significantly higher average annual pay than the other comparison counties in Utah. Agriculture makes up a small portion of employment in Duchesne and Uintah counties. Overall, average pay in upstream

oil and gas is much higher than the state average of $38,396, and pay in the other industries is much lower (AmericanEnergyWorks.org, 2012).

Exhibit 2.3 Employment and Average Annual Pay in Selected Utah Counties, 2011

	Upstream Oil and Gas		Hospitality and Recreation		Agriculture	
	Employment	Average Annual Pay	Employment	Average Annual Pay	Employment	Average Annual Pay
Duchesne	1,757	$70,408	385	$11,101	35	$15,515
Uintah	2,340	$71,749	1,060	$12,413	70	$25,364
Grand	4	$72,000	1,613	$18,115	-	-

(BLS data from 2011)

Exhibit 2.4 shows employment by sector for Duchesne, Grand, and Uintah counties and compares them to the state average. The Exhibit shows that of the three counties, Uintah has the highest percentage of employment in the agriculture, forestry, fishing and hunting, and mining sector (which includes oil and natural gas) while Grand County has the highest percentage of employment in the arts, entertainment, recreation, accommodation, and food services sector.

Exhibit 2.4 Percent Employed by Sector in Select Utah Counties, 2011[14]

Sector	Duchesene	Grand	Uintah	Utah Average
Agriculture, forestry, fishing, and hunting, and mining*	17.36%	2.24%	23.88%	2.00%
Construction	7.24%	12.60%	7.08%	7.49%
Manufacturing	1.50%	2.31%	3.03%	10.75%
Wholesale trade	2.03%	3.54%	1.78%	2.82%
Retail trade	10.43%	10.61%	10.25%	12.33%
Transportation, warehousing, utilities	8.36%	5.75%	6.51%	4.85%
Information	3.85%	2.83%	1.50%	2.31%
Financial, insurance, real estate	2.50%	4.59%	3.45%	6.79%
Professional, scientific, management, administrative, and waste management services	5.28%	4.59%	5.57%	10.91%
Educational services, health care, and social assistance	20.59%	14.68%	15.25%	21.15%
Arts, entertainment, recreation, accommodation, and food services	9.12%	23.33%	10.48%	8.60%
Public administration	4.62%	2.99%	4.44%	4.44%
Other services	7.38%	9.95%	6.77%	5.56%

*Oil and gas is a subset of mining

(U.S. Census Bureau data from 2011)

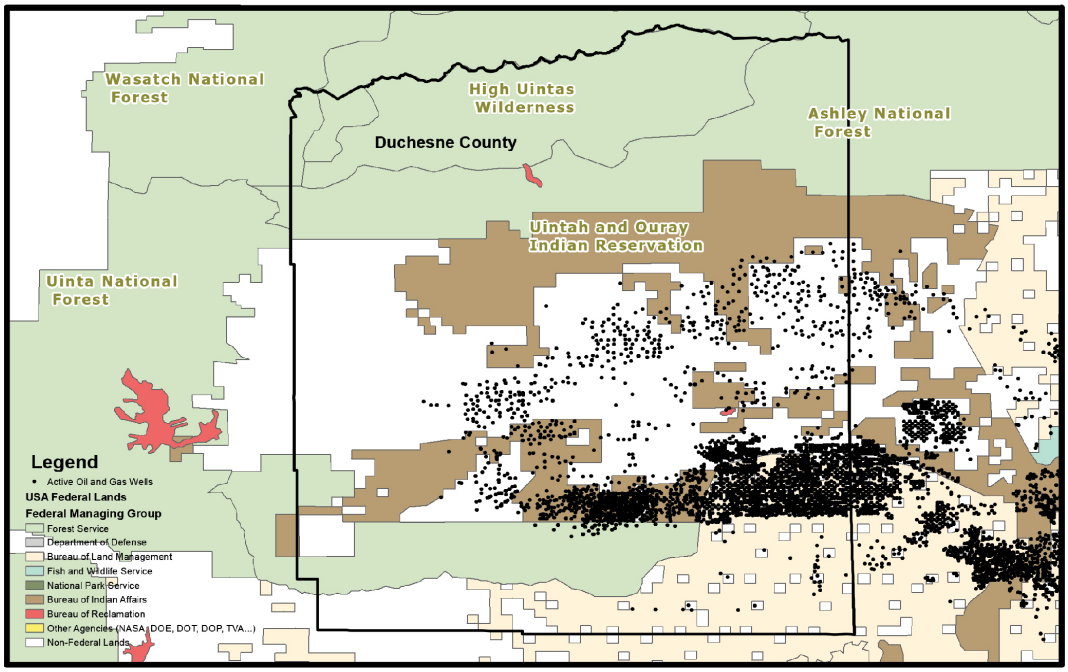
[14] Due to rounding and data structure issues, the percentages may not add up to 100 percent.

Duchesne County, Utah

In 2012, Duchesne County was the largest producer of oil and the third largest producer of natural gas in Utah (Utah Oil and Gas, n.d.). A portion of the county's energy resources are located in the Nine Mile Canyon area, which is also home to ancient Native American rock art (Loomis, 2010; Utah's Castle Country, n.d.). Duchesne County's experience demonstrates how energy development can safely occur, even in places of historical and cultural significance.

Duchesne County's economic success is an example of the benefits that result from an economy in which both amenity and energy development are encouraged. Exhibit 2.5 (for larger exhibit see Appendix) shows the location of active oil and gas wells within Duchesne County. As the map also shows, the county contains many federal lands including parts of Wasatch National Forest and Ashley National Forest. The county is also home to the High Uintas Wilderness. Many active oil and gas wells are located on or near federal lands, mostly BLM lands and tribal lands. The major concentration of wells is in the southern-central part of the county, away from the bulk of national forest and wilderness lands that are primarily in the north. Nine Mile Canyon, which runs along the southern border of Duchesne County, is one example of where amenities and energy have been able to develop side by side.

Exhibit 2.5 Active Oil and Gas Wells in Duchesne County, UT



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Energy Development

Oil and gas extraction put Duchesne County on the map. The county was historically regarded as "measurably valueless," due to its perceived lack of natural resources (General Plan, 2012(a), p.2). An oil boom in the 1970s brought radical change to the rural county. The boom brought "hundreds of rigs . . . drilling around the clock. For the first time in the county's history, jobs were plentiful and wages were good" (General Plan, 2012(a), p. 3-4). Extractive industries soon became an integral part of the county's local economy. This reliance also meant that Duchesne County suffered when oil prices fell in the 1980s.

As a result of the recent energy boom, Duchesne County is once again enjoying the economic benefits of its focus on energy extraction. Kirk Bostick, Director of the Utah State University Business Resource Center in Roosevelt, emphasizes that, "the bread and butter of our economy is oil and natural gas" (Personal Interview, December 7, 2012). The number of new wells spudded by year in Duchesne County

is shown in Exhibit 2.6 (Utah Department of Natural Resources, 2013, June 28). The increase in drilling activity is one reason that extractive industries that include oil and gas are among the largest employers in the county (U.S. Census Bureau, 2012).

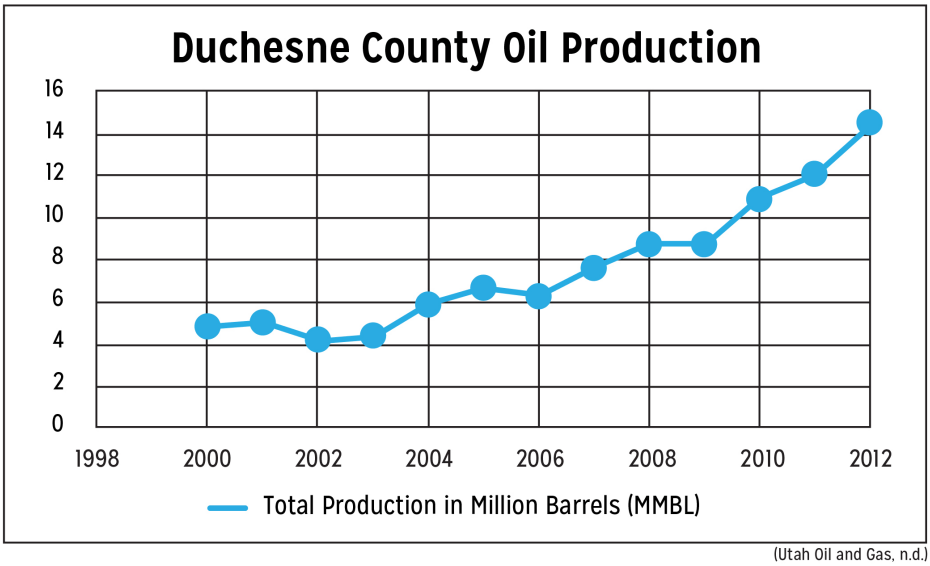
Exhibit 2.6 Number of Wells Spudded in Duchesne County

Year	Number of Wells Spudded
2009	164
2010	424
2011	351
2012	419

(Utah Oil and Gas, 2013)

Duchesne County is the largest producer of oil in the state, producing 14.4 million barrels in 2012, 48% of the state's total oil production (Utah Oil and Gas, n.d.). Oil production in Duchesne County has grown 11 out of the 13 years shown in Exhibit 2.7. In 2000, nearly 4.8 million barrels of oil were produced in Duchesne County. By 2010 production had more than doubled to more than 10.9 million barrels. The largest growth in production occurred between 2011 and 2012.

Exhibit 2.7

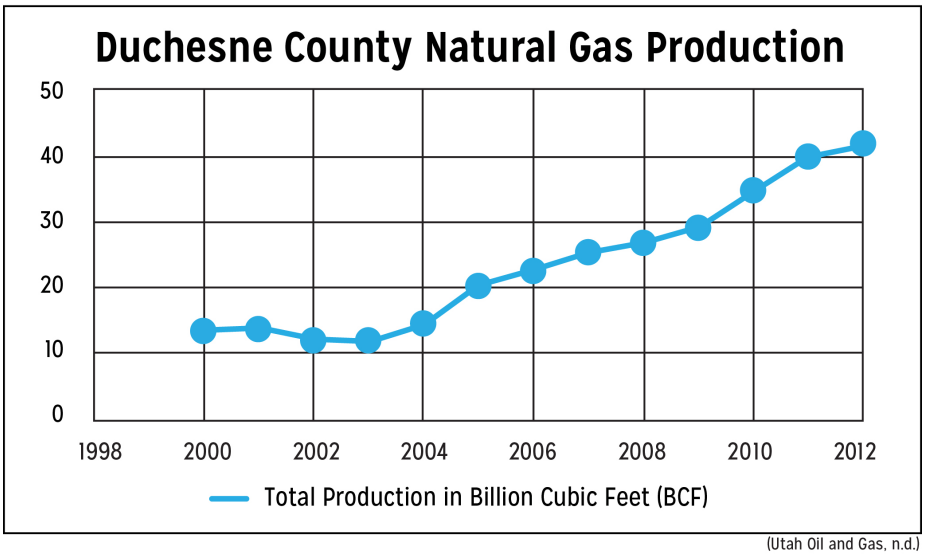


(Utah Oil and Gas, n.d.)

Gas production has also grown in Duchesne County. As shown in Exhibit 2.8, in 2000, over 13.9 BCF of gas were produced. Production slowly declined until 2003, but has increased every year since. In 2012 Duchesne County produced about 41.5

BCF of gas, about three times what it was producing in 2000, and about 9% of the state's total gas production in 2012 (Utah Oil and Gas, n.d.).

Exhibit 2.8



(Utah Oil and Gas, n.d.)

Both oil and natural gas production is increasing in the county, indicating that energy development will continue to play an important role in the Duchesne County economy.

Amenity Development

Duchesne County has approximately 250,000 acres of federally designated wilderness lands; all federal lands make up 12% of the county's total area (General Plan, 2012(a), p. 22; U.S. Census Bureau, 2012). These lands include mountain peaks, canyon lands, lakes and streams, and watershed areas. One highlight is the county's beautiful and rugged High Uintas Wilderness. This remote area provides extensive opportunities for hiking, backpacking, and fishing. The Highline Trail runs 78 miles through the High Uintas Wilderness, crossing 9 major mountain passes and providing opportunities for viewing of the area's 26 summits over 13,000 feet. The area boasts approximately 1,000 lakes and 36 streams. Despite the high amenity potential of the area, however, the Highline Trail attracts fewer than 50 through-hikers per year. This low visitation may be a result of the High Uintah Wilderness' close proximity to more famous nearby mountain ranges like the Tetons, Sawtooths, Wind Rivers, and Colorado's "Fourteeners" (Howe, 2011).

Duchene County's most famous landmark is Nine Mile Canyon. Administered by the BLM, the canyon straddles the Duchesne and Carbon County line and is also located in the oil and gas-rich Uinta Basin of eastern Utah. (Nine Mile Canyon, n.d.; Jones and DeMille Engineering, n.d.). The 50-mile gallery of Fremont and Ute Indian rock art is an archaeological find that has been featured in many publications, including National Geographic (Sun Advocate, 2004). In fact, Nine Mile Canyon is often referred to as the world's longest art gallery, and contains many pristine artifacts, attracting archaeologists and tourists alike (Quinn, 2012).

Duchesne County officials support a diverse economy and strategy that includes development of the area's plentiful amenities. In a 2012 countywide general plan, officials said they would "ensure that public lands are managed for multiple use and sustained yield and to prevent waste of natural resources" (General Plan, 2012(a), p. 22-24). Further development and marketing of Duchesne County's amenity opportunities might allow the county to further diversify its economy, attracting more visitors to areas like the High Uintas Wilderness.

Economic Indicators

Duchesne County's energy development has brought significant economic benefits to the area. These benefits include increased job growth, higher average annual pay, and an infusion of valuable tax revenue into the community. The benefits of energy development have also helped Duchesne to maintain its historical and natural amenities for the enjoyment of future residents and visitors alike.

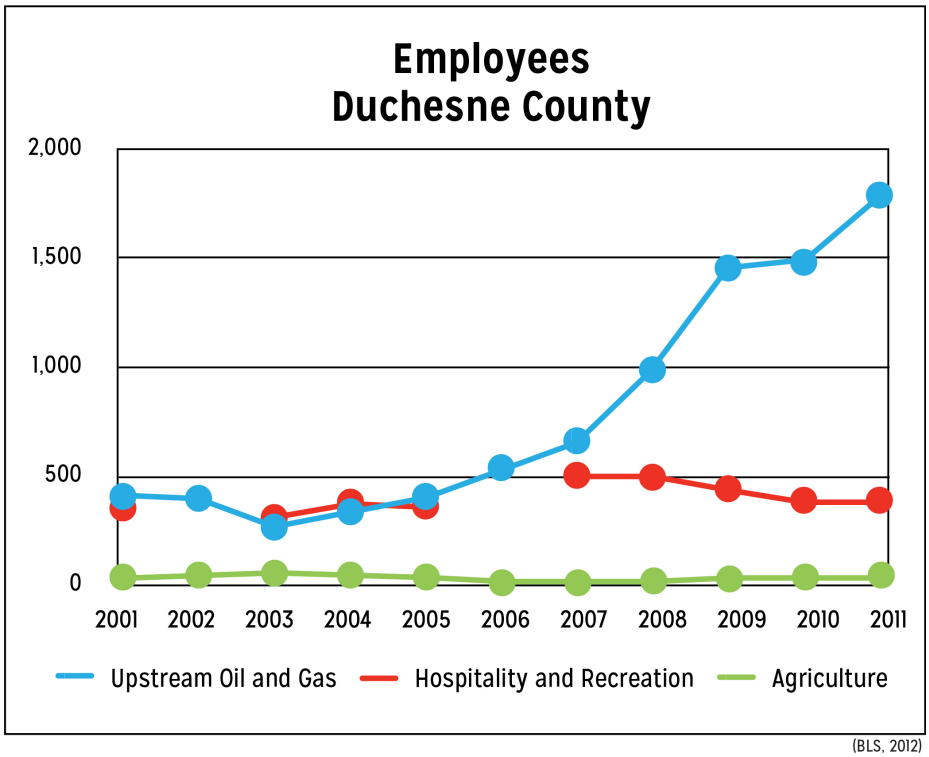
Bill Barrett Corporation, which leases BLM lands surrounding Nine Mile Canyon for natural gas extraction, understands the area's cultural and historical importance. The corporation has offered as much as $5 million to preserve many of the canyon's most significant areas (Loomis, 2010). Barrett's agreement provides $5,000 per new well drilled to support the preservation efforts, demonstrating the commitment of the oil and gas industry to protect an area's unique historical treasures.

Exhibit 2.4 shows the percent employed by sector for the civilian employed population over 16 years old in Duchesne County. Oil and gas are included in the agriculture, forestry, fishing and hunting, and mining category. This category is the

second-largest employment sector for Duchesne County (17.36%). That number is much higher than the state average of 2%, reflecting Duchesne's County's statewide prominence as an energy producer. Educational services, health care, and social assistance make up the largest employment sector (20.59%). Retail trade is also important, providing 10.43% of jobs. Arts, entertainment, recreation, accommodation, and food services provide 9.12% of Duchesne County's employment, slightly higher than the state average.

Exhibit 2.9 shows employment trends by sector for the three sectors of interest. In 2001 upstream oil and gas employed slightly more people than the hospitality and recreation sector. There was very little growth in the hospitality and recreation sector across this decade, and by 2011 this sector employed only moderately more people than in 2001. Upstream oil and gas saw a slight decrease in employment from 2001 to 2003, and a large increase starting around 2006. By 2011, it is estimated that this sector employed almost 1,800 people, about 1,400 more than had been employed in 2001. These employment numbers may be low, however, given the number of wells spudded in Duchesne County and the collection and inclusion issues with BLS data. Employment in the agriculture sector remained fairly constant across the decade.

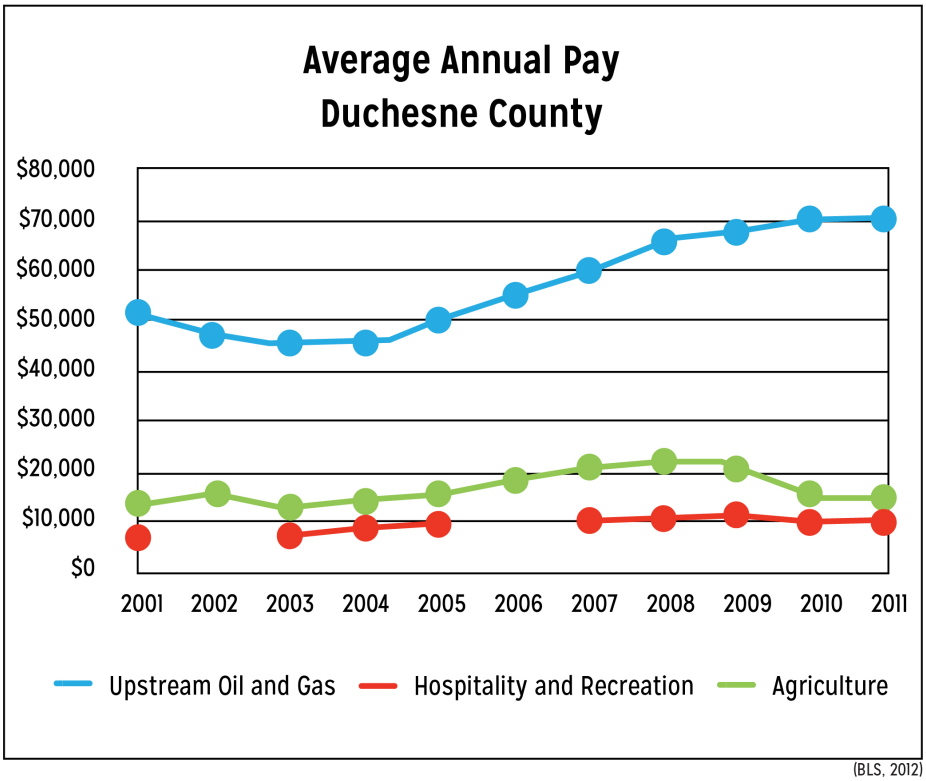
Exhibit 2.9



(BLS, 2012)

Exhibit 2.10 shows another important aspect of the oil and gas industry in the county—high pay levels. According to the BLS, employees in the upstream oil and gas sector have seen their average annual pay increase every year since 2004, with a total growth of almost $26,000 from 2004-2012. Pay in the oil and gas industry is higher than the average annual pay in either of the other two sectors of interest. Employees in agriculture, while fewer in number, are paid more than those in the hospitality and recreation sector on average. Average annual pay in the hospitality and recreation sector was relatively constant across the decade, averaging about $10,000.[15]

Exhibit 2.10



(BLS, 2012)

The oil and gas industry provides valuable tax revenues to Duchesne County. For example, in 2006, 33.9% of all property taxes in Duchesne County were collected from the oil and gas industry alone (The Structure and Economic Impact of Utah's Oil and Gas, 2007, p. 63). In 2009, Duchesne County received about $234,000 in oil royalties and lease payments. That number increased to about $322,000 in 2011. In

[15] Average annual pay is reported in nominal dollars and has not been adjusted for inflation.

2012 Duchesne County estimates it received approximately $542,000 in oil royalty and lease payments (Utah State Budget Report, 2013).

Development Strategies

When asked about the relationship between amenities and energy extraction, Darlene Garrison of the Duchesne Chamber of Commerce explained, "We support multiple use, . . . [though] oil is just way, way bigger than recreation" (Personal Interview, December 10, 2012).

Although many argue that energy development and amenity development are mutually exclusive, Duchesne County's economic development suggests that amenity and energy development can coexist without conflict. Kirk Bostick, Director of the Utah State University Business Resource Center in Roosevelt, Utah, explained, "You don't see oil wells where people go to hike and bike" (Personal Interview, December 7, 2012). This is partly due to the geography of the county—most recreation takes place in the northern mountains of Duchesne County while most of the oil and natural gas extraction occurs in the southern basin (Exhibit 2.5). While some oil and gas wells exist on USFS land, most of the wells are located outside the land designated for conservation and recreation. The exception to this is Nine Mile Canyon, which both "sits at the heart of the drilling boom," and contains the "longest art museum in the world" (Quinn, 2012).

As mentioned earlier, the Bill Barrett Corporation is sponsoring the preservation of the most famous amenity attraction in Duchesne County, Nine Mile Canyon. Many anthropologists are satisfied with this agreement. Utah State University professor of anthropology Dr. Steven Simms says academia cannot adequately research anthropology without funding from development (Quinn, 2012). The agreement, allowing for energy development while supporting preservation efforts, has been hailed as "landmark," "precedent-setting," and "historic" (Keiter and Lindstrom, 2011). Nine Mile Canyon is evidence that extractive industries and amenities can develop side by side, benefitting both the local economy and groups interested in the protection of natural amenities.

Because of the economic significance of the energy industry in Duchesne, county officials work closely with regulators, interest groups, and companies to find ways to manage the land for multiuse purposes.

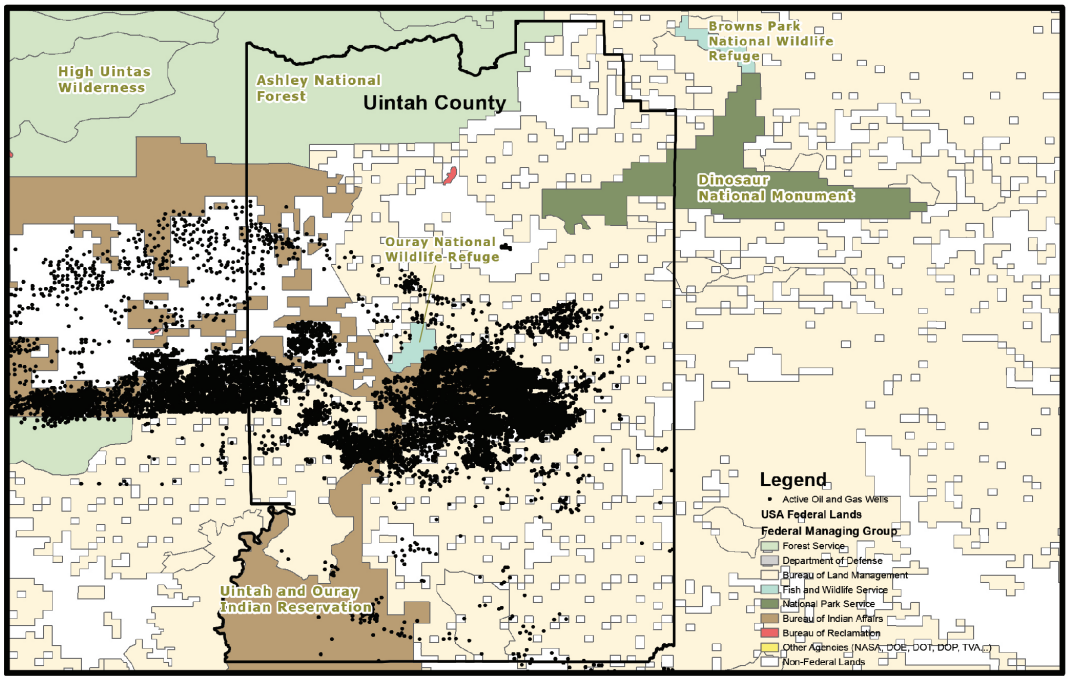
Uintah County, Utah

Uintah County is home to just over 33,000 residents, who enjoy the benefits of the county's mixed economy. The county has many natural resources, including both oil and natural gas, as well as abundant amenities. The Uinta Basin, located in northeastern Utah, was first found to have natural gas in 1925, and oil was discovered in 1949. Today, the basin is the state's largest oil and gas producer and, as a result, the region's economy is reaping significant benefits. The Uinta Basin, the center of the Uintah County's natural resources, encompasses both Uintah County and neighboring Duchesne County. Encompassing around 5 million acres, 54% of the basin is controlled by the federal government (The Structure and Economic Impact of Utah's Oil and Gas, 2007, p. 10).

Bill Stringer, the BLM District Manager in Vernal, Utah, manages more than 1.7 million acres of federal land spanning three counties in northeastern Utah (Vernal Field Office, n.d.). The 75 employees in the BLM's Vernal office include biologists, engineers, geologists, and recreation planners who work to carry out a mixed-use management strategy for public lands. This strategy requires the agency to manage and balance the interests of energy, the environment, and recreation. This mission can create tension, but local officials like Stringer "[try] to find reasonable approaches to solve issues" facing the county (Lipton 2012).

Although Uintah County produces less oil than its neighbor Duchesne County, it enjoys the benefits of a more diversified economy in which amenities also play a key role. Uintah County's federal lands include Dinosaur National Monument, Ashley National Forest, and the Ouray National Wildlife Refuge. These amenities provide ample opportunity for recreation for both residents and visitors. Uintah County is often called "Dinosaurland," thanks to its unique historical sites. Dinosaur National Monument, near Vernal, allows visitors to see over 1,500 dinosaur bones "all in their original resting place." (Visit Dinosaurland, 2012). Exhibit 2.11 (for larger exhibit see Appendix) shows these areas and the other public lands that make up the majority of land in Uintah County. Active oil and gas wells in the county are often located on public lands; oil and gas activity in Uintah County is primarily located in the center of the county.

Exhibit 2.11 Active Oil and Gas Wells in Uintah County, UT



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Uintah is an example of a county with a successful mixed-use strategy. It has many federally owned lands designated for recreation and conservation, as well as significant energy production.

Energy Development

The Uinta Basin has high potential for energy production. The USGS estimates the Uinta-Piceance Province of western Colorado and eastern Utah contains a mean of 21 trillion cubic feet of undiscovered natural gas and a mean of 60 million barrels of undiscovered oil (U.S. Geological Survey, 2002). Uintah County produces a significant amount of Utah's oil and gas. In 2012 Uintah County produced more than a quarter of Utah's total crude oil. During the same year, the county also produced two-thirds of the state's natural gas. Energy activity in the county has increased drastically in recent years. From 2000 to 2012, oil production in Uintah increased by 200%, and natural gas production increased by almost 300% (Utah Oil and Gas, n.d.). The number of new wells spudded by year in Uintah County is shown in Exhibit 2.12 (Utah Department of Natural Resources, 2013, June 28).

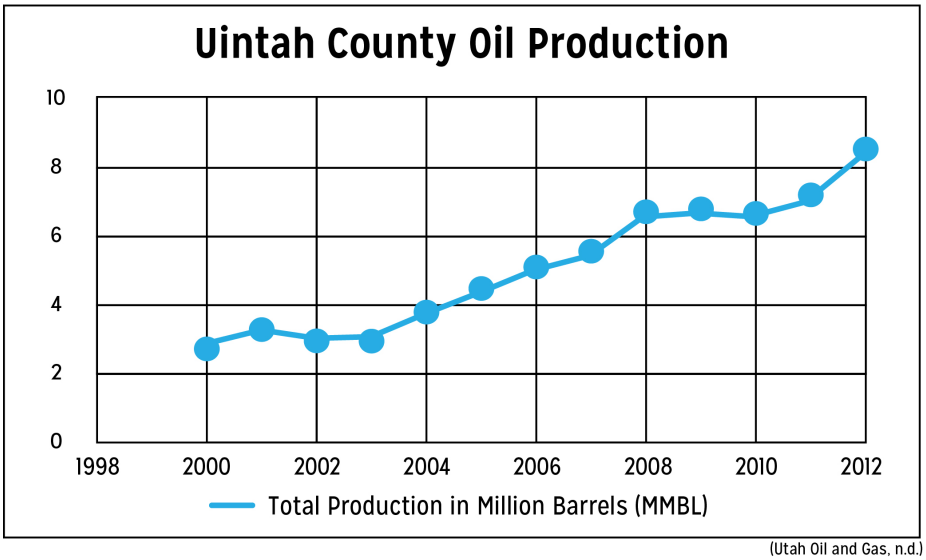
Exhibit 2.12 Number of Wells Spudded in Uintah County

Year	Number of Wells Spudded
2009	316
2010	460
2011	524
2012	631

(Utah Oil and Gas, 2013)

Exhibit 2.13 shows that oil production in Uintah County has risen steadily over the past decade. In 2000 oil production was at 2.79 million barrels. By 2008 it had risen to 6.56 million barrels. A brief stagnation, correlated with the nationwide recession, began in 2008 and ended in 2010, when production once again trended upwards. In 2012 Uintah County's annual production rose to nearly 8.36 million barrels.

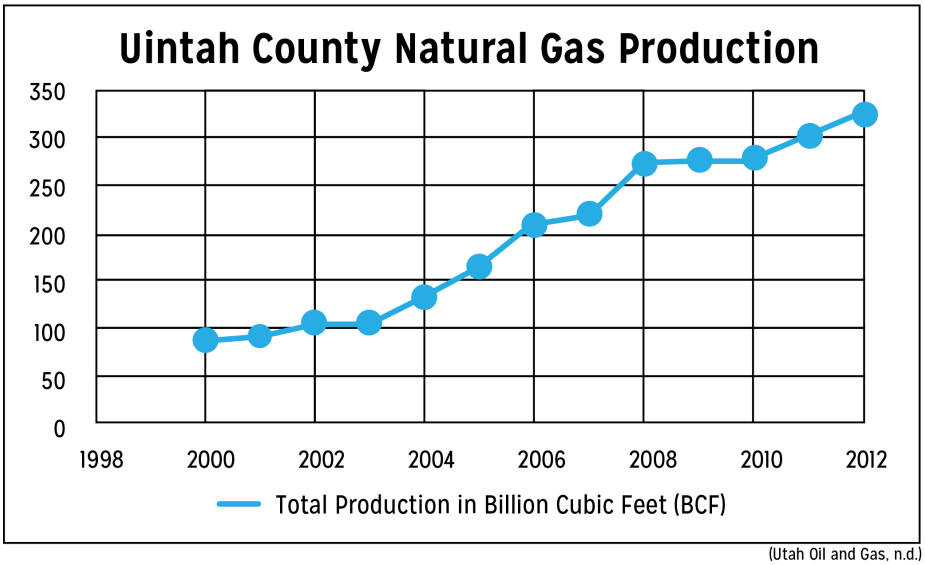
Exhibit 2.13



(Utah Oil and Gas, n.d.)

As shown in Exhibit 2.14, Uintah County's gas production has also followed an upward trend over the past decade. In 2000 Uintah County produced just over 83.1 BCF of natural gas. By 2012 the county's annual production had increased to almost 328 BCF.

Exhibit 2.14



(Utah Oil and Gas, n.d.)

Federal lands comprise a large share of Uintah County, which can at times be challenging for state and local officials. For example, in March 2013 the Department of the Interior drastically reduced the amount of federal land available for oil shale projects and oil sands leasing in Utah, Wyoming, and Colorado. Uintah County Commission Chairman Mike McKee expressed concern about the decision, saying, "It is a tragedy for our state ... Why would the federal government want to put a stranglehold on this when information shows it is energy-rich communities that are doing the best in this country?" (O'Donoghue, 2013, March 22).

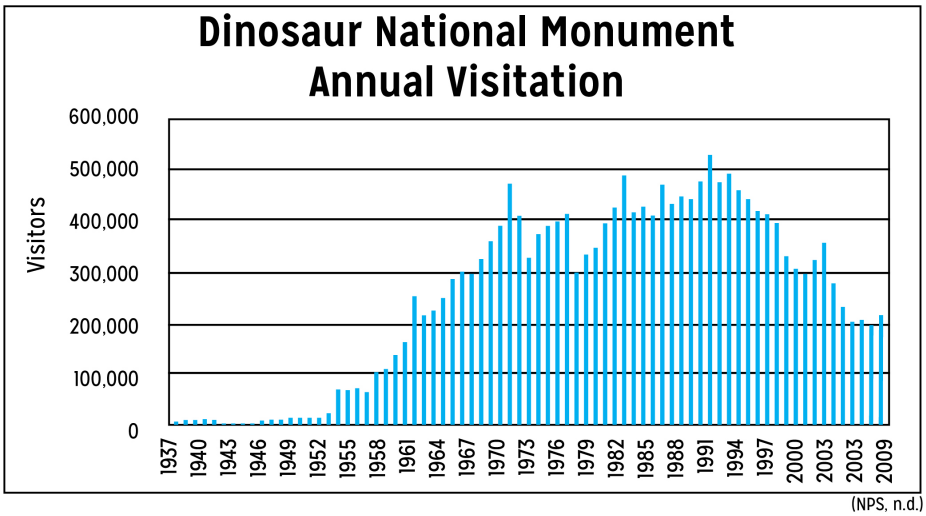
Despite these restrictions, the Uinta Basin is still a high-volume producer with significant potential for continued energy production. Most of the area's petroleum resources are unconventional, and companies like Total SA, based in Paris, are developing new, more economical methods for extracting oil trapped in the Uinta Basin. The company has partnered with Red Leaf Resources, Inc., based in Sandy, Utah, which owns 18 mineral leases totaling over 17,000 acres in the Uinta Basin. As unconventional sources of energy like oil shale become more economically feasible, places like Uintah County will continue to see even larger economic benefits.

Amenity Development

Uintah County is home to a variety of amenities, including a national monument, a wildlife refuge, and a portion of Ashley National Forest. Dinosaur National Monument covers parts of both western Colorado and eastern Utah and is a main attraction for visitors to Uintah County (see Moffat County, Colorado for further discussion of this monument). The park's Utah section allows visitors the opportunity to see over 1,500 fossils still preserved in the cliffs where they were found (Dinosaur National Monument, 2013). The park also includes the Carnegie Fossil Quarry (famous for specimens often featured in museums all over the world) and a visitor center that is open year round (Dinosaur National Monument, 2013). Dinosaur National Monument provides extensive opportunities for camping, hiking, river rafting, and viewing historical sites (Dinosaur National Monument, 2013).

Exhibit 2.15 shows visitation to Dinosaur National Monument from 1937 to 2012. There has been significant variation in visitation to the park over the years. After 2005 the park saw a greater-than-normal decrease in visitation. This could partly be explained by the almost 6 year closure of the visitor center during extensive safety renovations (Dinosaur National Monument, 2013). From 2006 to 2011 the park's visitation has averaged about 200,000 per year, as seen in Exhibit 2.15.

Exhibit 2.15



(NPS, n.d.)

The Ouray National Wildlife Refuge, located 14 miles south of Vernal, receives less than 7 inches of precipitation annually. Nevertheless, the refuge attracts thousands of waterfowl and other birds to its desert landscape every year. The Ouray National Wildlife Refuge covers about 12,000 acres. Established in 1960 to provide breeding, resting, and feeding areas for migratory waterfowl, the park is open to visitors. A visitor center and information kiosks have been created, and most roads are open to the public for wildlife viewing (National Wildlife Refuges in Utah, 2013; General Brochure, n.d.).

The Ashley National Forest makes up more than 1.38 million acres of mountainous terrain in the northeast corner of Utah. The forest includes just over 276 thousand acres of the High Uintas Wilderness Area, and offers access to Kings Peak, the highest peak in the state. The area boasts opportunities for solitude, hiking, camping, and off-roading.

Uintah County is also home to the Book Cliffs. Located 50 miles south of the Vernal BLM office, the Book Cliffs provide residents and visitors a remote hunting area. Annually, thousands of people hunt there for mule deer, elk, bear, and other wildlife. The area is known for its world-class hunting, described by BLM District Manager Bill Stringer as "one of the greatest wildlife areas in the country" (VTVcable6, 2011). In the past 10 years, increased development of oil and gas in the area has resulted in more roads and heavier traffic around the Book Cliffs. This development, however, has also resulted in improved access to the area, which will be discussed in greater detail in the *Development Strategies* section.

Economic Indicators

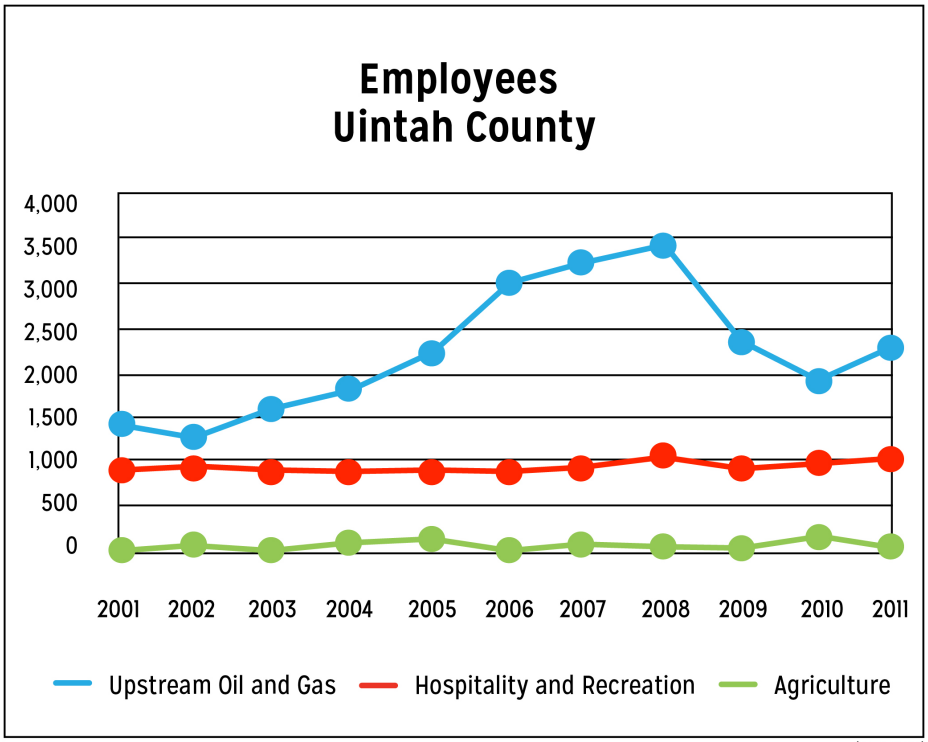
Uintah County's revised General Plan notes the importance of both energy extraction and amenities to the local economy. The plan calls natural resource exploration and development the "lifeblood" of the region's economy, noting that energy development is the county's largest tax contributor (Uintah County General Plan, 2012, p. 4.15). The plan also recognizes the importance of amenities and tourism, and establishes a policy to "encourage, establish and maintain a diversified tax base through the expansion of recreation and tourism facilities and venues" (Uintah County General Plan, 2012, p. 4.11). Balanced use of recreational sites compatible with resource exploration is also stressed (p. 4.11).

The majority of Utah's mineral revenue money, distributed by the state, goes to "counties of origin," or where revenues are generated. Both Uintah and Duchesne counties are high on the list. These revenues are intended to help rural counties like Uintah mitigate the potential negative effects of energy extraction. Former Carbon County Commissioner Mike Milovich said of the funding, "That mineral lease money has literally been the lifeblood of rural Utah" (O'Donoghue, 2013, March 28). From 2003 to 2007, a state legislative audit estimated Uintah County's mineral leasing generated at least $243.2 million. Over the same period, $132 million of that money was returned to the county (Liesik, 2008, December 4).

Mike Burnett, manager of the Community Impact Fund, a fund that uses mineral lease money to help finance local projects through loans or grants, explained the importance of mining revenues to Uintah County saying, "The roads in Uintah County, for example, get hammered. There's people moving in, big-time growth, and you need to be able to support that" (O'Donoghue, 2013, March 28). Federal budget cuts, however, have caused the Department of Interior to reduce the mining revenue payments to 35 states. Utah will lose just under $9 million in funding this year alone (O'Donoghue, 2013, March 28). These cuts will have real effects on local communities across the nation, reducing the economic impacts realized by counties with energy extraction.

Exhibit 2.16 shows the percent employed by sector for the civilian employed population over 16 years old. Oil and gas are included in the agriculture, forestry, fishing and hunting, and mining category. This category is the largest employment sector in Uintah County with 23.9% of civilian workers over 16 employed in one of these industries. This percentage is much higher than the state average of 2%, reflecting Uintah County's place as a top energy producer in the state. Educational services, health care, and social assistance make up the second-largest employment sector (15.2%). Arts, entertainment, recreation, accommodation, and food services is third (10.5%), and is higher than the state average.

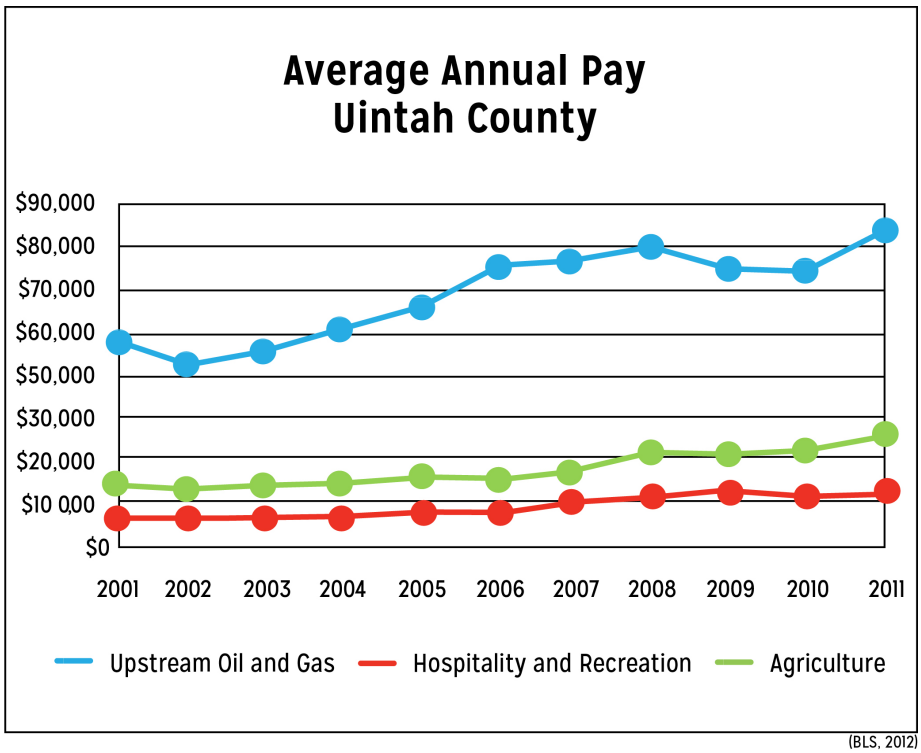
Exhibit 2.16



(BLS, 2012)

Exhibit 2.16 shows Uintah County's employment by sector from 2001 to 2011. Upstream oil and gas employs far more residents than hospitality and recreation or agriculture. Employment in upstream oil and gas has experienced more change over time—it has been somewhat cyclical—while hospitality and recreation and agriculture employment have been fairly level. Growing through 2008, employment in the oil and gas sector then declined as the economy experienced the effects of the nationwide recession. From 2010 to 2011, however, employment in these extractive industries increased, showing signs of a potential economic recovery in Uintah County. Over all years examined employment in upstream oil and gas exceeded employment levels in both hospitality and recreation and agriculture. The large number of wells spudded in Uintah County (see Exhibit 2.12) suggests employment in upstream oil and gas may have been higher and less cyclical than the BLS data indicates.

Exhibit 2.17



(BLS, 2012)

Exhibit 2.17 shows average annual pay by sector in Uintah County from 2001 to 2011. Workers in the upstream oil and gas industry earn about two times more than those in hospitality and recreation or agriculture. Across the entire period, workers in upstream oil and gas have seen wages increase by nearly $24,000. Those in both agriculture and hospitality and recreation also saw their wages increase over the decade, although at slower rates than those in upstream oil and gas. The wages are reported in nominal dollars and have not been adjusted for inflation.

Energy extraction has brought growth to counties like Uintah by increasing employment, average annual wages, and tax revenues. As of 2006, 40.1% of all property taxes in Uintah County were paid by the oil and gas industry (The Structure and Economic Impact of Utah's Oil and Gas, 2007, p. 63).

Development Strategies

In Uintah County, energy and amenity development are occurring alongside one another. The multiple uses of Ouray National Wildlife Refuge gives one example

of how energy and amenities are being balanced in Uintah County. While the refuge is managed by the USFWS, the mineral rights to the area do not belong to the federal government, but to the Ute Tribe, private individuals, or the School and Institutional Trust Lands Administration (O'Donoghue, 2013, March 5).

These split-estate lands must be managed to balance the interests of both the land and mineral rights owners. Accordingly, over the past 10 years, several wells have been drilled in the Ouray National Wildlife Refuge, and the USFWS is analyzing a proposal to open up the refuge to additional oil and gas drilling. If the proposal is approved, Axia Energy will drill and operate nine oil and gas wells within the Ouray National Wildlife Refuge (O'Donoghue, 2013, March 5). Despite this production, the wildlife refuge still functions in its primary purpose as a home and breeding ground for migrating waterfowl and ducks (General Brochure, n.d.). In addition, as a mineral rights owner in this area, the School and Institutional Trust Lands Administration receives revenues from the extraction of its resources, which are then used to provide financial support to Utah public education and 11 other public institutions (School and Institutional Trust Lands Administration, n.d.).

In some ways, increased energy development has actually benefited Uintah County's natural amenities. In 2012 a collection of 30,000 dinosaur bones was kept in the county thanks to the help of the Uintah Impact Mitigation Special Service District. Money from mineral lease fees allowed for the construction of a storage facility adjacent to the Utah Field House of Natural History State Park Museum, where the fossils are now on display to the public (Prettyman, 2013, March 28).

New wells lead to more tax dollars that pay for improvements like new roads or improvement and maintenance of old ones. In the Book Cliffs, amenity development and energy extraction are occurring side by side. Because of increased revenues used for road improvement, access to the Book Cliffs has been enhanced. Uintah County officials have improved Sheep Ridge Road, an under-maintained dirt road used primarily for hunting and access to oil and gas fields. The new, paved road permits higher traffic levels and speeds and allows greater access to the Book Cliffs area (Loomis, 2011).

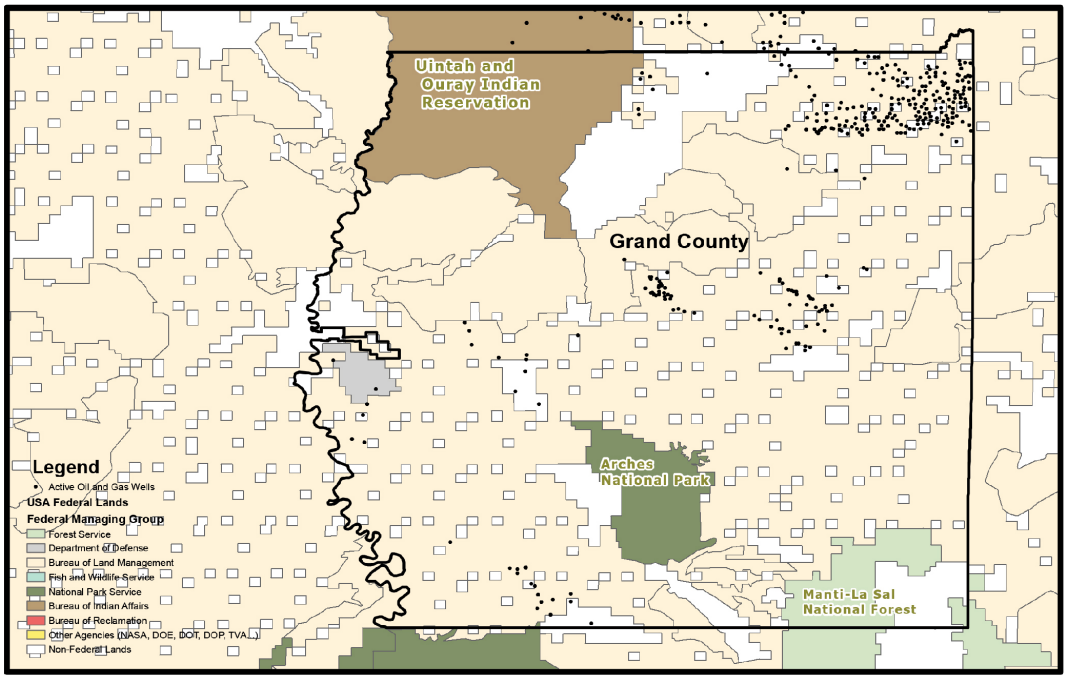
This development is well received by many locals. Marcus Batty, an employee at a local sporting goods store, who grew up in Vernal, said oil and natural gas

wells were good for hunters. Batty said, "As a sportsman, I am glad [the oil and gas wells] are out there so I can utilize the land. Without those roads, I wouldn't have access" (Personal Communication, December 19, 2012). John Gale, of the National Wildlife Federation, commented on amenity and energy extraction in Utah, citing the Book Cliffs as an example where balance is key. Gale said, "You've got amazing places like the Book Cliffs … that provide really high-value hunting and fishing opportunities. And I think when we look at our energy extraction interests there it's a prime place to consider balance in the truest sense" (Thomas, 2012).

Grand County, Utah

Grand County is home to Arches National Park, and visitors come from across the world to see Utah's iconic Delicate Arch. Located in the desert of Southern Utah, Grand County is rural with fewer than 10,000 residents. Despite its small population, Grand County, with Moab as its county seat, is an important tourism hub for Utah. Grand is primarily an amenity-focused economy, though it does have some energy development that provides important economic support to the county. Grand County has been able to develop its amenities and energy resources, partly because the two largely occur in different geographical locations.

Exhibit 2.18 Active Oil and Gas Wells in Grand County, UT



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

As shown in Exhibit 2.18 (for larger exhibit see Appendix), much of Grand County's land is federally owned. The BLM administers the majority of this land, and this is where the county's oil and natural gas development takes place. The energy activity in the county is occurring primarily in the northeastern portion of the county. Arches National Park and Manti-La Sal National Forest occupy portions of the southern half of the county, providing valuable opportunities for tourism and amenity activities. A small piece of Canyonlands National Park enters

the southernmost part of the county. As current oil and gas activity in Grand County is relatively small and mainly occurs away from recreation areas in Arches National Park and Moab, the two industries tend to not conflict with one another.

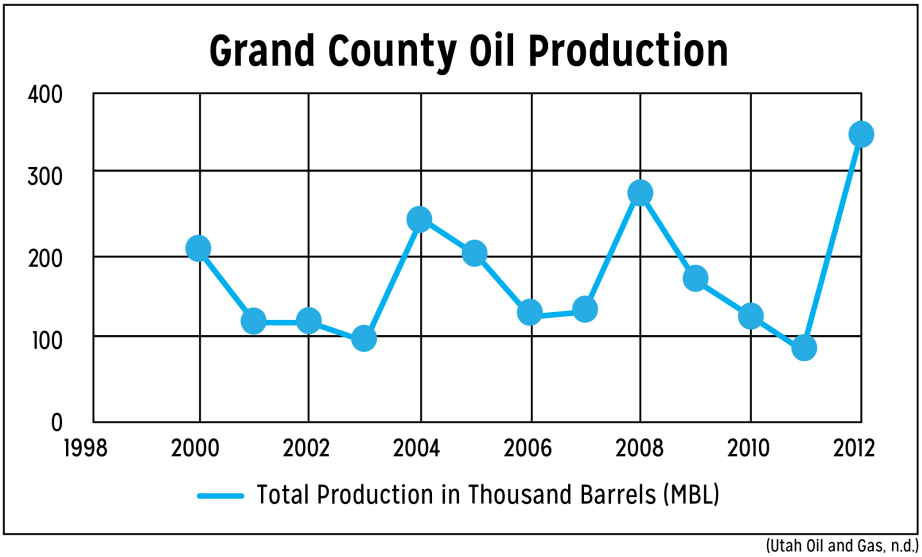
Energy Development

Historically, energy extraction has contributed significantly to the growth of Grand County. Mining operations in the 1890s helped the newly founded communities. Then, in the 1950s, geologist Charles Steen discovered uranium in the county (Kovash, 2012, December 13). Grand County's economy relied heavily on mining uranium, oil, and potash for several decades (About Grand County, n.d.), but in the wake of a depressed uranium market in the 1980s, the county shifted from a small mining area to a world-famous tourist and recreation area. The rise of an amenity and tourism-based economy for Grand County occurred in the wake of the mining bust.

Grand County contains part of the Paradox Basin, which extends into Utah, Colorado, New Mexico, and Arizona. In 2011 the USGS released an assessment of undiscovered oil and gas resources in the basin province. They estimated that Paradox has a mean of 560 million barrels of undiscovered oil and 12.7 trillion cubic feet of undiscovered natural gas (Assessment of Undiscovered Oil, 2012). All of the oil and gas wells shown in Exhibit 2.18 are in the Paradox Basin.

Despite the possible future potential of this basin and unlike neighboring counties, Grand County does not have significant current or potential energy extraction. In 2012 Grand County produced only 1.2% (just short of 364 thousand barrels) of the state's total oil production and 0.85% (just over 4.1 BCF) of its total natural gas (Utah Oil and Gas, n.d.).

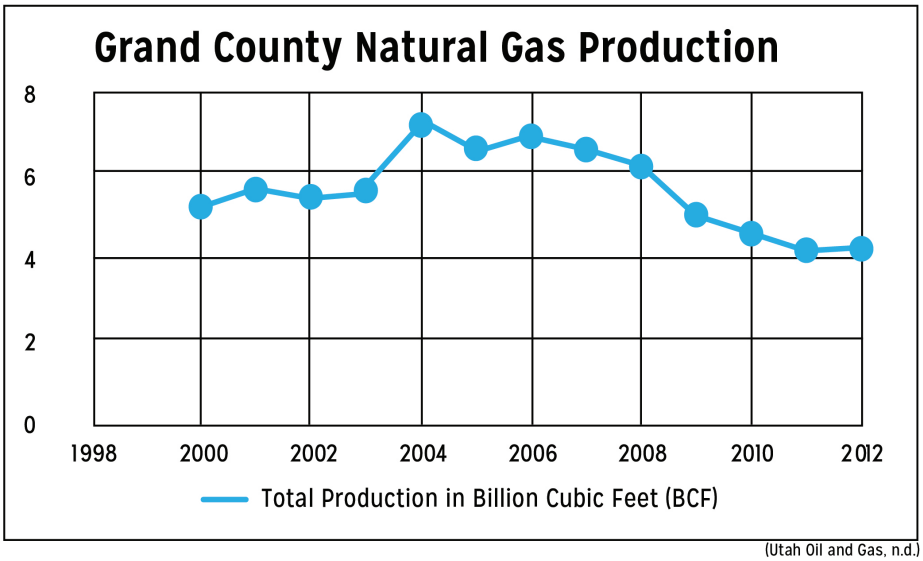
Exhibit 2.19



(Utah Oil and Gas, n.d.)

Exhibit 2.19 shows Grand County's cyclical oil production over the past decade. Until 2012 the county's oil production had consistently been less than 300 thousand barrels per year. Production saw a drastic decline from 2008 to 2011—dropping to a low of only just under 83 thousand barrels in 2011—most likely due to the effects of the nationwide recession. From 2011 to 2012 production increased again, reaching its decade-long high of nearly 364 thousand barrels.

Exhibit 2.20



(Utah Oil and Gas, n.d.)

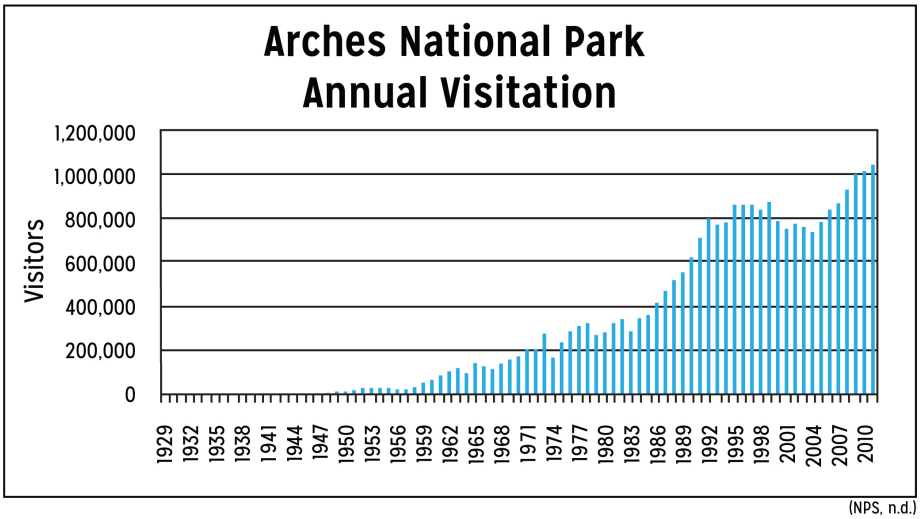
Exhibit 2.20 shows Grand County's natural gas production in BCF over the past decade. While the county's oil production has been cyclical over the past 10 years, its production of gas has gradually declined, with a few exceptions. In 2004 production reached its peak at 7.2 BCF, and then slowly trended downward. In 2012 production of gas in Grand County was just over 4.1 BCF.

Amenity Development

Grand County is home to Arches National Park, Canyonlands National Park, Manti-La Sal National Forest, and the McInnis Canyons National Conservation Area. Arches National Park contains more than 2,000 natural sandstone arches, the largest concentration of such arches in the world. Portions of many movies have been filmed in the county, including *Stagecoach*, *City Slickers*, *Riders of the Purple Sage*, and *Star Trek*. Hundreds of miles of beginner-to-advanced mountain biking trails, as well as extensive ATV trails, are located in the county (Weather and Climate, n.d.). Moab, the largest city in the area and the county seat, is home to about 5,000 residents. The town is a last stop for tourists headed to the area's vast network of jeep roads, mountain biking trails, and the nearby national parks (Discover Moab, 2012).

Arches National Park became increasingly popular over the last couple of decades. In the 1970s a total of nearly 2.5 million people had visited the park. This increased to roughly 3.9 million in the 1980s and over 7.9 million in the 1990s (Arches NP Annual Visitation, n.d.). Since 2000, over 11.3 million people have visited Arches (more than 870,000 per year) (Arches NP Annual Visitation, n.d.). Tourists can enjoy various hikes, both easy and difficult, that showcase different arches. They can also take advantage of the park's biking, backpacking, photography, canyoneering, and camping (Things To Do, n.d.).

Exhibit 2.21



(NPS, n.d.)

Canyonlands National Park, which is partially located in the county, saw similar growth, with a 109% increase in visitation from the 1970s to the 1980s, and nearly 200% growth from the 1980s to the 1990s (Canyonlands NP Annual Visitation, n.d.). From 2001 to 2010 total visitation increased by over 67,000 visitors to almost 436,000 (Park Statistics, 2013). Visitors enjoy hiking hundreds of miles of hiking trails that feature geological and cultural landmarks. Biking in Canyonlands is popular, and the 100 mile White Rim Road is the most famous of the park's trails. In addition, the Colorado River and Green River join at Cataract Canyon with Class III and V white water, excellent conditions for white water rafting (Activities, n.d.).

Economic Indicators

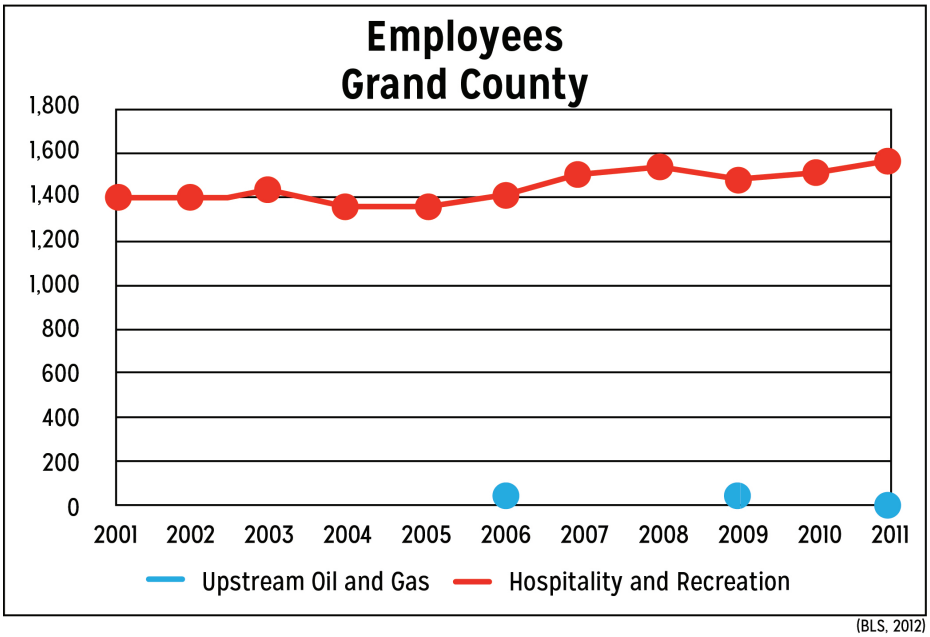
Historically, mining was the economic driver for Grand County. The loss of mining activity in the 1980s took a toll on Grand County's economy and residents: The population dropped by 20% from 1980 to 1990 (U.S. Census Bureau, 2009). Today, tourism and recreation based on natural amenities has replaced mining as the main focus of Grand County's economy.

Exhibit 2.4 shows Grand County's employment by sector for the civilian employed population over 16 years old. Oil and gas are included in the agriculture, forestry, fishing and hunting, and mining category. This category is the smallest employment sector in the county, employing just 2.2% of civilian workers over 16. This

percentage mirrors the state average of 2%, reflecting the lack of extractive and agricultural activities in the county. Arts, entertainment, recreation, accommodation, and food services are the single largest sector in the county with 23.3% of the civilian workforce over 16 years old.

Exhibit 2.22 shows employment in both upstream oil and gas and hospitality and recreation in Grand County from 2001 to 2011. Employment in hospitality and recreation remained fairly constant over the decade. The few data points available for upstream oil and gas show low employment in that sector.

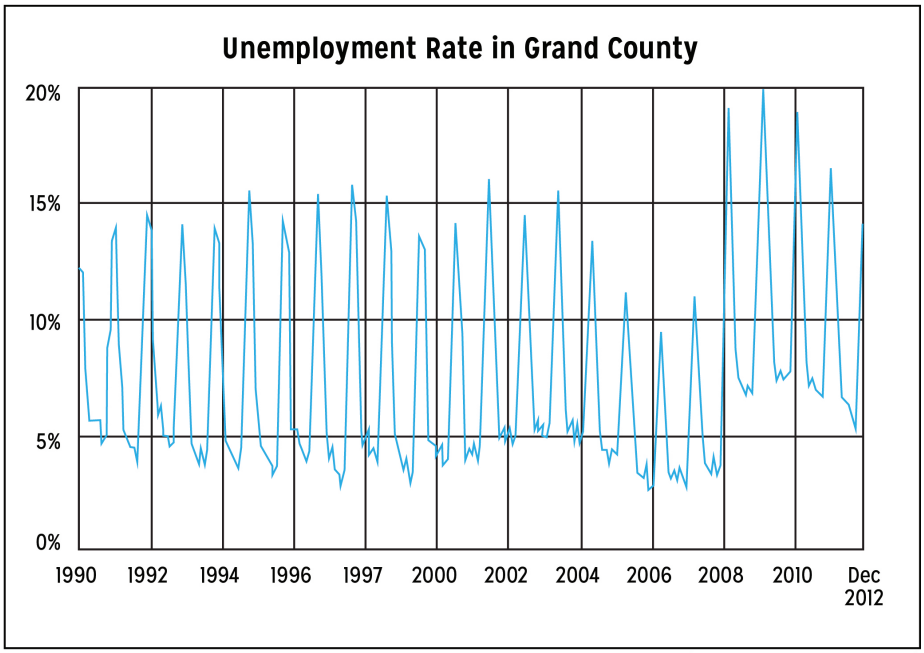
Exhibit 2.22



(BLS, 2012)

The recreation that drives employment in hospitality and recreation is seasonal, leading to high unemployment in the off-season, as seen in Exhibit 2.23. For example, in January 2010, unemployment was nearly 20%, but it fell to 7.6% in June of that year when recreationists poured into the county for the summer months (BLS, n.d.). It is important to note that from 1990 to 2004 these unemployment spikes remained fairly constant and then dipped from 2005 to 2008. After 2009, however, unemployment levels spiked, reaching a high of 19.8% in 2010.

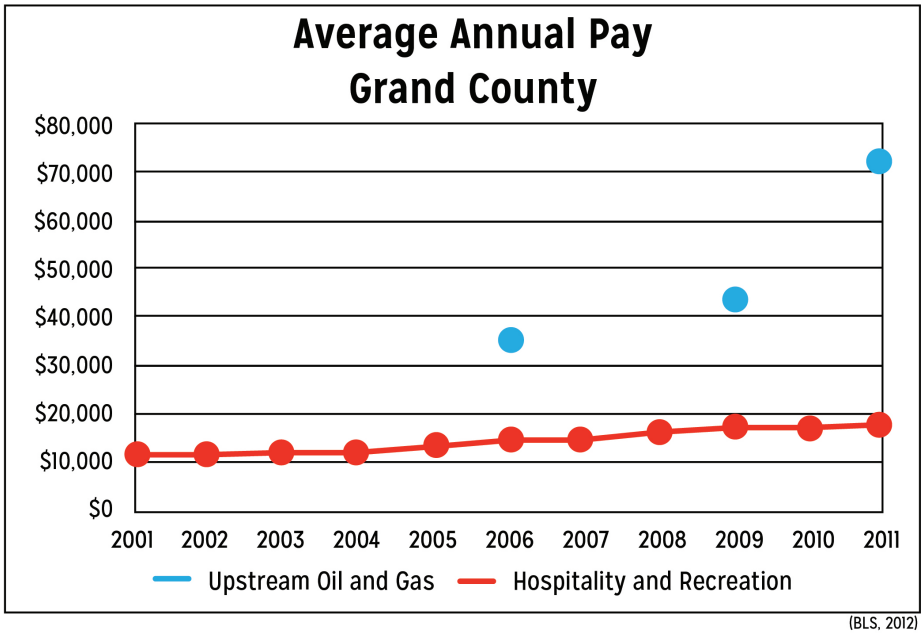
Exhibit 2.23



(BLS, 2012; via Google Public Data)

Exhibit 2.24 shows average annual pay trends in hospitality and recreation and upstream oil and gas. Though a significant part of the county is employed in hospitality and recreation, these jobs pay significantly less than jobs in upstream oil and gas. Wages in oil and gas have also been increasing even as employment in this sector has fallen. In contrast, wages in hospitality and recreation have remained low across the decade. These average annual pay numbers are reported in nominal dollars and have not been adjusted for inflation.

Exhibit 2.24



(BLS, 2012)

Despite employing only a small number of people, oil and natural gas does have some impact on Grand County's budget. The taxable value for natural gas in the county exceeds $3.5 million, and oil and gas pipelines' taxable value exceeds $66 million (Peggy Taylor, Personal Communications, May 6, 2013). The Grand County Treasurer reported about $600,000 in revenue from the oil and gas industry, which accounts for 4.8% of the total budget (Peggy Taylor, Personal Communications, May 6, 2013). Oil and gas pipelines contribute to collections as well. The hospitality and recreation industry also contributes to Grand County's revenue stream. The transient room tax in Grand County generated about $1.6 million in revenue in 2010 and $1.7 million in 2011. This accounted for about 10% of the county's total revenue in 2010 and just under 9% of the county's total revenue in 2011 (Grand County Financial, 2012).

Development Strategies

Grand County benefits from its robust tourism sector that is centered on amenities, as its small but profitable energy sector. After the mining bust in the 1980s, recreation and tourism helped rebuild Grand County's economy. While the economy now is still somewhat cyclical due to seasonality in tourism and sensitivity to broader economic conditions, amenities have provided a good base for the

county economy and have not been hampered by the energy development that does occur. As shown in Exhibit 2.18, energy extraction activities generally occur away from major amenity attractions (e.g. Arches National Park), one reason that the two sectors can successfully coexist.

Looking to further boost amenities in the county, residents and outdoor retailing industries started an initiative in 2012 to create Greater Canyonlands National Monument. The proposal would protect 1.4 million acres around Canyonlands National Park from resource extraction, including oil and gas drilling. This effort is ongoing. Although in some cases like this there are groups of individuals or organizations who favor amenity development over energy development, as a whole the county wants to grow both sectors: As described in the 2012 Grand County General Plan, residents and officials envision a sustainable and diverse economy for Grand County's future (General Plan, 2012(b)). Energy and amenity development are both included in that vision. The county plans to both "maintain and enhance the recreational, scenic, and cultural amenities unique to Grand County to attract and sustain economic activity," and "encourage businesses to develop solid and fluid mineral resources while using the best technology and mitigation techniques to protect natural amenities and natural resources" (General Plan, 2012(b)). Clearly, Grand County sees itself as a place where both energy and amenities will develop together in the future to jointly benefit the county.

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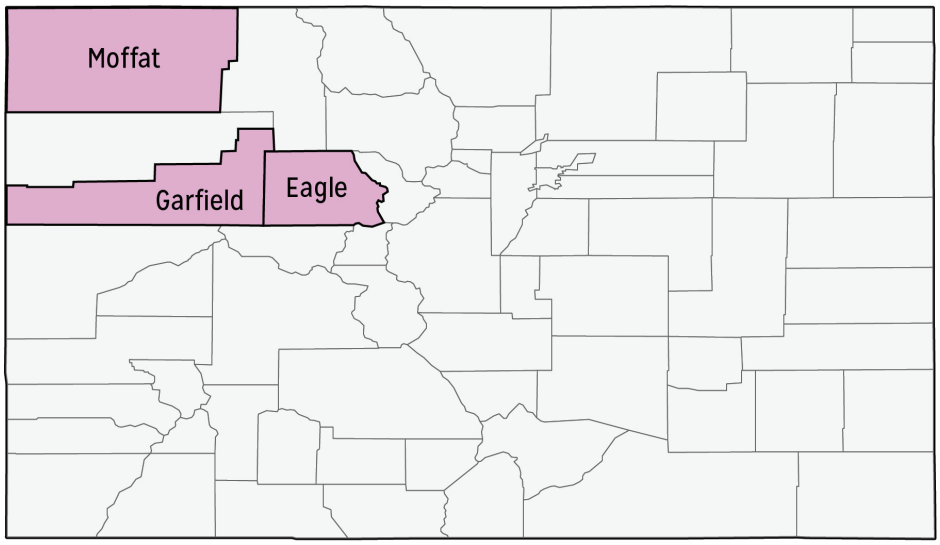
Colorado

Energy extraction and amenities play important roles in Colorado's economy. The oil and gas industry in the state is booming and residents are reaping the benefits. In 2012 Colorado's oil and gas production reached its highest level since 1962 (Proctor, 2013). Along with oil and gas resources, Colorado also offers significant amenity activities such as skiing and hiking, which create jobs and generate revenue in the state.

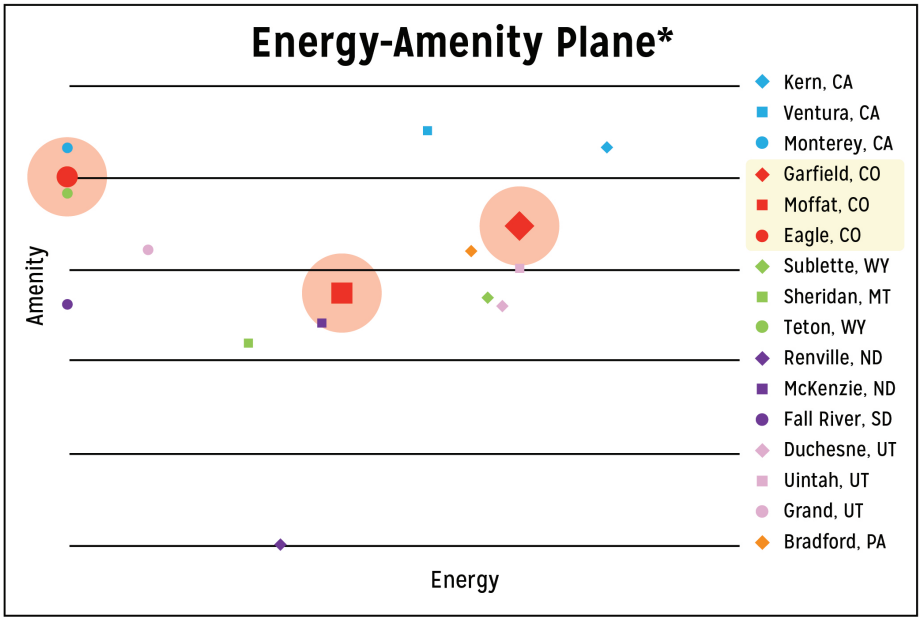
Exhibit 3.1 Map of the State of Colorado with Select Counties



The relationships between Eagle, Moffat, and Garfield counties demonstrate that county economies are often connected. Economic events in one county can have ripple effects throughout the state. It is often difficult to disentangle the effects of one industry (such as hospitality) on one economic indicator (such as per capita income). Instead, as mentioned earlier in this report, the case studies focus on

individual industries and how they contribute to the overall economic growth of the county and state.

Exhibit 3.2



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

Exhibit 3.2 shows that Eagle County is highly dependent on its amenity sector for economic growth; the county greatly benefits from its high-end ski resort town of Vail. Garfield County has had more time than Moffat County to develop its oil and gas industry, which explains its distance from Moffat County in Exhibit 3.2. Moffat County remains on the cusp of such development as it works to transition away from a traditionally coal-based economy, while Garfield County residents more fully enjoy the benefits of thriving oil and gas and amenity industries.

The State of Colorado enjoys substantial economic benefits from its oil and natural gas industry. It is estimated that 161,266 jobs were supported[16] by the industry in the state in 2009 (AmericanEnergyWorks.org, 2012). This created $10.2 billion in labor income and added $20.5 billion to the state's economy overall (AmericanEnergyWorks.org, 2012).

Exhibit 3.3 shows oil and gas, hospitality and recreation, and agriculture employment and annual pay by county in Colorado. It is evident from these numbers that in Garfield County oil and gas jobs make up an important sector of

[16] This support includes direct, indirect, and induced jobs

the economy. Jobs associated with amenities are also significant, though the average pay in both the hospitality and recreation and agriculture sectors is much lower than the state average salary of $47,916 (AmericanEngeryWorks.org, 2012).[17]

Exhibit 3.3 Employment and Annual Average Pay in Selected CO Counties, 2011

	Upstream Oil and Gas		Hospitality and Recreation		Agriculture	
	Employment	Average Annual Pay	Employment	Average Annual Pay	Employment	Average Annual Pay
Garfield	2,295	$78,257	2,793	$18,313	181	$30,955
Moffat	101	$64,634	495	$14,723	26	$26,625
Eagle	-	-	10,342	$29,920	47	$39,248

(BLS data from 2011)

Eagle County has no significant petroleum reserves. The county instead relies on its unique amenities as an economic base. Nearby Garfield County relies on the petroleum industry for economic growth. While maintaining the strength of its oil and gas industry, Garfield also actively protects its amenities, which play a large role in the county's economy. In Moffat County, the once-fundamental coal industry is in decline and some county officials are hoping to see the petroleum industry take its place. Moffat County officials hope to use a portion of the tax revenues from the growing petroleum industry to help the sagging tourism industry. In Moffat County and across Colorado, both amenities and energy extraction are viable avenues for economic growth, and are not mutually exclusive.

Exhibit 3.4 shows the civilian employed population over the age of 16 by sector for Eagle, Garfield, and Moffat counties, and compares these numbers to the state average. Oil and gas are included in the mining portion of the agriculture, forestry, fishing and hunting, and mining sector. As the table shows, Moffat County has the highest percentage employed in this sector. Eagle County has the highest percentage employed in the arts, entertainment, recreation, accommodation, and food services sector, which suggests a reliance on tourism.

[17] Average annual pay is reported in nominal dollars.

Exhibit 3.4 Percent Employed by Sector in Select Colorado Counties, 2011[18]

Sector	Garfield	Eagle	Moffat	CO Average
Agriculture, forestry, fishing, and hunting, and mining*	4.59%	2.47%	16.30%	2.23%
Construction	18.91%	16.33%	7.44%	8.33%
Manufacturing	2.89%	1.72%	2.24%	7.19%
Wholesale trade	1.70%	1.55%	3.20%	2.83%
Retail trade	13.91%	8.23%	15.78%	11.35%
Transportation, warehousing, utilities	5.01%	2.89%	9.11%	4.74%
Information	0.70%	0.99%	1.14%	3.24%
Financial, insurance, real estate	4.88%	7.95%	6.14%	7.38%
Professional, scientific, management, administrative, and waste management services	9.70%	12.77%	3.17%	12.98%
Educational services, health care, and social assistance	16.00%	12.94%	14.45%	19.56%
Arts, entertainment, recreation, accommodation, and food services	12.11%	25.17%	6.58%	10.17%
Public administration	4.97%	4.51%	7.25%	5.09%
Other services	4.63%	2.48%	7.19%	4.83%

*Oil and gas is a subset of mining

(U.S. Census Bureau data from 2011)

[18] Due to rounding and data structure issues, the percentages may not add up to 100 percent.

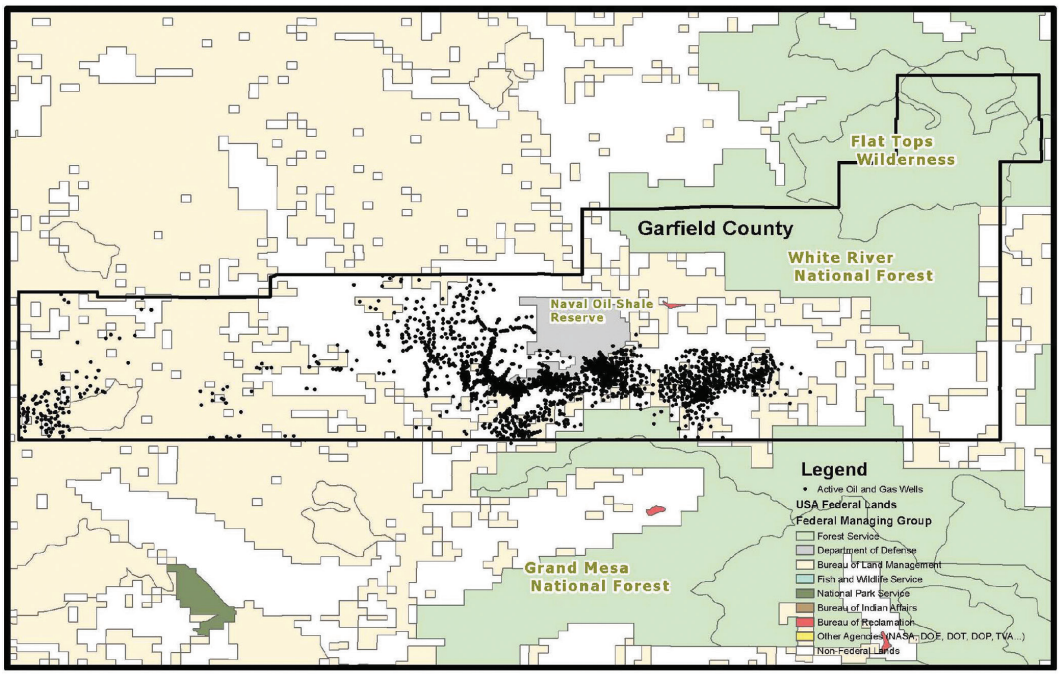
Garfield County, Colorado

Residents of Garfield County are fortunate to live in a rural county with natural resources that allow for both outdoor amenities and energy development. Northwest Colorado is described as being in "an extraordinary period of challenges, risks and opportunities" because of economic activity surrounding the oil and gas industry (BBC Research & Consulting, 2008).

Kirby Wynn was hired by Garfield County to deal specifically with these opportunities on a local level. In 2011 Wynn started working as the Garfield County Oil and Gas Liaison. Today he works to facilitate communication between the Colorado Oil and Gas Conservation Commission, state and federal agencies, citizens, and energy operators. Wynn says, "High priorities for me are fostering effective communication and problem solving amongst all parties relative to oil and gas development concerns" (Garfield County, 2011, September 27). By hiring Wynn, Garfield County hopes to facilitate positive relationships between the oil and gas industry and the local community. Such efforts bode well for the potential for extractive and amenity-based industries to continue to develop together in the county.

Exhibit 3.5 (for larger exhibit see Appendix) illustrates Garfield's County's mix of amenity and energy opportunities: The county includes large parts of the WRNF and Flat Tops Wilderness, located mostly in the northeastern part of the county, as well as large areas of BLM lands. It also has petroleum reserves; energy extraction activities are mainly located in the central part of the county.

Exhibit 3.5 Active Oil and Gas Wells in Garfield County, CO



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Energy Development

Covering the central portion of Garfield County is the Piceance Basin; the majority of the oil or natural gas wells shown in Exhibit 3.5 above are located in this basin. In total the basin covers an area of 7,110 square miles over several counties, although the largest portion of high potential oil lies in Garfield and Rio Blanco counties (Garfield County Board of County Commissioners [GCBCC], 2012, p. 2; Colorado Geological Survey, n.d.). The USGS estimated in 2010 that there are over 1.5 trillion barrels of oil in-place in the basin, "making it the largest oil shale deposit in the world" (GCBCC, 2012, p. 2). The basin also contains plentiful natural gas reserves. Most of the current production in Garfield County is natural gas (University of Colorado Denver, n.d.; Exhibits 3.7 and 3.8).

Garfield County's economy is heavily influenced by the oil and gas industry. Between 2006 and 2012, Garfield County had just over 7,000 well starts (State of Colorado Oil and Gas. 2013, June 17). The breakdown of starts by year can be seen in Exhibit 3.6.

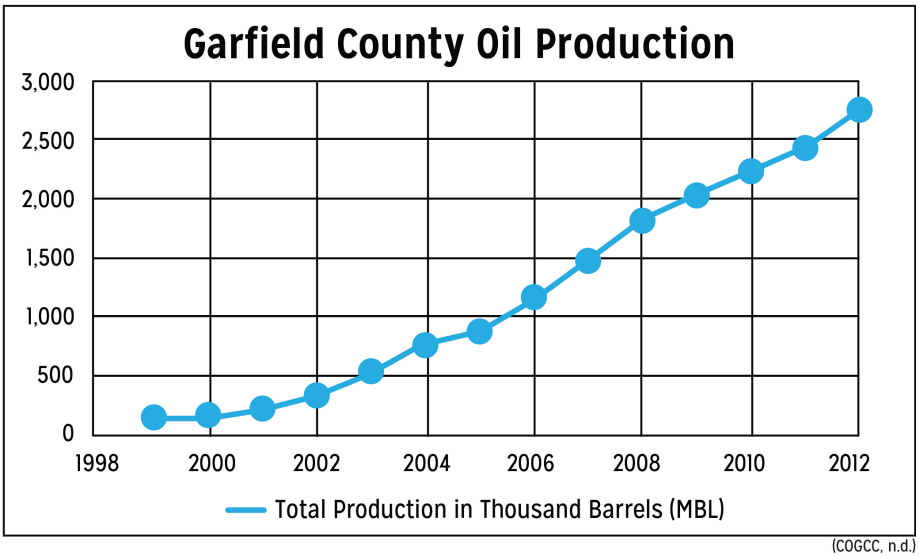
Exhibit 3.6 Number of Well Starts in Garfield County

Year	Number of Well Starts
2006	1,005
2007	1,304
2008	1,688
2009	768
2010	910
2011	881
2012	498

(COGCC, 2013, P. 22)

In 2012 Garfield County produced 2.75 million barrels of oil and 701.4 BCF of natural gas (including coalbed methane) (COGCC, n.d.). Garfield's energy production represents a significant share of statewide totals. Though it makes up just under 6% of state oil production, Garfield County accounted for 41.2% of the state's natural gas production in 2012 (COGCC, n.d.). In 2011, 27.3% of Colorado's drilling permits were for projects located in Garfield County (Garfield County, 2011). Of the 77 total active drill areas in Colorado as of November 2011, 21 were located in Garfield County (Garfield County, 2011).

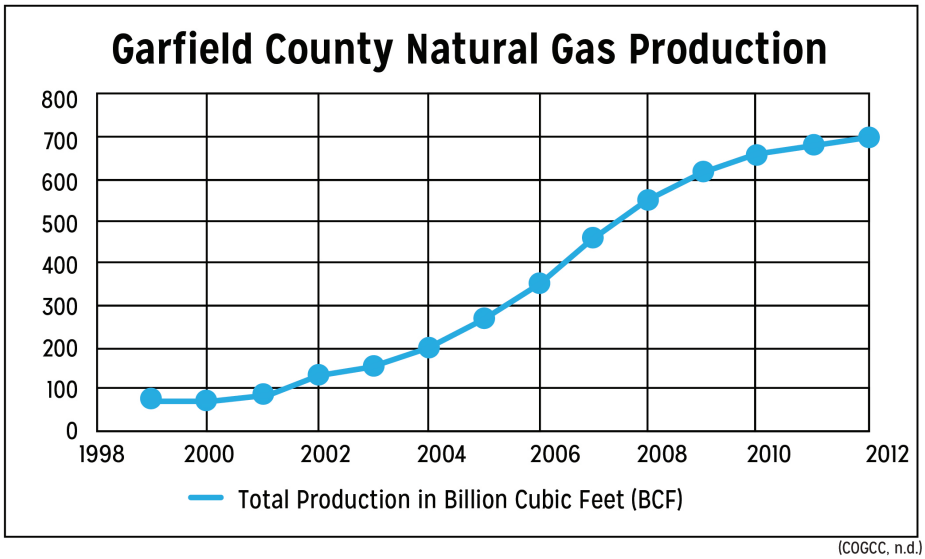
Exhibit 3.7



(COGCC, n.d.)

Exhibit 3.7 illustrates growth in oil extraction in Garfield County from 1999 to 2012. Oil production took off after 2002, doubling between 2003 and 2006. By 2012 total production had exceeded 2.8 million barrels of oil.

Exhibit 3.8



(COGCC, n.d.)

Gas extraction in Garfield County has seen a decade of growth similar to that of oil extraction. There has been a significant increase in production every year, though growth slowed somewhat from 2008 to 2009. Garfield County saw the most growth between 2006 and 2008, an increase of about 200 BCF. In 2012 the county produced 703.2 BCF of gas.

Because of Garfield County's plentiful resources, county officials have advocated for more energy development. To further foster growth in energy extraction, in 2012 Garfield County commissioners approved a resolution denouncing federal plans to reduce the amount of land available for oil shale development in western states, including Colorado (Rebhan, 2012).

Amenity Development

Along with its oil and natural gas production, Garfield County's economy also includes a viable, year-round outdoor recreation and tourism economy. Glenwood Springs, the county's largest city, is located just outside the WRNF border. The city boasts the world's largest mineral-rich hot springs, Hot Springs Pool. The county also has miles of hiking and biking trails, and winter activities including skiing and snowboarding (Garfield County Economic Development [GCED], 2011). Some Garfield County towns are gateway communities to the world-famous Aspen ski complex in adjoining Pitkin County, as well as world-renowned trophy catch-and-

release trout fishing on the Fryingpan River. Along with the tourism these amenities attract, a 2008 survey of Garfield County residents revealed that most county residents also enjoy the outdoor recreation provided by the area's natural amenities (GCED, 2011).

Garfield County includes a large part of the WRNF, "the top recreation forest in the nation" (USFS, n.d.). This forest has a relatively low elevation, high levels of moisture, and clean streams, making it a good habitat for many animals, including elk, bear, birds, and trout (Thompson Divide Values, n.d.). Many towns and farms in the area take advantage of water from these streams and rivers for municipal and agricultural needs (The Issue, n.d.). The WRNF fuels the local economy by attracting tourists that come to the area for hunting, fishing, biking, camping, rock climbing and other activities year round. High levels of tourism make the WRNF the most visited national forest in the United States (Glenwood Springs Chamber Resort Association, n.d.). The Sunlight Mountain Ski Resort, which markets itself as an affordable, family-friendly ski resort, is located in the WRNF (Sunlight Mountain Resort, 2013). Garfield County includes a portion of the Thompson Divide, which has been home to recreation and ranching for more than a century, and is also part of the WRNF (Thompson Divide Coalition, 2011; Thompson Divide Values, n.d.). The Thompson Divide is an expansive area also covering portions of Mesa, Pitkin, Gunnison, and Delta counties (Thompson Divide Values, n.d.).

The Flat Tops Wilderness, the second largest wilderness area in Colorado, covers about 235,000 acres of the WRNF (Exhibit 3.5; University of Montana, n.d.). Much of this wilderness area is in Garfield County and provides residents and visitors with more opportunities for outdoor recreational activities in a protected and pristine environment (University of Montana, n.d.). Both the WRNF and the Flat Tops Wilderness areas can be seen in the map of Garfield County (Exhibit 3.5).

A profile of Carbondale, one of the cities within Garfield County, highlights a few of the activities the county offers. Just 7 miles from Carbondale is the Spring Gulch Trail System, which offers miles of well-groomed cross-country ski trails (National Geographic, n.d.). Visitors can eat at many restaurants serving seasonal and local fare (National Geographic, n.d.). Visitors can also hike the twin peaks of Mount Sopris (National Geographic, n.d.). Amenity opportunities such as these are developing throughout the county and fortifying its economy.

Economic Indicators

Garfield County's energy development provides extensive benefits for the county in the form of tax revenues. In 2012, 35% of Garfield County's forecasted total tax revenue was directly attributable to the oil and gas industry (Dawson, n.d.). Also, in 2012 all 10 of the county's top tax contributors were oil and gas companies (Garfield County, CO, 2012, p. 8). Additionally, the oil and gas industry generates significant revenues for the county in sales tax, which totaled $10 million in 2011, and property taxes, which totaled $95 million in 2011. These were expected to increase by 10% the following year (Garfield County, CO, 2012, p. 31).

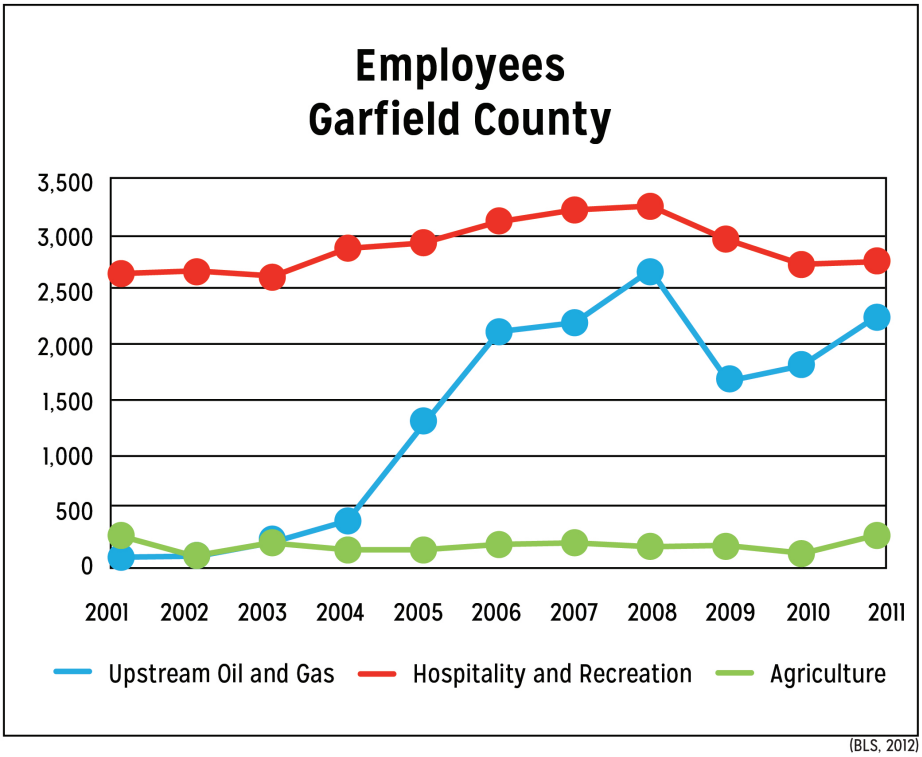
Traditionally, one of the largest beneficiaries of oil and gas revenues in Garfield County has been school districts. For example, the district that includes Silt, Rifle, and New Castle, in the western part of the county, saw a significant increase in its budget thanks to increased oil and gas revenues, growing from $116 million in 2001 to $987 million in 2006, according to the most recent data available (Gray, 2006, August 15). Meanwhile, the school district covering Parachute and Battlement Mesa saw an increase from $71 million in 2001 to $672 million in 2006. Over the same 5 years, the county's total revenues from natural gas production alone grew from $201 million to $1.7 billion (Gray, 2006, August 15).

Percent employment of civilians age 16 years and older in Garfield County can be seen in Exhibit 3.4. Agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset, employed 4.59% of the civilian population age 16 years and older in 2007, almost double the state average. Garfield County's employment in arts, entertainment, recreation, accommodation, and food services is also higher than the state average.

While the hospitality and recreation sector employs more people than either the upstream oil and gas or agriculture sectors, upstream oil and gas has seen the most growth. Between 2004 and 2008 upstream oil and gas employment exploded, increasing by almost 36.8% as seen in Exhibit 3.9. Employment in the hospitality and recreation sector increased much more gradually over the period—from 2,686 employees in 2001 to 3,292 in 2008. As with upstream oil and gas employment, the hospitality and recreation sector lost jobs after 2008, though its decline was not as

steep. Since the decline, hospitality and recreation employment has not regained growth, but has seemed to level off. Employment in agriculture has remained fairly constant over the decade. Both the upstream oil and gas employment and the agriculture employment numbers are likely low due to the data collection and inclusion issues discussed in Part I. As a point of comparison, the large number of well starts in Garfield County (shown in Exhibit 3.6) suggests that employment in the oil and gas sector would have been much higher over the period than the BLS data indicates due to the significant employment that drilling wells generates (see Considine et al.'s 2011 work). However, the trend in the BLS data seems generally consistent with the well start Exhibits.

Exhibit 3.9

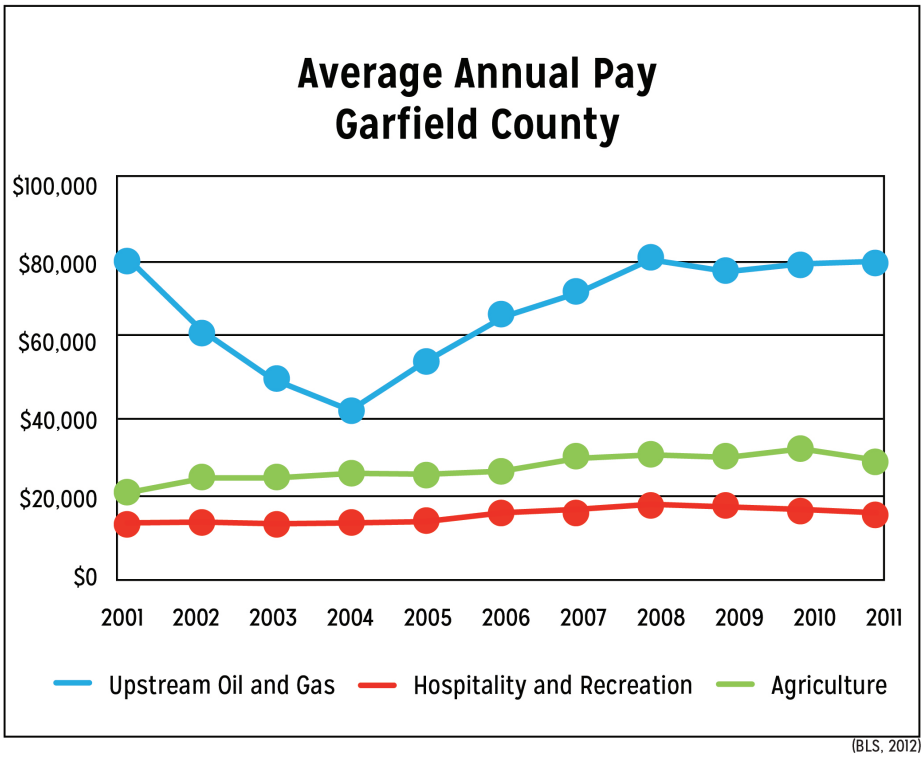


(BLS, 2012)

Exhibit 3.10 shows trends in average annual pay for the three sectors. Average annual pay is reported in nominal dollars and has not been adjusted for inflation. Despite slightly lower employment numbers, average annual pay for oil and gas employees is more than double that of hospitality and recreation and agriculture employees. Notwithstanding the sharp decrease in average annual pay for oil and gas employees from 2001 to 2004, pay has grown since 2004 and leveled off at about $80,000 in 2008. While the hospitality and recreation sector employs greater

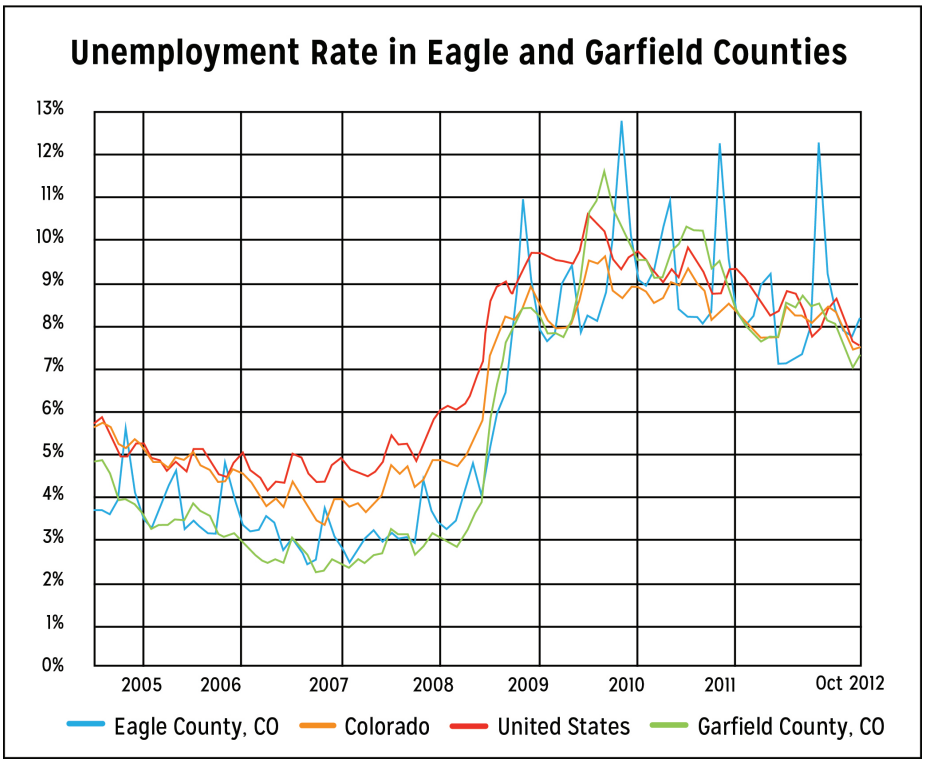
numbers (Exhibit 3.9), these jobs on average were paying only about $16,000 during the last decade. Average pay in agriculture has grown slightly over the decade, averaging a little over $28,000. Those working in the oil and gas sector averaged $60,000 in pay over the decade.

Exhibit 3.10



(BLS, 2012)

Exhibit 3.11



(BLS, 2012; via Google Public Data)

Exhibit 3.11 shows unemployment rates in Garfield County from 2005 to 2012. After the 2008 financial crisis, the unemployment rate in Garfield County began to follow much more extreme seasonal cycles. This is likely due to the growing number of Garfield residents who have moved out of and are now commuting to Eagle County because Garfield County is a more affordable place to live. This is one example of why it can be difficult to disentangle one county's economic growth from that of its neighbors. The most recent socioeconomic study of the area (2005) found that 6,700 Garfield County residents commuted to Eagle and Pitkin counties for work (BBC Research & Consulting, 2007, pg. 15). This study projected that the number of residents moving to Garfield County for lower costs of living was expected to increase to nearly 24,000 by 2030 (BBC Research & Consulting, 2007, pg. 15).

Development Strategies

Garfield County has been able to balance its economy well between various interests. Even with the huge growth in petroleum extraction, the county has maintained its amenity sector. Exhibit 3.5 shows one reason that both sectors can thrive here. Generally, extractive development and amenity development do not occur in the same geographic areas. The active oil and gas wells are mostly located in the central part of the county. Some development is occurring on BLM lands in the western part of the county, a common occurrence in the western United States. The natural gas development is occurring in geologically promising areas along the I-70 corridor, and north of that corridor, in mesa country in the Piceance and Parachute Creek drainages (Lyon et al., 2001, p. 19). Trophy elk hunting takes place in the Roan Plateau and Thompson Divide portions of this area (Lyon et al., 2001). For the most part, however, recreation takes place in the county's national forest and wilderness areas in the northeastern part of the county. The heaviest recreational use takes place in the WRNF-administered lands characterized by a montane ecosystem (Lyon et al., 2001). Because they are physically separated, energy extraction and amenities both have room to develop.

Garfield County's employment and wage statistics further demonstrate that simultaneous development can occur. Despite increasing oil and gas production (see Exhibit 3.7 and 3.8), employment in agriculture and hospitality and recreation has remained fairly constant. Further, while the oil and gas sector does not employ as many people as the hospitality and recreation sector, the oil and gas industry wages are much higher. The different characteristics of these sectors help to create a diverse and economically viable economy.

Garfield County officials have taken steps to encourage such mutual growth. In addition to hiring oil and gas liaison Kirby Wynn, the county created the Energy Advisory Board (EAB) with the mission of providing a forum for the oil and gas industry, local citizens, and concerned landowners to,

> "prevent or minimize conflict associated with oil and gas development through positive and proactive communication and actions that encourage responsible and balanced development of these resources within Garfield County (Garfield County, 2013)."

The EAB holds meetings almost every month where citizens can ask questions of representatives from the local government, school districts, and oil and gas operators (Garfield County, 2013). They also give regular educational presentations on issues such as hydraulic fracturing, air quality management, and the geology of the Piceance Basin (Garfield County, 2013). These proactive steps will help ensure that energy extraction and amenity development can successfully develop side by side in Garfield County for years to come.

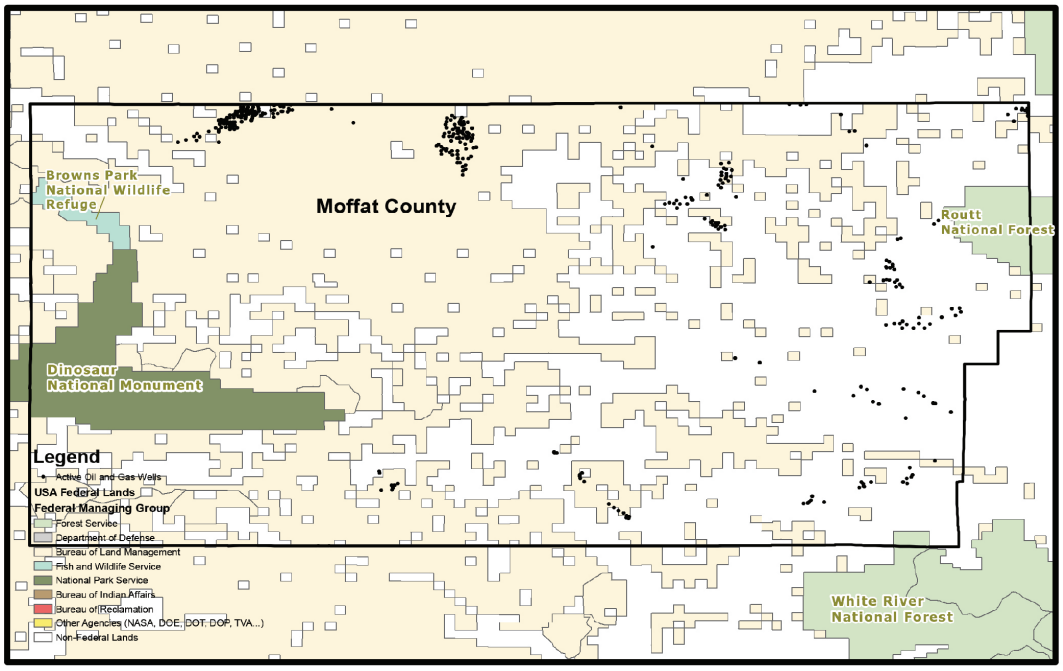
Moffat County, Colorado

Once heavily reliant on the coal industry, Moffat County is attempting to create a more diversified economy with available petroleum and amenity resources, centered on oil and gas resources. With the closure of the Seneca Coal Mine in 2005, job cuts in other mines during the last few years, and a weak outlook in the domestic demand for coal, the "heart and soul" of Moffat County's economy has greatly declined (Manzanares, 2005; Craig Daily Press, 2009, December 5; Colorado Energy News, 2010, December 8; Moylan, 2012, November 16). County officials now envision a "strong energy based economy" where water, gas and oil, land, and coal "all play a role in providing essential services to others in our state and nation. That is our economic base" (Danner, 2012, pg. 1). The Friends of Northwestern Colorado and other conservation groups are lobbying for an increased focus on amenity development to replace the declining coal industry's role in the county economy (Craig Daily Press, 2009, December 5).

In August 2007, Tammie Thompson-Booker (then chair of the Moffat County Tourism Association Board of Directors) and Mike Crackel (vice-chair) reported that most of the association's revenue comes from lodging taxes on energy workers (Smith, 2007). "'It's the energy workers that gave us this money,' Thompson-Booker said. 'I know (hunters) spend a lot of money here, but those three to four weeks do not get us to where we are'" (Smith, 2007). As revenues in the county have increasingly come from energy development, the general consensus has been to focus the county's resources on energy development and use the resulting revenue to help build and run amenities in the county, such as the Dinosaur National Monument.

Exhibit 3.12 (for larger exhibit see Appendix) shows oil and gas activities and federal lands in Moffat County. Most of the petroleum activity is concentrated in pockets across the northern part of the county. Meanwhile, lands managed by the USFS and USFWS are located on the western and eastern edges of the county. These designated areas provide many of the amenity opportunities in the county.

Exhibit 3.12 Active Oil and Gas Wells in Moffat County, CO



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Energy Development

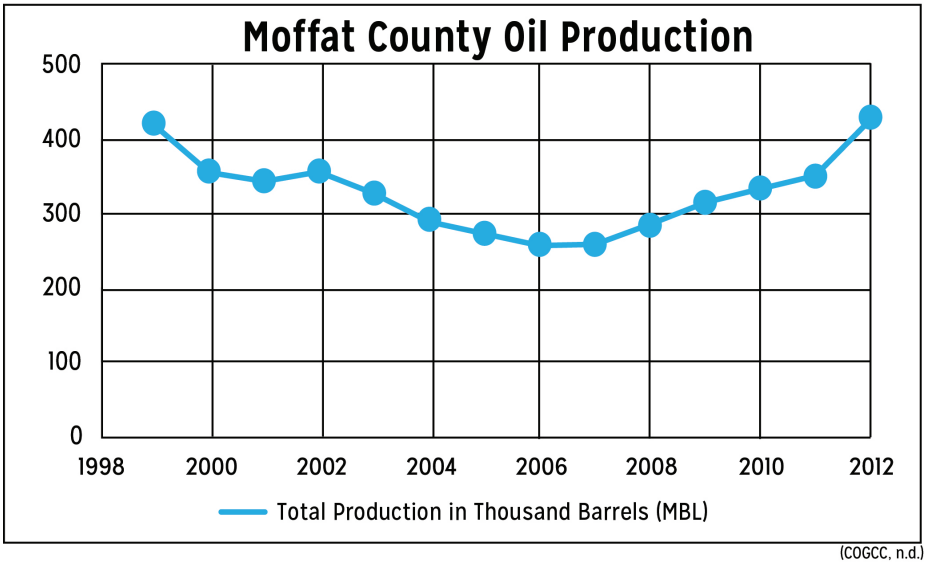
Moffat County contains a part of the Niobrara Shale formation, which stretches from New Mexico through Colorado to Wyoming (Proctor, 2011; Sonnenberg, 2011). Petroleum production began in one of the basins within the Niobrara Shale in Moffat, Routt, and Rio Blanco counties in the 1920s (Colorado Department of Natural Resources, 2011). Within this formation is the Sand Wash Basin, covering 5,600 square miles of Moffat County and Routt County. The Sand Wash Basin is expected to hold 101 trillion cubic feet (TCF) of coalbed methane gas (Environment Protection Agency, 2004). Despite this large resource, petroleum production has been slow in Moffat County. Much of the Sand Wash Basin's resources, though vast, are difficult to produce because of "large volumes of water in most coalbeds" (Environment Protection Agency, 2004). Energy development is further complicated in Moffat by a combination of a difficult regulatory climate and underperforming wells (Smith, 2010, March 2; Moylan, 2013, March 2). The number of well starts by year in Moffat County are shown in Exhibit 3.13 (State of Colorado Oil and Gas. 2013, June 17).

Exhibit 3.13 Number of Well Starts in Moffat County

Year	Number of Well Starts
2006	60
2007	42
2008	25
2009	18
2010	15
2011	34
2012	26

(COGCC, 2013, P. 22)

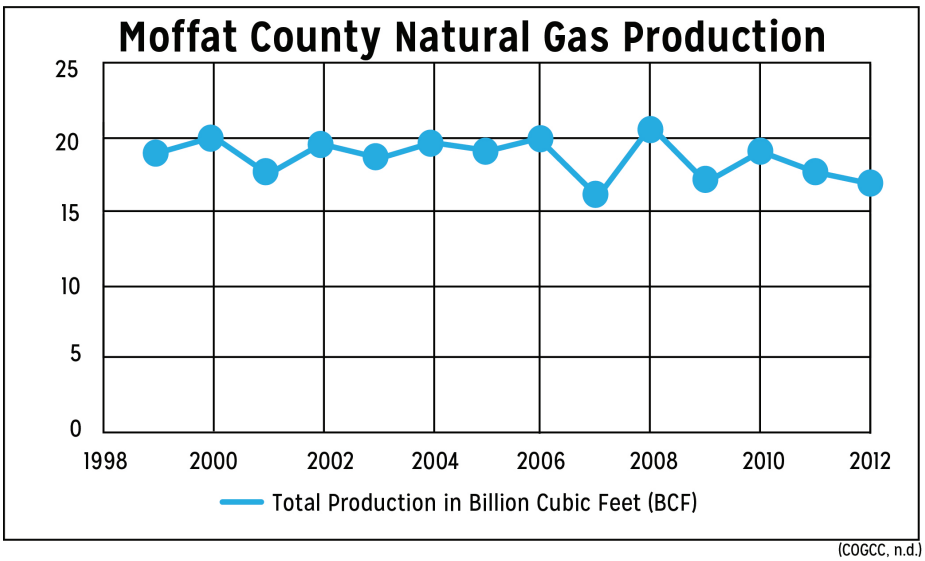
Exhibit 3.14



(COGCC, n.d.)

Oil production in Moffat County saw a gradual decline from just above 414 thousand barrels in 1999 to 246.5 thousand barrels in 2007. Since then, oil production has rebounded to 427.5 thousand barrels in 2012. Steady for the first part of the decade, gas production in Moffat County became much more volatile after 2006. Between 2006 and 2010, gas production cycled through two dips and two rebounds of about 3 BCF each, and then declined again to a low of 16.9 BCF in 2012.

Exhibit 3.15



(COGCC, n.d.)

Beginning in 2009 new state regulations regarding oil and gas drilling took effect. According to some county officials, the increasingly murky regulatory environment caused a decrease of almost 3,000 drilling permits from the record high in 2008 (Smith, 2010, March 2). State Representative Randy Baumgardner called the regulations a "huge deterrent to the industry here in the state" (Smith, 2010, March 2). A Nabors Industries, Ltd. floor hand, Robert Smith, asserted, "there's a lot of money to be made [by the county] if they would just let [the petroleum companies] get to work" (Moylan, 2011, September 16).

Despite this regulatory climate, the petroleum industry has tried to move forward. Landmen—representatives from oil and gas companies who negotiate mineral rights leases—were spending 8 hours a day in the Moffat County Clerk and Recorder's office reviewing land records for owners of mineral rights (Smith, 2011a, January 22). Their presence was a sign of "economic hope" to Moffat County Commissioner Tom Mathers (Smith, 2011, January 22). Though officials are slow to call Moffat County the site of a new oil and gas boom, by 2011 almost 500,000 mineral acres had been leased in the county, mostly on privately owned land (Moylan, 2011, September 16; Smith, 2011, January 22).

In 2013 Shell Oil, together with Commissioner Mathers, announced that Shell Oil would begin fracturing up to seven wells in Moffat County in an effort to increase the flow of petroleum reserves (Moylan, 2013, March 2). Shell Oil has been

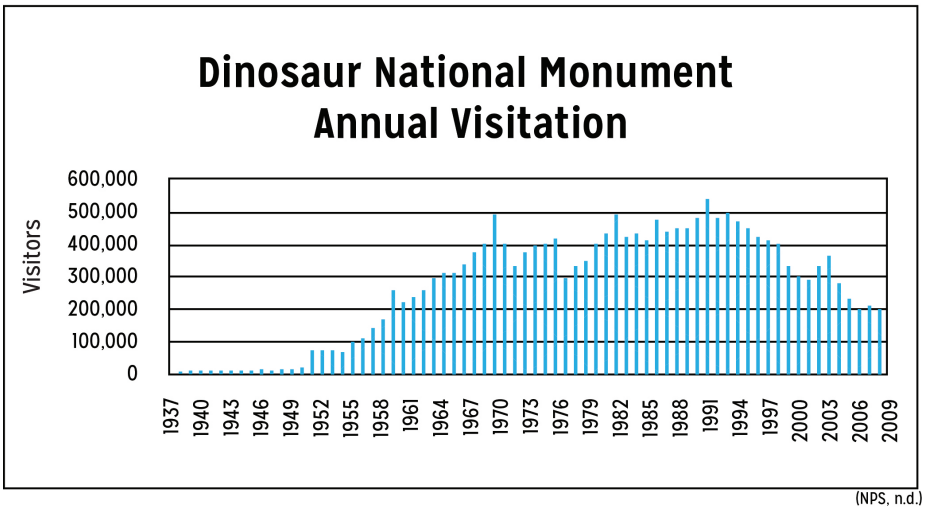
working to extract shale oil from the Niobrara Shale formation since May 2010. Although the lack of flow has slowed down production, Shell Oil plans to drill up to 25 new wells by the end of 2013 in Moffat County. Exploration has increased so much that for the 2013 budget, the Moffat Board of County Commissioners approved a new position, the Assessment Services Technician, to focus on the impacts of oil and gas exploration in Moffat County (Moffat County, 2012).

Planned BLM lease auctions are further evidence of the unfolding energy development in Moffat County. Three parcels totaling about 2,100 acres in northeastern Moffat County will be included in a planned August 2013 BLM auction. An additional nine parcels totaling almost 7,500 acres have been proposed for inclusion in a February 2014 BLM lease sale. The public will have the opportunity to provide comments on these proposed parcels in the months leading up to the auction (Colson, 2013).

Amenities Development

With preserved land areas and natural resources, Moffat County sells itself as an ideal location for a number of activities, including hiking, biking, horseback riding, kayaking, rafting, tubing, and winter sports. Dinosaur National Monument on the county's western border was founded in 1915 and contains beautiful landscapes and dinosaur fossils. The monument had served as Moffat's major tourist attraction, but visitation has steadily declined since the mid 1990s, due to a variety of factors. Annual visitation reached an all-time low in 2010, with only 197,000 tourists coming to the park that year (NPS, 2013). The reduction in tourists has had a large impact on the local economy, especially in small towns such as Dinosaur, whose economy is heavily dependent on visitors to the monument (Craig Daily Press, 2006).

Exhibit 3.16



(NPS, n.d.)

The American Recovery and Reinvestment Act of 2009 allocated funds to help rebuild the Dinosaur National Monument visitor center in order to "help put money into the local and regional economies" (Craig Daily Press, 2009, July 31). With plans moving forward to reconstruct the monument's central attraction many anticipated higher annual visitation. The new visitor center opened in October 2011. The center appears to have had an impact on annual visitation, with a 54.4% increase in visitation in 2012 (NPS, 2013). However, despite the funds and reconstruction, the number of visitors remains at its lowest levels since the late 1960s.

Because of the decrease in visitation to Dinosaur National Monument, the Moffat County Tourism Association (MCTA) decided in 2010 to pay for a market evaluation of their county (Smith, 2010, August 26). According to Director Marilynn Hill, the MCTA is trying to understand exactly what brings tourists to the county. The MCTA is also hoping to identify how they can use the county's available resources in synergistic ways (Smith, 2010, August 26).

Moffat County is home to other federally owned lands that offer amenity opportunities. Partially located in eastern Moffat County (Exhibit 3.12), Routt National Forest covers parts of Colorado and Wyoming and provides many recreation opportunities. Horseback riding, off-highway vehicle riding, fishing, hunting, biking, camping, and hiking are all allowed within the national forest (USFS, n.d.).

In western Moffat County, Browns Park National Wildlife Refuge offers 12,150 acres of peaceful wilderness between the Cold Springs and Diamond Mountains (USFWS, 2011, March 7). Home to a wide variety of wildlife, visitors are encouraged to use non-motorized vehicles to access the park in order to maintain the feeling of wilderness in the area (USFWS, 2011, March 7). Many of the hiking trails were created naturally by big game in the area (USFWS, 2011, March 7). Visitors can also visit Sand Wash Basin, where they can see herds of wild mustangs (Craig Chamber of Commerce, 2009(a)).

Visitors looking for summer water activities can visit Elkhead Reservoir, located just west of Routt National Forest. The American Bass Anglers has held several national tournaments at the reservoir (Craig Chamber of Commerce, 2009(b)). Open for boating in the summer and home to snowmobiling trails in the winter, the reservoir is popular with tourists because of the ease of accessibility from the town of Craig (Craig Chamber of Commerce, 2009(b)).

Economic Indicators

Moffat County benefits from both its amenity and energy sectors. The county already markets itself as a travel destination, and tourism contributes around $9 million per year to the local economy (Moffat County Tourism Association, n.d.; Schlaufman, 2011). The oil and gas industry also contributes—as of 2010 the industry produced $100 million in petroleum products in Moffat (Leeds School of Business, 2011, p. 39). Increased interest in energy extraction development is beginning to make Moffat County a destination for petroleum companies. David Ludlam from the West Slope Oil and Gas Association paints an optimistic economic picture for Moffat County: "I would say the definition of a boom is in the eye of a beholder. We're certainly on an upward trend. We're seeing an increase in economic activity here [in Moffat County]" (Moylan, 2011, September 16).

Moffat County Natural Resources Director Jeff Comstock understands the importance of energy development for Moffat County's economy. "Oil and gas development pays the bills in Moffat County," he said. Energy industries contribute money to the county through mineral lease payments, severance taxes, and revenue from sales and use taxes. Petroleum companies also contribute

property taxes at a significantly higher rate than residential or commercial activity (Moylan, 2011, September 16).

Natural resources, including oil, gas, and coal, contributed 30% of the total revenue to Moffat County in 2012 (State of Colorado, 2013). Of the top ten tax payers in Moffat County in 2012 all ten were associated with oil and gas activity (State of Colorado, 2013). Together these firms contributed $7.4 million tax dollars to the county.

Because of the increase in government revenue, Moffat County created an Oil and Gas Exemption Fund starting with the 2010 budget (Moffat County Fund, 2011, p. 4-2). The fund, using money from oil and gas property taxes, compensates Moffat County for the increased demand in government services due to the burgeoning petroleum sector (Moffat County Fund, 2011, p. 4-2). In 2011 this fund allocated $516,000 to allow Moffat County to provide increasingly demanded personnel, government operations, and equipment (Moffat County Fund, 2011, p. 4-21).

In November 2010 Moffat County experienced an economic windfall in the form of payments for mineral permits. The county, along with the Museum of Northwest Colorado, owns 13.9 thousand acres of land now considered quite valuable because of the potential oil and gas resources (Smith, 2011, April 1). The revenue from the 2010 mineral sales—over $3.3 million—was split between the Moffat County taxing districts and the Museum of Northwest Colorado, providing a significant boost to the local economy (Smith, 2011, April 1). The leasing boom has generated "economic hope" for many, as exploratory drilling is expected to grow in the next few years, resulting in more energy workers—and tax revenue—flowing into the county (Smith, 2011, April 1).

Mineral leasing sales in 2011 were another "shot in the arm" for Moffat County's local taxing districts (Smith, 2011, April 1). At the beginning of 2011 mineral right permits were being leased for about $100 an acre. At an auction in April just a few months later, as interest peaked in the Niobrara Shale formation, the price per acre increased to $1,233 on average (Smith, 2011(b), April 1). This auction netted $1.3 million for Moffat County (Smith, 2011, April 1).

The landmen mentioned earlier also contribute to the local economy. Many of the landmen in Moffat are planning to stay in the area for at least 3 years, each with a per diem of around $135 a day (Smith, 2011, January 22). These dollars are spent in the county at housing and food establishments, and a portion goes to the county in the form of the lodging tax. It is estimated that if 40 landmen live in the area and together they can contribute $1.9 million each year to the region (Smith, 2011, January 22). In 2007 MCTA collected more than $31,000 in revenue from the lodging tax—fueled by growth in the petroleum sector—that it can use to increase tourism and amenity opportunities. Between 2006 and 2007, the revenue collected by MCTA increased by more than $20,000, mostly due to energy workers in the area (Smith, 2007, August 16).

Landowners in the area are also benefitting as citizens that own mineral rights can profitably lease them. According to Mathers,

> "[Oil and gas companies] have put millions and millions of dollars into our economy through people that own property … They are going to go out and all of a sudden they have a check for $100,000 and they're going to buy a new pick-up and buy new furniture. It's good, positive growth for Moffat County"(Smith, 2011, January 22).

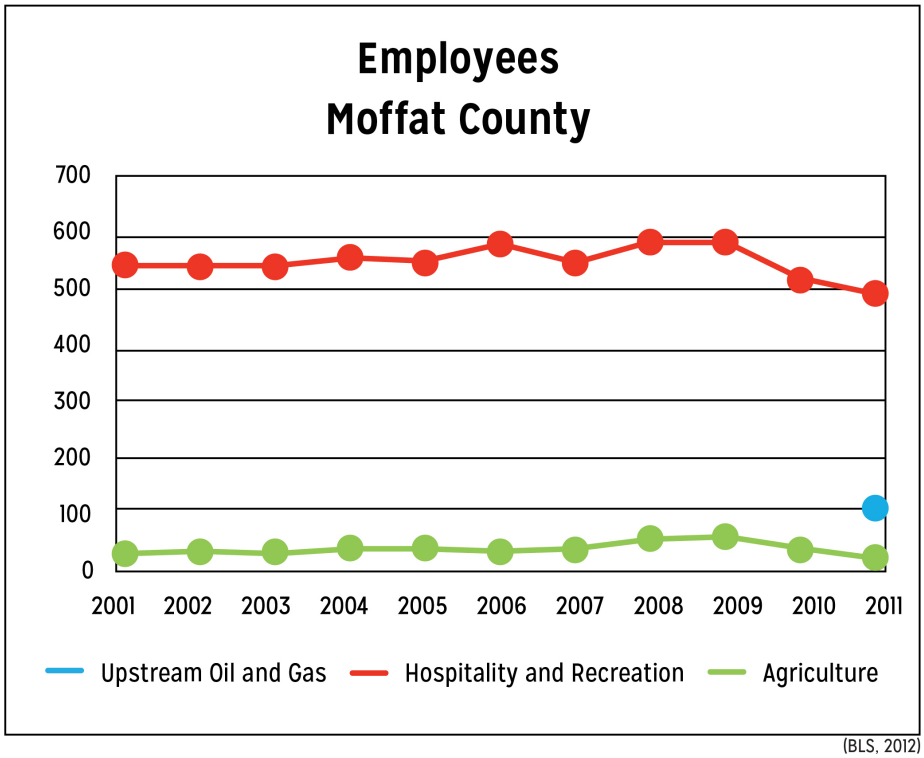
The economic impacts of oil and gas activity positively affect individuals living in the county, from small, private property owners to hotel and restaurant owners.

More than 16.3% of Moffat County residents are employed in agriculture, forestry, fishing and hunting, and mining (see Exhibit 3.4). This is significantly more than the state average. Amenity-based industries—the arts, entertainment, recreation, accommodations, and food services sector—employ just over 6.5% of the population, about 4% less than the state average.

Another picture of employment in oil and gas, hospitality and recreation, and agriculture is shown in Exhibit 3.17. Employment in hospitality and recreation has been fairly constant, increasing on average by about 5 employees per year until 2009. From 2009 to 2010 the sector lost almost 60 employees, and then employment dipped to its lowest level this decade in 2011. Unfortunately, there is only 1 year of data available for the upstream oil and gas industry; employment

data is only released from the BLS once employment reaches a certain threshold (see *Data* in Part I for a fuller discussion of BLS data). This data point seems low relative to the number of well starts in Moffat County in 2011 (see Exhibit 3.13), and is likely underestimating the upstream oil and gas employment due to the BLM data collection and inclusion issues discussed in Part I. Agricultural employment has always been small in the county; it dropped to its lowest level this decade in 2011.

Exhibit 3.17

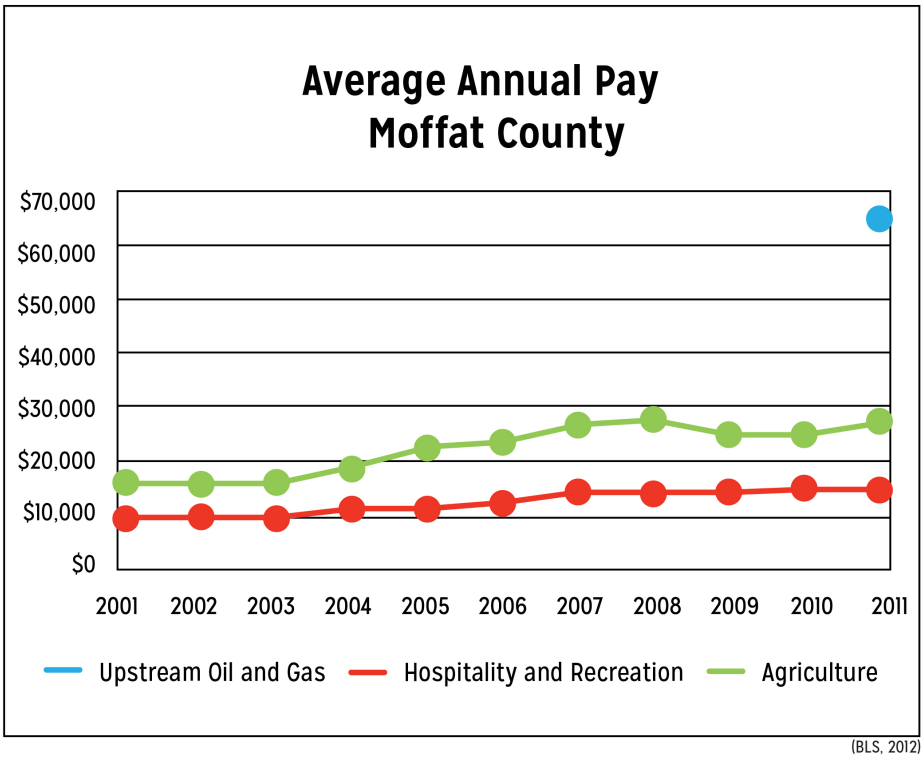


(BLS, 2012)

Available data (2011 only) shows that annual pay for oil and natural gas employees is significantly higher than that of other industries in Moffat County. Average annual pay in 2011 for upstream oil and natural gas workers was almost $65,000, while agriculture employees only received about $27,000 in average annual pay. Hospitality and recreation workers had the lowest average annual pay at almost $15,000 (BLS, 2012). Average annual pay in Moffat County has steadily, though slowly, risen for the hospitality and recreation and agriculture sector employees, though the data is in nominal dollars and has not been adjusted for inflation. While pay in the two sectors is fairly similar (agriculture employees are paid slightly more on average) upstream oil and gas employees are paid significantly more. Even with the small amount of

data available, it is evident that oil and gas employees are much better off in terms of wages. The largest group of employees from the three sectors of interest, hospitality and recreation, is the group that is paid the least.

Exhibit 3.18



(BLS, 2012)

Development Strategies

In Moffat County energy and amenities can develop together. Energy extraction creates revenue that can be used to increase funding for education, infrastructure, and services, which can help draw tourists and further increase the county's economic base (Moylan, 2011). Energy development is also helping private landowners in Moffat. According to Mathers, "[selling their mineral rights] means they'll be able to keep their family farms and ranches" (Smith, 2011, January 22).

The large increase in revenue, as reported above, has allowed the MCTA to plan amenity opportunities that can reach a wider variety of potential tourists. As of 2007 the MCTA was planning to use this revenue to create a 5,000-acre easement to allow for handicapped hunting excursions, more horseback riding trails and

winter recreation opportunities (Smith 2007, August 16). The MCTA would also like to plan more events in coordination with the Dinosaur National Monument to attract more visitors (Smith, 2007, August 16).

County officials are careful to make sure that they are developing both their amenity and energy resources in balanced ways. For example, the county has established a "Bill of Rights" for surface owners that they can use to protect themselves and their property if necessary, as well as reclamation standards and other good-faith negotiation procedures (Smith, 2011, January 22). Comstock said he feels the county has been taking a responsible and balanced approached to energy development. He explained, "We use our county land plan to guide where we are headed with this and I believe it is balanced." (Smith, 2011, January 22).

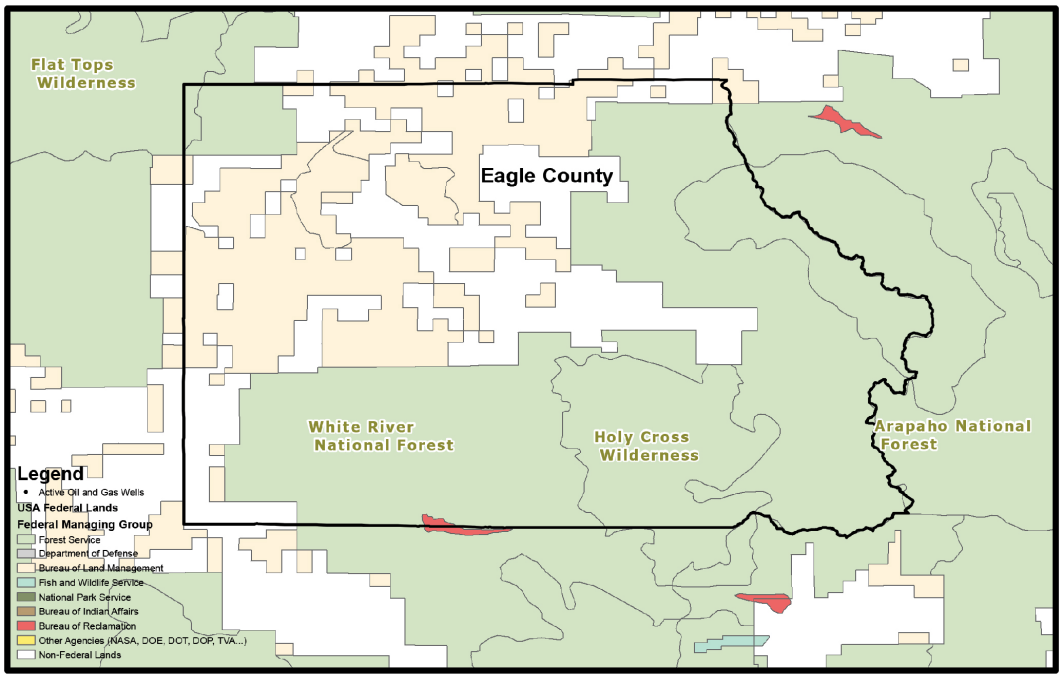
As shown in Exhibit 3.12, most oil and gas wells are clumped together near the northern borders of Moffat County. The largest clusters are located on BLM land, while pockets of wells can be found through the county on private and non-federal land. Because most of the oil and gas wells are located far from Dinosaur National Monument and other amenities, there is little potential conflict between energy and amenity development in Moffat County.

Recognizing the opportunity in Moffat County to reap the benefits of energy development and maintain its amenities, Harris Sherman, Executive Director of the Colorado Department of Resources, wrote to the Craig Daily Press in 2007 that a "balanced approach to development would allow for Moffat . . . to experience significant economic benefits from gas development and, at the same time, protect one of the most unique landscapes found anywhere in the state" (Sherman, 2007, October 9).

Eagle County, Colorado

Eagle County is located in mountainous central Colorado and has an amenity-focused economy (Exhibit 3.19; Exhibit 3.2). Unlike neighboring Garfield County, Eagle County does not have significant oil or gas reserves, and relies on amenities as its primary economic base (Colorado Geological Survey, 2011). The county has a beautiful landscape, with many amenity opportunities that attract residents and tourists alike, among them the world-class and word-famous ski areas at Vail and Beaver Creek. Eagle County focuses on high-end recreation to draw tourists to the area.

Exhibit 3.19 **Active Oil and Gas Wells in Eagle County, CO**



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 3.19 (for larger exhibit see Appendix) shows the federal land in Eagle County. The BLM and USFS administer much of the land in Eagle County. The White River National Forest (WRNF) is within the county's boundaries. The Holy Cross and Eagles Nest Wilderness areas also provide amenity opportunities. As shown in the map, Eagle County has no active oil or gas wells.

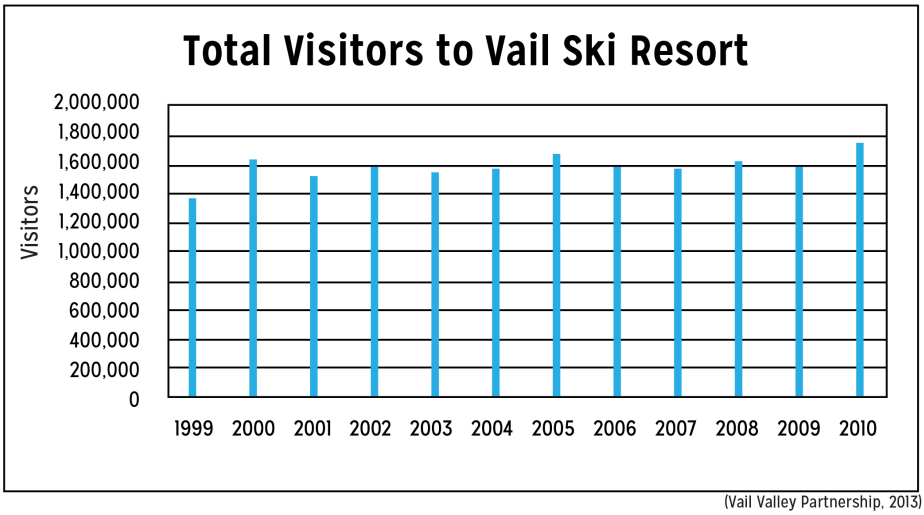
Energy Development

Unlike neighboring Garfield County, Eagle County does not have significant oil or natural gas resources and has no energy extraction activities currently occurring.

Amenity Development

Although the town of Eagle has been the county seat since 1921, Vail is by far the most famous town in the region and is known as a luxury destination for downhill skiing. The amenity-focused town enjoys a fortuitous climate. On average Vail gets over 300 days per year of sunshine and in 2011 was blanketed in over 38 feet of snow. Vail's resort also boasts the largest area of groomed terrain anywhere on earth with 5,289 acres in total (Vail Resorts Management Company, 2012). Vail has received over 1.5 million skiers and snowboarders per year since 2000, who come to experience the resort's legendary front face, back bowls, and terrain park (Vail Resorts Management Company, 2007). As Exhibit 3.20 illustrates, although there has been some variation, Vail has seen at least 1.3 million visitors every season since 1999.

Exhibit 3.20



(Vail Valley Partnership, 2013)

The Vail Ski Resort is located within the WRNF, one of four federally owned and protected areas in Eagle County (USFS, n.d.; Exhibit 3.19). Those looking for skiing outside of Vail can visit Eagle's Nest Wilderness Area, which boasts 180 miles of

trails leading to an alpine lake, and the Shrine Pass road, which goes from Vail Pass to Red Cliff and is popular with cross country skiers and snowmobilers (University of Montana, n.d.). The Flat Top Wilderness Area, a small portion of which crosses into the northwestern part of Eagle County, is unlike any other mountain range in the state. Instead of steep mountain passes, a large plateau looms, covered in peaks thousands of feet tall (Island of the Rockies, 1999). Visitors to the area can hike, cross-country ski and hunt (Island of the Rockies, 1999). Those looking for a challenging hike can try one of the more than 24 peaks reaching at least 13,000 feet in the Holy Cross Wilderness Area, also within the WRNF (Wagner, n.d.).

Though tourism decreases significantly in the off-season, Vail still offers activities like hiking and mountain biking in the surrounding 350,000 acres of national forest (Eagle County, 2011). Vail also boasts over 90 bars and restaurants and 187 retail shops (Vail Resorts Management Company, 2007).

Although Vail makes up the heart of the county's tourism, the rest of Eagle County is also home to abundant amenities, many of which have been developed to appeal to visitors looking for a more affordable vacation destination.

Almost 80% of Eagle County is publicly owned (Fletcher, n.d.; also see Exhibit 3.19). The town of Eagle itself, with a population of 6,508, offers easy access to over 80 miles of single-track trails, attracting mountain bikers of all levels (Eagle Colorado, 2011; Eagle Colorado, n.d.). Because the city of Eagle is at a lower elevation than its neighbors, like Vail, these trails stay open for at least 4 months longer than other trails in the county. Hiking trails are also plentiful, as Eagle is located in the heart of the Sawatch Range, an offshoot of the Rocky Mountains that includes 15 of Colorado's 48 peaks above 14,000 feet (Eagle Colorado, n.d.).

Eagle County's fishing and white-water rafting is another important part of Eagle's amenity-based economy. Just west of Eagle, the town of Gypsum has 6,477 residents, many of whom claim, "you can fly fish out the front door" (Eagle County, 2011). Sylvan Lake State Park, just south of the town of Eagle, offers fishing in a high alpine setting with cabins, yurts, and 46 campsites (Colorado Tourism Office, 2012). Many visitors to Eagle County enjoy kayaking or rafting on the Class III and IV rapids of the Lower Eagle River, while the Colorado River's Class I and II provide a more relaxed experience for beginners (Eagle Colorado, n.d.).

As part of the Re-Discover Eagle event, held at the Eagle Pool and Ice Rink in September of 2012, the City of Eagle's marketing committee teamed up with local agencies including the USFS, the Colorado Division of Parks and Wildlife, Eagle County, Western Eagle County Metropolitan Recreation District, and local businesses. Meg Stepanek, from the Eagle City Tourism Office, said the event was meant to let locals know about efforts to "sustain and expand our economy to make sure businesses will stay here" (Franz, 2012). Stepanek said in the near future she hopes to increase funding for the Eagle Regional Visitor Information Center to help visitors learn about and take advantage of all the amenities the area has to offer (Franz, 2012).

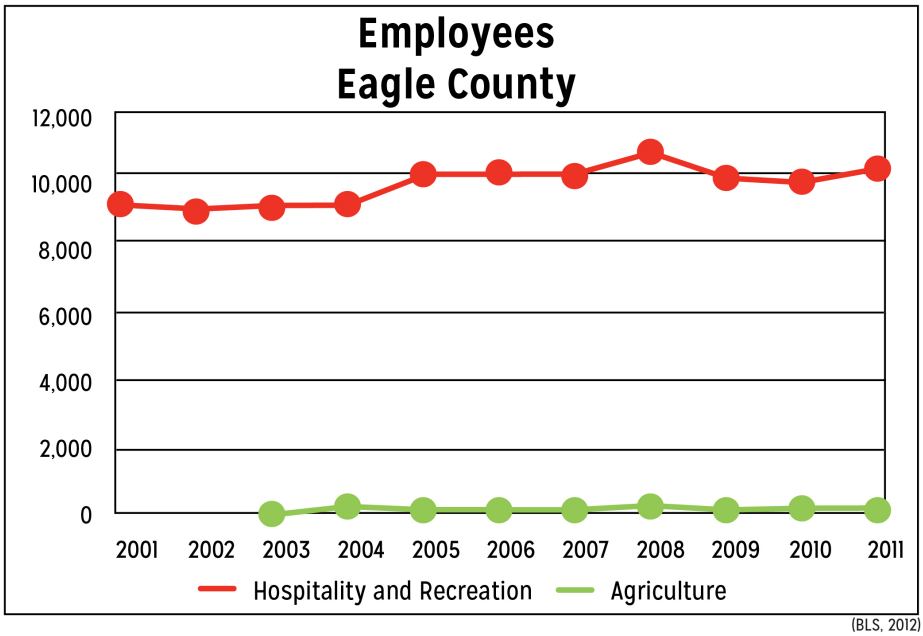
Eagle is also partnering with other communities across the county in its efforts to increase tourism. For example, the town of Gypsum does not have any hotels; it is known, however, for its fly fishing and other amenities. Eagle's marketing committee has partnered with Gypsum to help the town host events like the Dirty Dozen adventure race and the Gypsum Triathlon. These events attract visitors to the county, where they can enjoy Gypsum's amenity opportunities while lodging in nearby Eagle (Franz, 2012).

Economic Indicators

The importance of tourism to the local economy is reflected in the region's tax revenue and job numbers. In 2011 Eagle County brought in over $80 million in revenue, 37% of which came from property taxes, and 21% from sales taxes (Eagle County Finance Department, 2011, B4-B5). Of these revenues 12% was spent on public works, 20% on transportation, and 2% on culture and amenity purposes (Eagle County Finance Department, 2011, D20).

A small fraction, almost 2.5%, of Eagle County civilians over the age of 16, rely on agriculture, forestry, fishing and hunting, and mining for their employment (Exhibit 3.4). Exhibit 3.21 shows that the agricultural portion of this employment sector has stayed relatively steady over the last decade. As shown in Exhibit 3.4, more than 25% of the civilian labor force over age 16 in Eagle County is employed in the arts and entertainment sector, 15% more than the state average. Eagle's residents rely heavily on tourism as a key source of jobs in the region.

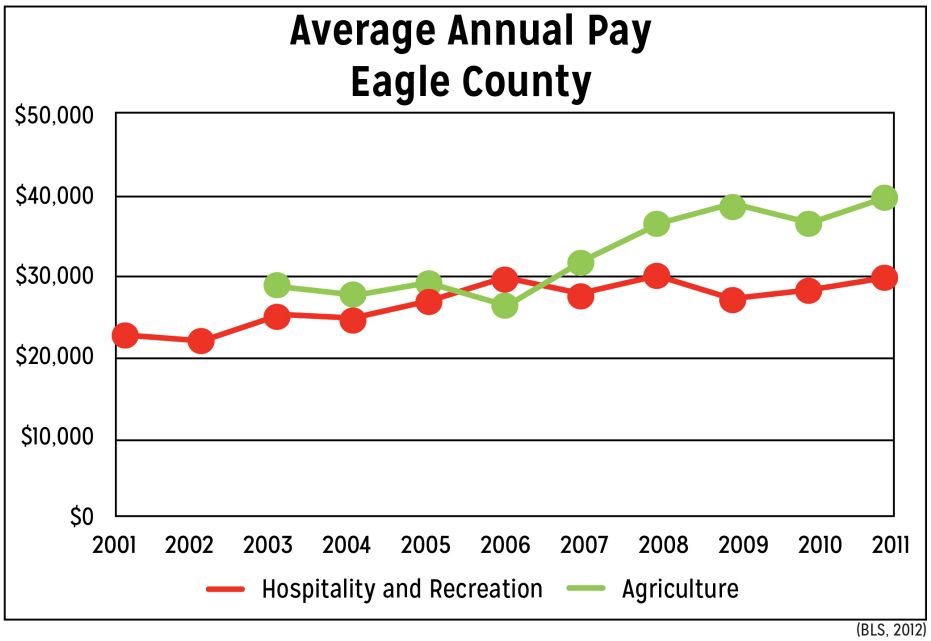
Exhibit 3.21



(BLS, 2012)

Exhibit 3.21 shows employment trends for the hospitality and recreation sector and the agriculture sector in Eagle County since 2001. Growth in employment in hospitality and recreation was fairly stagnant until 2003, when gradual growth pushed employment to 10,000 in 2006. Hospitality and recreation employment peaked in 2008, and passed the 10,000 mark again in 2011. Employment in agriculture has remained small and level since 2003.

Exhibit 3.22

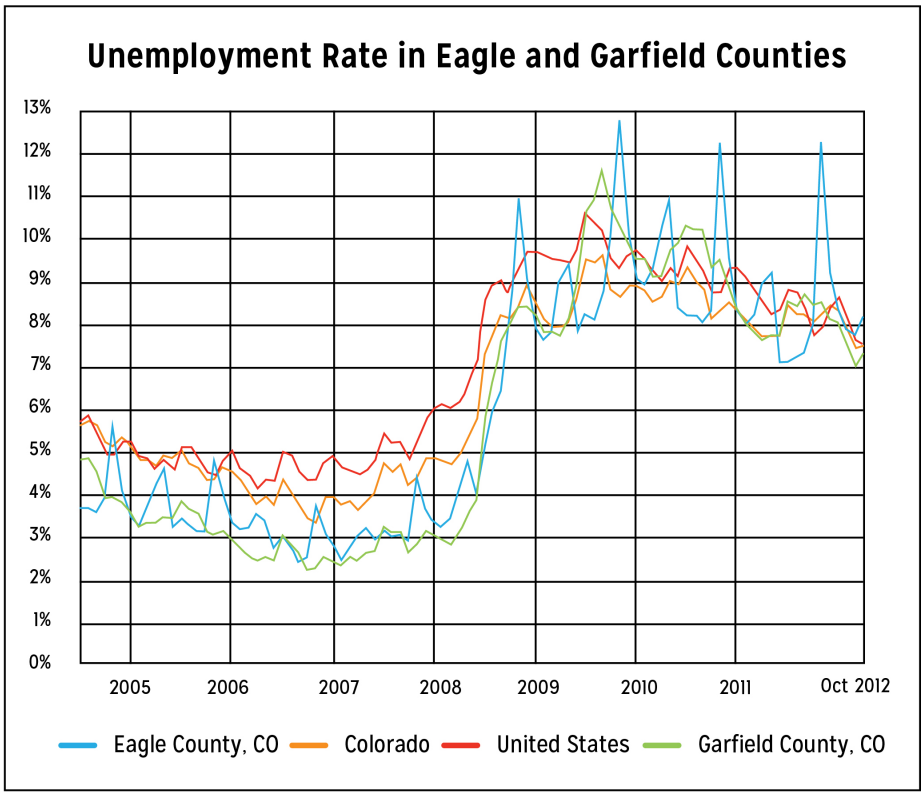


(BLS, 2012)

Exhibit 3.22 shows trends in nominal wage data. Although the agriculture sector employs only a small number of people, agricultural employees earned, on average, about $33,000 per year during this decade; hospitality and recreation employees earned an average of $27,000 during the same period. From 2003 to 2006, employees in both sectors earned similar wages. Since about 2008, average annual pay in agriculture has increased by $2,000 on average compared to an increase of just $450 in the hospitality and recreation sector.

Relying solely on tourism as the primary base for an economy can have disadvantages. Eagle County's cyclical unemployment, shown in Exhibit 3.23, is one such disadvantage. When compared to other counties with developed energy extraction (like Garfield), Eagle County traditionally sees more extreme spikes in its unemployment rate. Because winter is Eagle County's on-season, when most visitors come to ski or snowboard in Vail, lower unemployment rates are seen in the winter months. During summer months, unemployment in Eagle County tends to increase drastically. Even before the onset of the recession, it was not uncommon for the unemployment rate in the county to increase by 2% or more from December to May (BBC Research & Consulting, 2007).

Exhibit 3.23



(BLS, 2012; via Google Public Data)

Garfield County, which is focused on energy extraction, had enjoyed a much steadier rate of unemployment until about 2009, when Garfield's seasonal cycles became much more pronounced (see a fuller explanation of this in the Garfield section; BBC Research & Consulting, 2007). Although Eagle County enjoys the benefits of tourism provided by its plentiful natural amenities, it also suffers the consequences of an economy that is not diversified. In response to employment cycles, Eagle County officials created a media campaign to draw tourists in the summer months.

Development Strategies

Eagle County is focused on amenities, with an economy centered on the tourism brought to the area by Vail's skiing industry. Eagle County's economy owes much of its success to Vail, which brings revenue into the local economy and gives the county increased visibility. Eagle County's unique amenity opportunities and limited energy resources result in a unique county economy. Not all amenity-

rich counties have the opportunity to develop a town that can attract some of the world's wealthiest visitors. Demand for such luxury destinations is limited and the conditions for their development must be just right. Eagle County has benefited from those conditions.

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Pennsylvania

Recent innovations in the drilling process have made trillions of cubic feet of natural gas in Pennsylvania technically recoverable, leading natural gas companies to begin extensive drilling projects throughout Pennsylvania in 2009, centered on the resource-rich Marcellus Shale. These projects have had significant impacts on the state. In the third quarter of 2012, total employment from Marcellus Shale related industries was 245,000 in Pennsylvania (Pennsylvania Department of Labor and Industry, 2013, May 29). These jobs are some of the highest paying in the state. Pennsylvanian oil and natural gas workers earn approximately $22,900 more than the average employee in Pennsylvania (AmericanEnergyWorks, 2012).

Bradford County, Pennsylvania

Bradford is a small county in northeastern Pennsylvania with a rich agricultural history. Until recently, Bradford County relied solely on agriculture to fuel its economy. As energy extraction activities ramped up and this small agricultural community was swept into the center of the Pennsylvania natural gas surge, some residents raised concerns that the county's rich agricultural legacy would be lost in the new world of energy development. Progress has been made in alleviating these concerns as many residents saw that the increase in energy activity did not ruin their traditions and could even support them: Farms have been saved from financial ruin by royalty and lease payments from natural gas companies, and increased tax revenues have funded recreation and tourism projects essential to the culture and success of the county. Natural gas drilling has bolstered the economy, allowing Bradford County to progress into a growing, mixed economy while retaining its strong agricultural roots.

Exhibit 4.1 Map of the State of Pennsylvania with Select Counties

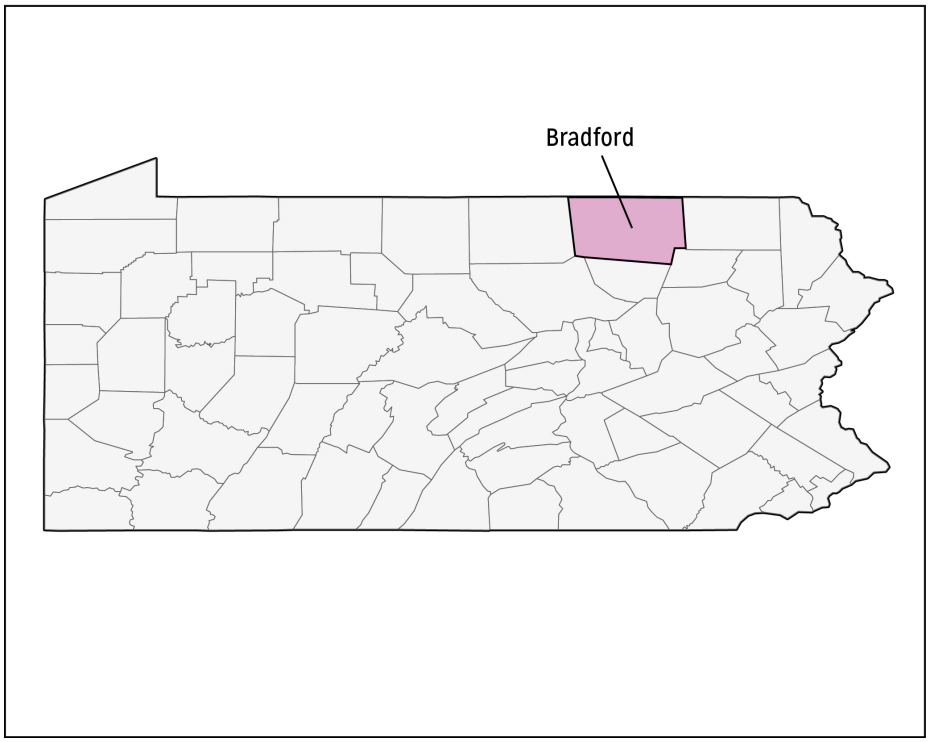
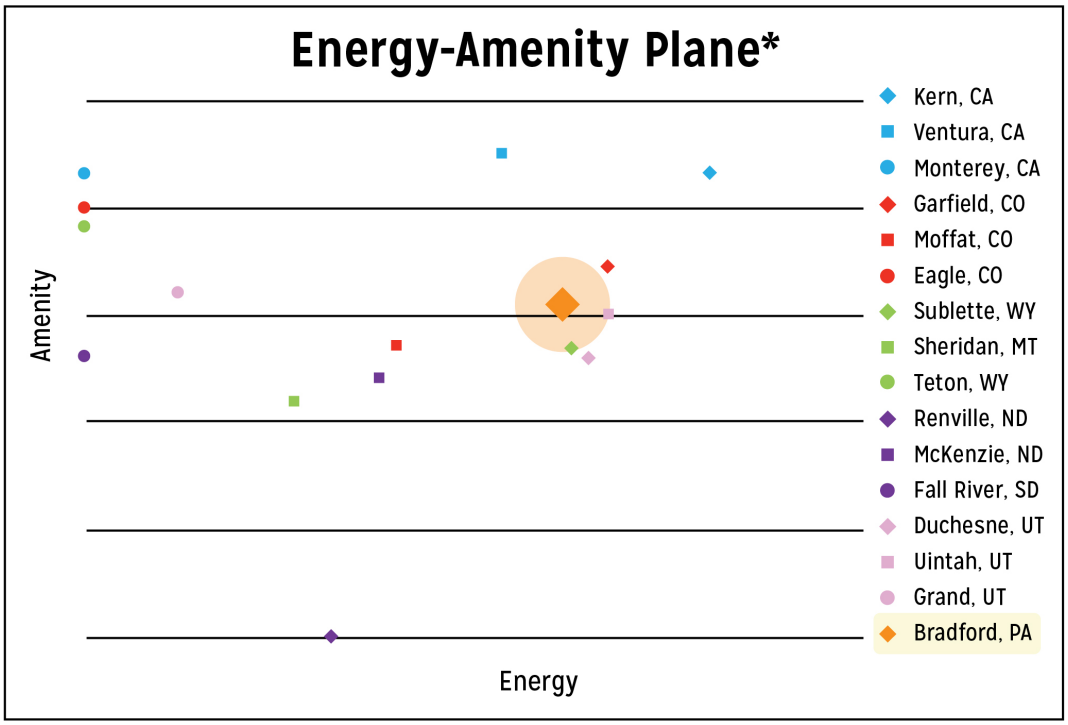


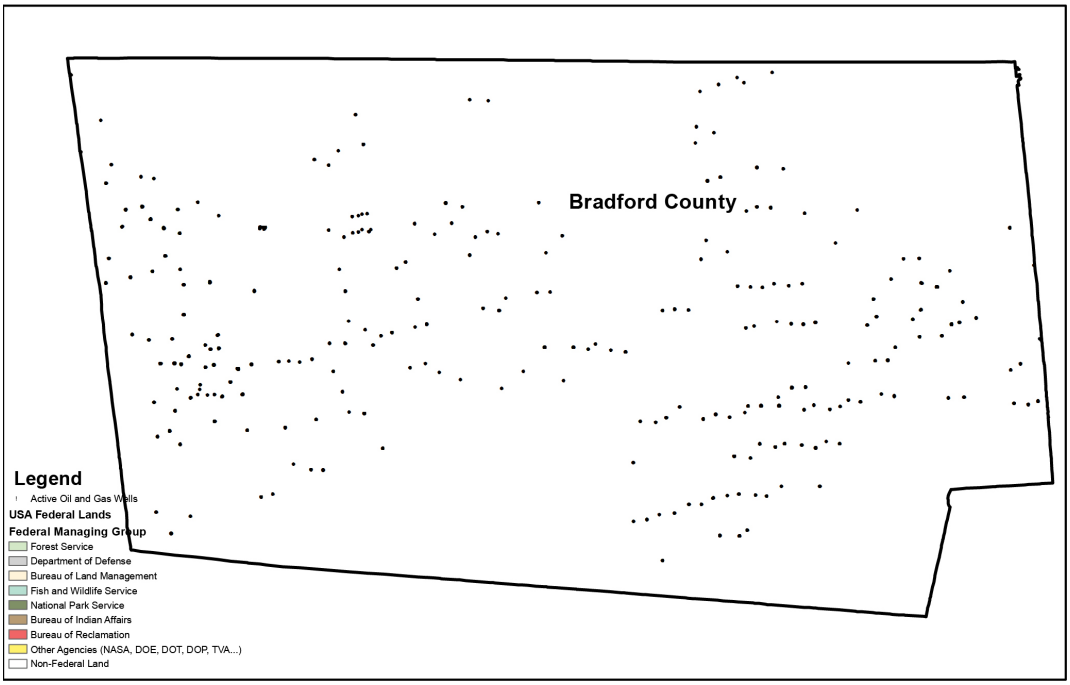
Exhibit 4.2 shows the balance that Bradford County has struck between energy and amenity development. As shown in Exhibit 4.3 (for larger exhibit see Appendix), active oil and gas wells are dispersed throughout the county. Because of the lack of any federal land within the county, all of the oil and gas activity occurring in the county is on state, local, or privately held lands.

Exhibit 4.2



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

Exhibit 4.3 Active Oil and Gas Wells in Bradford County, PA



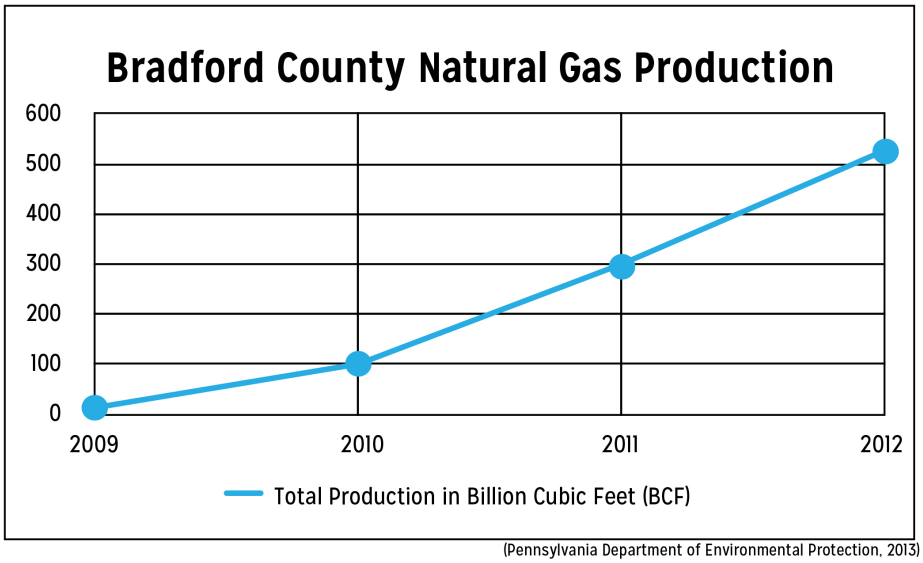
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Energy Development

Natural gas consumption increased 5.1% between 2009 and 2010 in the United States, reaching more than 24 trillion cubic feet (EIA, 2013). The rising demand was a factor in the drilling of the Marcellus Shale, particularly in Bradford County. The county is located in the northeastern node of the Pennsylvania portion of the Marcellus Shale formation, estimated by the USGS to contain a mean of 84.1 trillion cubic feet of undiscovered, technically recoverable natural gas (USGS, 2011, August). The EIA estimate of the Marcellus is significantly higher at 141 trillion cubic feet (U.S. Energy Information Administration, 2012).

Beginning in 2011, Bradford County had the highest quantity of active natural gas wells of all Pennsylvania counties (Amico et al., 2011). Twenty-five percent of Pennsylvania's gas wells are located in Bradford County (PA Environment Digest, 2011). In addition, in 2012 Bradford County accounted for almost one quarter of Pennsylvania's total natural gas production (Pennsylvania Department of Environmental Protection, 2013). Bradford County has no oil production.

Exhibit 4.4



(Pennsylvania Department of Environmental Protection, 2013)

Exhibit 4.4 shows the growth in total gas production in Bradford County since production began in 2009. Production has increased dramatically between 2009 and 2012, growing from just over 17 billion cubic feet (BCF) to more than 520 BCF of gas. Even though natural gas prices were falling in 2011, from July to December of that year Bradford County saw a 52% increase in the number of wells, and a 34% increase the amount of extracted gas (Detrow, 2012). The number of new wells drilled by year in Bradford County is shown in Exhibit 4.5 (Pennsylvania Department of Environmental Protection, 2013, June 28).

Exhibit 4.5 New Wells Drilled in Bradford County

Year	Number of Wells Drilled
2009	159
2010	373
2011	396

(Pennsylvania Department of Environmental Protection, 2013, June 28)

Amenities Development

While natural gas plays an important role in the county, Bradford still markets itself as "Fresh. Natural. Pure" (Visit Bradford County, n.d. (a)). Home to the 75-acre Stephen Foster Lake, Mount Pisgah State Park provides residents and visitors opportunities for hiking, wildlife watching, boating, hunting, and ice fishing (Mount Pisgah History, n.d.; Things To Do, n.d.). Canoeing on the Susquehanna River is a popular activity, as is hiking, camping, hunting, and snowmobiling.

Bradford County is an area rich in history. Monuments and museums honor Native American Indians, refugees from the French Revolution, and the county's agricultural legacy (Visit Bradford County, n.d.(a)). The county also has many festivals and fairs to celebrate its history and culture (Visit Bradford County, n.d.(b)). The Wyalusing Valley Wine Festival, one of the largest wine festivals in northeastern Pennsylvania, is held in Bradford (Visit Bradford County, 2013(c)). The festival celebrates 15 Pennsylvania wines, and proceeds go to the Wyalusing Valley Museum Association, the Lions Club, and Lioness Club (Visit Bradford County, 2013(c)).

Bradford County has a long history of agriculture, and is still described as "an agrarian society" (Visit Bradford County, 2013(a)). Historically, the alluvial soils of the region's valleys have been cultivated to produce crops including wheat, corn, oats, tobacco, and vegetables. At higher elevations, grass, oats, buckwheat, and potatoes are grown. The region also has prime acreage for grazing sheep, cows, cattle, and horses, which has allowed the county to produce large quantities of dairy products (Bradford County, n.d.). According to the most recent Census of Agriculture, in 2007, Bradford County had almost 267,000 acres of farmland (Census of Agriculture, 2007). In the same year, the value of crops sold was over $9.1 million, and livestock sales totaled approximately $112.1 million (Census of Agriculture, 2007).

Bradford County maintains its agricultural image by encouraging visitors to dine or shop at local restaurants and stores that use all local, natural ingredients (Visit Bradford County, 2013(a)). Bradford County also hosts its Old Timers Show, an annual antique tractor show that exemplifies the agrarian history of the county; this event will be discussed further in the *Development Strategies* section (The Review, 2010).

Economic Indicators

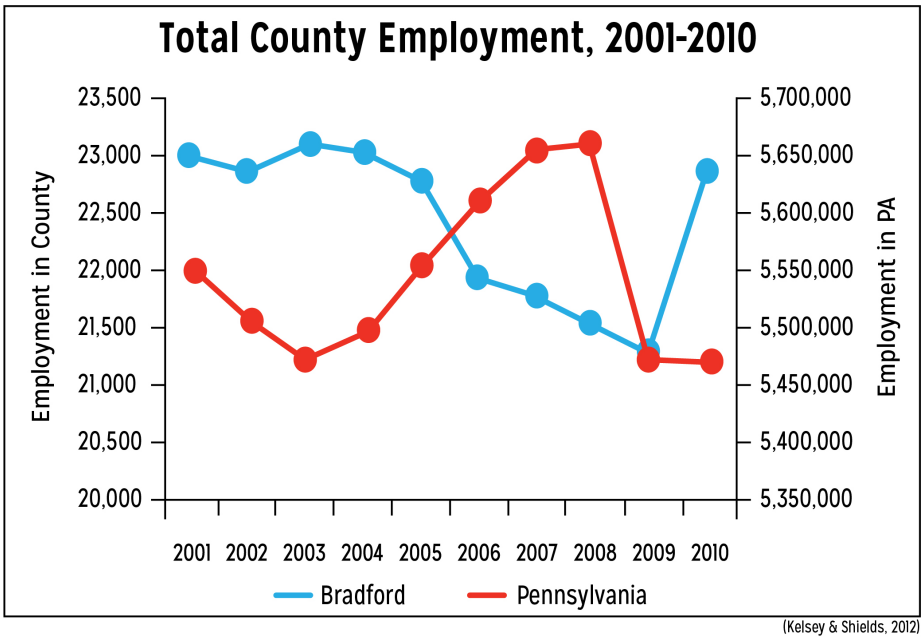
The development of hydraulic fracturing technologies has driven the Marcellus Shale drilling boom, which has had many positive economic impacts on Bradford County. One key economic impact of increased energy activity in Bradford County and around the Marcellus Shale is increased tax revenue. Due to higher economic output and employment, combined state and local tax revenues were expected to be $987 million higher during 2011 (Considine, Watson, & Blumsack, 2010, p. 14). Because the tax distribution is dependent on the quantity of drilling, Bradford County receives more of the revenue than neighboring counties. In 2011 Bradford County received $8.4 million, and its municipalities received $13 million in impacts fees due to the high drilling rate in the area (Swift, 2012).

One of the most obvious economic impacts of the gas boom in Bradford County has been the creation of jobs. As illustrated in Exhibit 4.6, Bradford County experienced net job growth between 2009 and 2010. During this time, 1,600 new jobs were created, a 7.5% increase in employment, while statewide there was little growth. This job creation is one result of increased drilling activity and its

associated economic benefits (Kelsey & Shields, 2012).

The BLS reports that only about 2,000 people were unemployed in Bradford County in July 2011, down from about 3,300 unemployed at Bradford's unemployment peak in March 2009 (Kelsey & Shields, 2012). While employment in Pennsylvania remained level during this period, Bradford County saw a significant amount of growth.

Exhibit 4.6



(Kelsey & Shields, 2012)

As a point of comparison, in Considine, Watson, and Blumsack's most recent update on the impacts of the Marcellus shale development on Pennsylvania (Considine, et al., 2011, July 20), they find that each well drilled generates about 26 full-time annual jobs[19]. Using that estimate and the number of new wells drilled by year in Bradford County (see Exhibit 4.5), it suggests that employment from drilling activity in Bradford County actually may have grown from about 4,000 jobs in 2009 to over 10,000 jobs in 2011 (Pennsylvania Department of Environmental Protection, 2013, June 28). Note that a significant number of these jobs may have been filled by crews coming in from outside the county and state.

[19] This estimate is already scaled to account for rigs that drill multiple wells per year.

Employment in Bradford County is diverse, as represented in Exhibit 4.7. Three sectors employ 56% of the population: manufacturing; educational services, health care, and social assistance; and retail trade. Mining, agriculture, forestry, fishing, and hunting in the county accounts for only 5.9% of total county employment, but is higher than the 1.3% employed statewide by this sector.

Exhibit 4.7 **Percent Employed by Sector in Bradford County, 2011** [20]

Sector	Bradford	PA Average
Agriculture, forestry, fishing, and hunting, and mining*	5.9%	1.3%
Construction	6.5%	6.1%
Manufacturing	21%	12.8%
Wholesale Trade	2.5%	3.0%
Retail Trade	11.1%	11.6%
Transportation, warehousing, utilities	6.1%	5.2%
Information	1.2%	2.0%
Financial, Insurance, Real Estate	4.2%	6.5%
Professional, scientific, management, administrative, and waste management services	6.3%	9.6%
Educational services, health care, and social assistance	23.9%	25.2%
Arts, entertainment, recreation, accommodation, and food services	6.8%	7.9%
Public Administration	5.1%	4.7%
Other Services	4.7%	4.2%

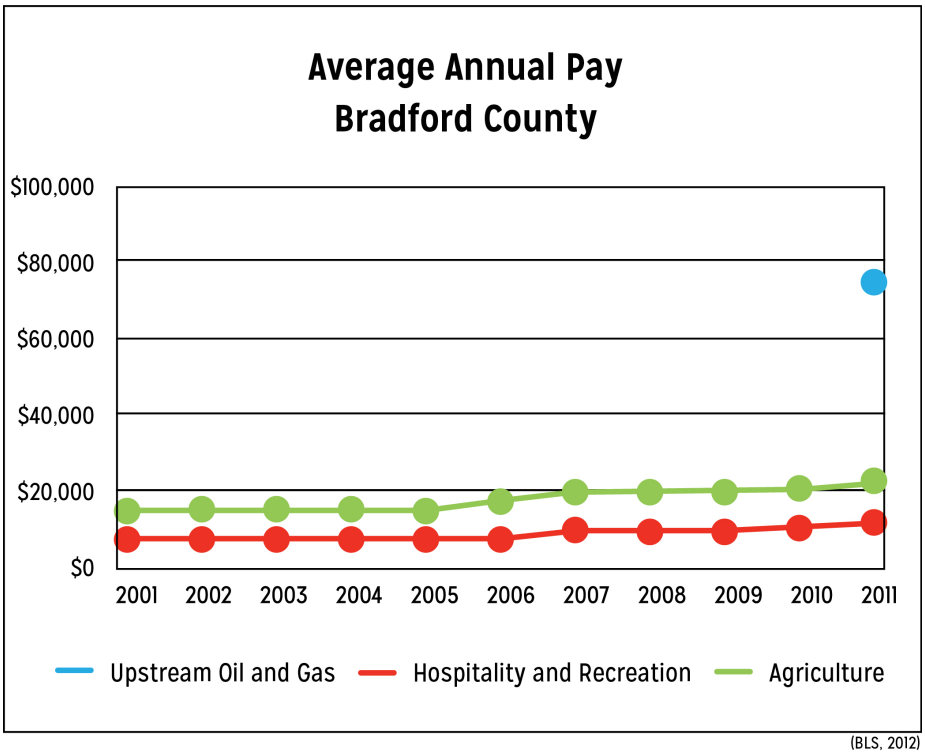
*Oil and gas is a subset of mining

(U.S. Census Bureau data from 2011)

In 2011 the average annual pay of an upstream oil and gas worker in Bradford County was $77,318. In contrast, the average annual pay of an agriculture worker was $22,203, and average annual pay of a worker in hospitality and recreation was $12,231. While the hospitality and recreation sector employs a larger percentage of people than oil and gas (based on the Census data in Exhibit 4.7), it also pays about $10,000 less than the agriculture sector, and $65,000 less than the oil and gas sector. These differences can be seen in Exhibit 4.8, which shows annual average pay for the sectors over time.[21]

[20] Due to rounding and data structure issues, the percentages may not add up to 100 percent.
[21] Annual average pay is reported in nominal dollars.

Exhibit 4.8



(BLS, 2012)

Hotel rooms throughout Bradford County are in high demand as drilling crews book rooms for weeks and sometimes months at a time (Boren, 2011). This benefits hotel staff and owners. Additionally, a 3% per-night room tax is used to promote historic, amenity, and cultural projects in Bradford County (Boren, 2011). Increases in drilling throughout the county accounted for an increase in the hotel tax revenue of more than 65% from 2008 to 2010 (Boren, 2011). Thirty percent of this tax revenue is earmarked for distribution through grants that are reviewed by the Bradford County Tourism Board for the purpose of encouraging the growth of tourism in Bradford County (Bradford County Tourism Committee, 2008). More than $100,000 in grants was approved for 27 such projects in 2011, up from about $65,000 for 15 projects in 2010 (Loewenstein, 2011; The Endless Mountain Visitors Bureau, 2011; Bradford County Commissioners, 2010).

Among the most significant sources of injection of financial capital from natural gas drilling into a local economy like Bradford County's are the lease payments made by companies to residents, private entities, and government organizations for the rights

to drill and produce. Gas companies pay the lessor the amount set forth in lease agreements and royalties from the sale of the natural gas. Lease and royalty income has profound impacts on the local economy. As of September 2012, it was expected that the Marcellus Shale mining raised more than $160 million for landowners in Bradford County (Loewenstein, 2012). A recent IMPLAN study found that leasing incomes in 2010 stimulated $16.8 million in output that supported more than 180 jobs in the county, while royalty incomes in 2010 also added $6.5 million in output, supporting 66 jobs (Kelsey & Shields, 2012). Lease and royalty incomes add to household income and also stimulate job growth and county economic output.

Increased drilling in Bradford County fosters the overall economic growth that has taken place since the beginning of the gas boom. As concluded in a Pennsylvania State University report:

> "There are many activities before and after drilling that generate significant economic impacts. Many people are required to identify lease properties, write leases, and conduct related legal and regulatory work. Once a prospective site is identified, site preparation and drilling begins and with it the need for services, labor, and other locally supplied activities. If natural gas is found in commercial quantities, infrastructure, such as well production equipment and pipelines are installed, which again stimulates local business activity. Finally, as production flows from the well, royalties are paid to landowners and taxes paid to local governments. These expenditures stimulate the local economy and provide additional resources for community services, such as healthcare, education, and charities (Considine, Watson, & Blumsack, 2010, p. 8)."

A 2011 study by University of Pittsburgh researchers quantified the direct impact of a single Marcellus gas well on the local community (Hefley et al., 2011). They determined that the investment from the drilling of just one well is about $5 million. Between 2008 and the end of 2011, 958 wells were drilled in Bradford County (Pennsylvania Department of Environmental Protection, 2013, June 28). Using Hefley's investment estimate, over that period the drilling activity from new gas wells generated almost $4.8 billion of investment in Bradford County.

Development Strategies

The above mentioned tourism projects funded through the Bradford County Tourism Board have allowed Bradford County to stimulate its tourism sector. These projects have included a remodel of the second floor of the Sayre Museum, maintenance of recreational paths such as the Wyalusing Heritage Trail, and various community celebrations (Shedden, 2010; Loewenstein, 2011). Hotel tax revenue has funded the Bradford County Old Timers Show, an antique tractor exhibition that highlights the agricultural history of the area. The increase in hotel tax revenue is one example of how the expansion of energy extraction in Bradford County stimulates amenity and tourism sector growth, contrary to the assumption that the energy and amenity sectors cannot grow together.

Bradford County's economy, once dominated by agriculture, has now developed a positive mix of energy and amenities (McLinko, 2010). While the rapid expansion of energy extraction initially raised some concerns, it is bolstering the agricultural community in the long run. Increased income from royalties and lease payments have allowed some farmers to retire early and saved others from financial ruin. Farmers assert that mineral rights payments have allowed them to stay on their farms, and that without the extra income they would not be able to stay afloat economically (Haggerty, 2010). Royalty and lease incomes can save farms kept in families for years. As stated by farm owner Judy Ahrens, this funding "enables those of us who have farms to keep our farms so they can be passed on to our families so they don't have to be split up and developed" (Marcellus Shale Coalition, 2010).

Natural gas drilling in Bradford County has had positive economic benefits such as job creation, increased household income from lease and royalty payouts, and increased tax revenues. Lease and royalty payments have been used to strengthen other industries in the county (e.g., agriculture, hotels), which creates a strong and growing mixed economy. Additionally, tax revenue increases have allowed government officials to increase government spending and support of tourism and amenity ventures. Bradford County clearly demonstrates that energy extraction and amenity development are not mutually exclusive. Rather, they together provide positive economic outcomes for county residents.

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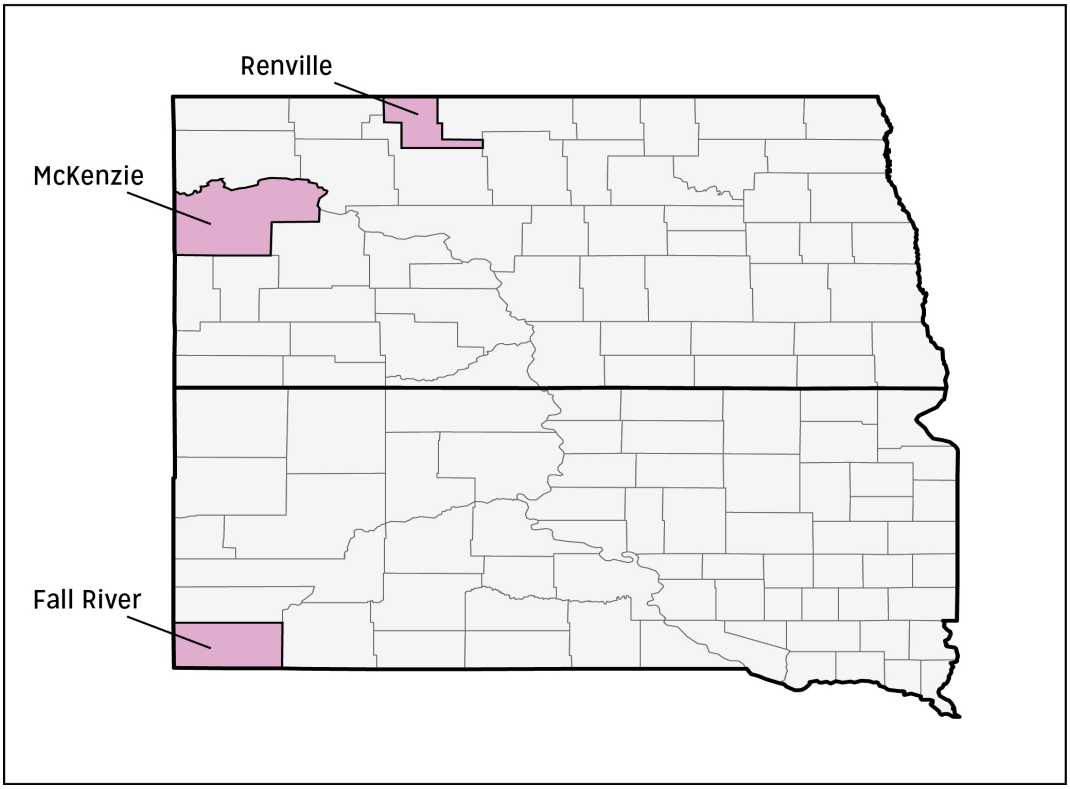
Northern Plains

North Dakota and South Dakota have benefited from the recent increase in energy development in the region. Increased petroleum production in the Williston Basin and the Bakken Shale formation has helped the once sparsely populated Dakotas grow their economies. The boom in the oil and gas sector has generated growth in employment, fueled the housing industry, and been a key aspect of North Dakota's strong economic performance (Perry, 2011). South Dakota has also seen growth in employment and housing, although not to the extent that growth has occurred in North Dakota. This section examines McKenzie and Renville counties in North Dakota and Fall River County in South Dakota.

Exhibit 5.1 **Map of Northern Plains (North & South Dakota) with Select Counties**



In North Dakota 36,995 jobs were supported[22] by the oil and natural gas sector in 2009. Extractive industries contributed $1.8 billion in labor income to the state, and brought $3.8 billion to the state's economy as a whole that year. In addition, the average salary for an oil and gas worker in North Dakota is $71,678, nearly twice

[22] This support includes direct, indirect, and induced jobs.

as much as the state average of $38,028 (AmericanEnergyWorks.org, 2012). "The economic impact of North Dakota's oil industry has increased nearly sevenfold between 2005 and 2011, from $4.4 billion to $30.4 billion, according to a study from North Dakota State University"(NewsOK, 2013). This impact includes direct and secondary impacts from oil and gas spending (Holdman, 2013). North Dakota has created an oil and gas tax "Legacy Fund" that receives 30% of the state's petroleum tax collections, none of which can be spent until 2017. The fund currently has about $850 million in assets, and is growing rapidly as petroleum production continues to boom throughout the state (Associated Press, 2013).

South Dakota has also seen benefits from the development of its oil and natural gas industry. Extractive industries supported[23] 18,318 jobs in South Dakota in 2009. These industries also contributed $1.3 billion to the state economy overall and injected $709 million in labor income into the state that year. In addition, the average salary for an oil and gas worker in South Dakota is $47,439, well above the state average of $33,887 (AmericanEnergyWorks.org, 2012). South Dakota has seen growth in its petroleum extraction, although not nearly as much as seen in North Dakota. From 2007 to 2011 South Dakota produced 1.6 million barrels of oil annually, which is what North Dakota was averaging in just over 2 days in 2012, explaining some of the impact differences between the two states (MacPherson, 2012).

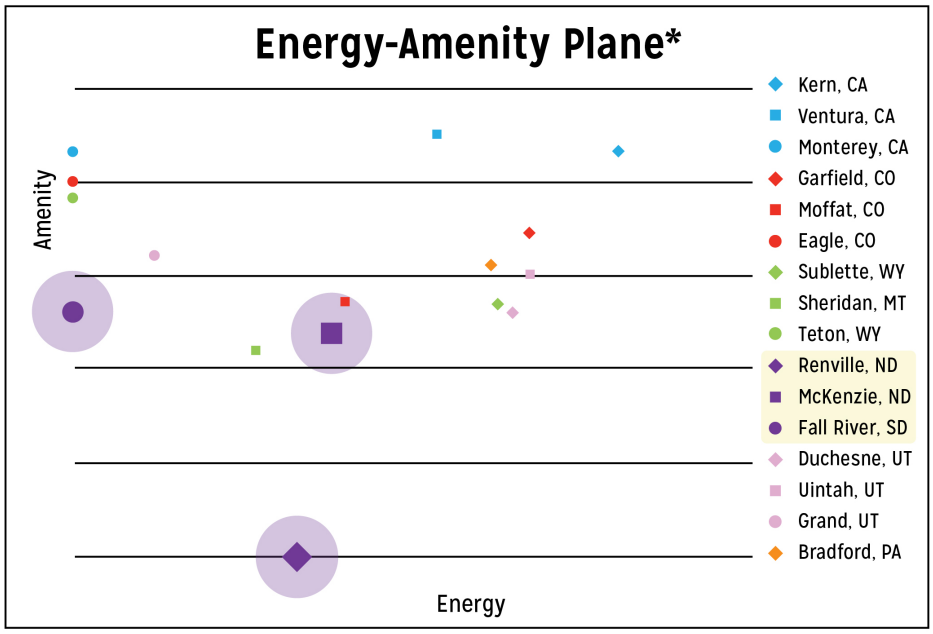
The Williston Basin covers several thousand square miles in North Dakota, South Dakota, Montana, and several southern Canadian provinces; it encompasses parts of both the Bakken Shale and Three Forks Shale formations. Energy Policy Research Foundation reports that North Dakota has oil reserves of 11 billion barrels (The Bakken Boom, 2011). In 2011 Bloomberg reported that, because of the Williston Basin, North Dakota was set to surpass California's total oil production in 2012 and could be generating more oil than Alaska by the end of the decade (MacPherson, 2011). Beating all predictions, however, North Dakota's production eclipsed Alaska's in May 2012 to become the second-leading state in oil production (Associated Press, 2012).

Renville County and McKenzie County (both in North Dakota) have seen extensive benefits from the increased development of extractive industries. Though Renville County has little energy development in the county, it has benefitted from

[23] This support includes direct, indirect, and induced jobs.

regional development in terms of population growth and increased demand for services. For McKenzie County, energy extraction leading to increased tax revenues have allowed for greater amenity development, providing a more diverse economic profile. In Fall River County, South Dakota, residents with a traditionally amenity-focused economy are hoping their county will be next to receive the economic benefits associated with energy development. All three Northern Plains case studies demonstrate that throughout the region oil and natural gas play key roles in diversifying local economies and bringing in valuable revenue streams. Across the Dakotas, extractive industries have played an important role in transforming traditionally underdeveloped areas into economically viable places to live and work.

Exhibit 5.2



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

Exhibit 5.2 shows where Renville, McKenzie, and Fall River counties lie on the energy-amenity graph, based on how heavily focused the counties' economies are toward energy or amenities. As shown in Exhibit 5.2, Fall River County has well-developed amenities but little energy extraction. Renville County lies on the other axis, with an economy focused on extractive industries and that has limited amenity offerings. McKenzie County has a more mixed economy that enjoys the benefits of

both energy and amenity development. Because the industries in the Dakotas are relatively new when compared to oil and gas activity in other states, such as Utah, reported BLS employment numbers in these sectors are still fairly low, which place the North and South Dakota counties low on the energy-amenity graph.

Exhibit 5.3

Average Annual Pay in Selected Northern Plains Counties, 2011

	Upstream Oil and Gas	Hospitality and Recreation	Agriculture
	Average Annual Pay	Average Annual Pay	Average Annual Pay
Renville, ND	$58,170	-	$43,234
McKenzie, ND	-	$24,060	$36,517
Fall River, SD	-	$12,154	$29,404

(BLS data from 2011)

Exhibit 5.3 shows average annual pay for upstream oil and gas, hospitality and recreation, and agriculture in the three Northern Plains counties.[24] Average annual pay in upstream oil and gas was $58,170 in 2011, almost $15,000 higher than that of agricultural employees in the county. In Fall River County, hospitality and recreation employees averaged only $12,154 in pay. McKenzie County had no reported upstream oil and gas information in 2011, likely due to data disclosure issues (see discussion of BLS data in Part I).

Exhibit 5.4 Percent Employed by Sector in Select Northern Plains Counties, 2011[25]

Sector	Renville	McKenzie	North Dakota	Fall River	South Dakota
Agriculture, forestry, fishing, and hunting, and mining*	25.80%	25.3%	8.60%	8.38%	7.11%
Construction	4.70%	5.2%	7.00%	4.75%	6.32%
Manufacturing	5.60%	3.60%	7.40%	0.19%	10%
Wholesale trade	3.80%	2.20%	3.30%	0.55%	2.75%
Retail trade	9.80%	6.80%	12.10%	7.55%	11.58%
Transportation, warehousing, utilities	3.50%	6.10%	5.40%	7.04%	4.28%
Information	0.90%	0.60%	1.70%	2.31%	1.92%
Financial, insurance, real estate	3.66%	5.06%	5.97%	1.22%	7.57%
Professional, scientific, management, administrative, and waste management services	8.54%	6.59%	6.58%	4.21%	5.99%
Educational services, health care, and social assistance	17.77%	18.47%	24.61%	27.75%	23.65%
Arts, entertainment, recreation, accommodation, and food services	5.19%	9.19%	7.89%	19.37%	9.06%
Public administration	3.51%	2.92%	4.58%	3.37%	4.5%
Other services	7.17%	7.92%	4.89%	13.30%	5.28%

*Oil and gas is a subset of mining

(U.S. Census Bureau data from 2011)

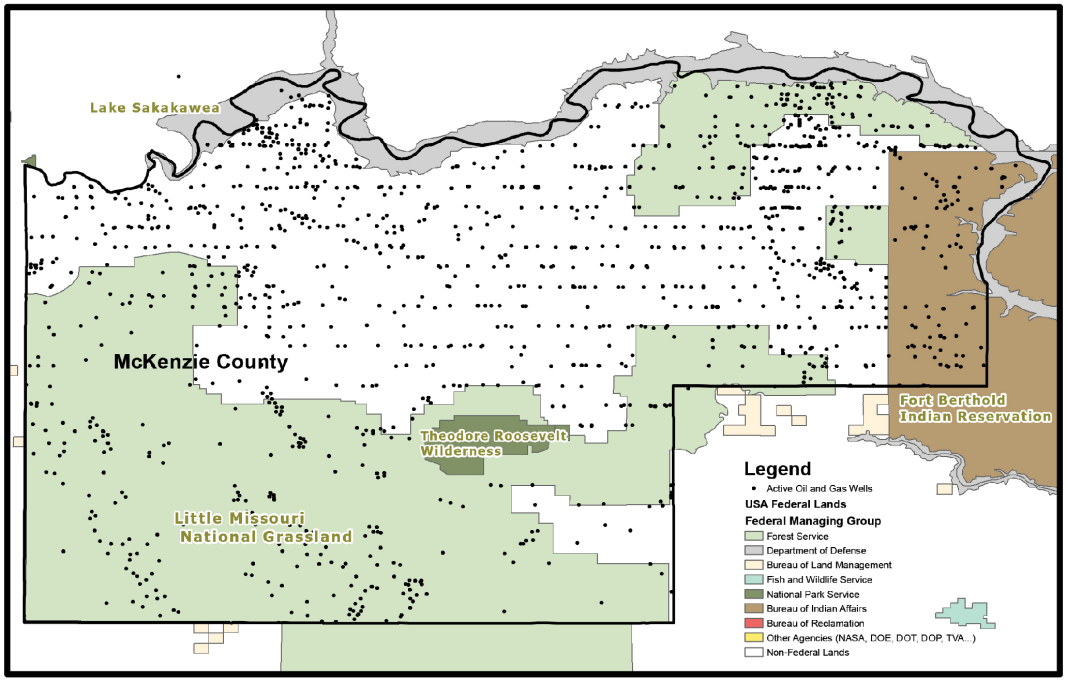
[24] Average annual pay is reported in nominal dollars.
[25] Due to rounding and data structure issues, the percentages may not add up to 100 percent.

Exhibit 5.4 shows the percentage of civilians over the age of 16 employed by sector in Renville, McKenzie, and Fall River counties, and compares these to the state averages in North Dakota and South Dakota. When compared to the North Dakota State average, McKenzie County and Renville County both have a high percentage of employment in the agriculture, forestry, fishing and hunting, and mining category, which includes oil and gas extraction. In contrast, Fall River County has a much lower percentage employed in that sector than the other two counties of interest, and a much higher percentage employed in the arts, entertainment, recreation, accommodation, and food services sector.

McKenzie County, North Dakota

In recent years McKenzie County, located in western North Dakota, has seen its strong farming and amenity-based economy complemented by North Dakota's ongoing oil and gas boom. As a result, the local community has diversified, adding new jobs and revenues. The rapid growth has also brought some environmental and infrastructural challenges (McKenzie county background, 2013). Despite these

Exhibit 5.5 Active Oil and Gas Wells in McKenzie County, ND



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

As shown in Exhibit 5.5 (for larger exhibit see Appendix), McKenzie County contains a significant amount of land administered by the USFS, notably the Little Missouri National Grassland. A portion of the grassland is designated as the Theodore Roosevelt Wilderness. Adjacent Billings County contains Theodore Roosevelt National Park, which represents one of the major attractions to the area. Lake Sakakawea is the northern border of the county.

Theodore Roosevelt first "fell in love with the North Dakota Badlands" when he came west to hunt bison in 1883, several years before becoming known as the

"conservation president" (McKenzie County Tourism Bureau, n.d.). After only 15 days of hunting, Roosevelt found the landscape so enchanting he purchased the Maltese Cross Ranch and entered the cattle business. Roosevelt's time in the badlands is said to have strongly influenced his philosophy on conservation and land management. In 1884 he said of the area that is now Theodore Roosevelt National Park:

> "I heartily enjoy this life, with its perfect freedom, for I am very fond of hunting, and there are few sensations I prefer to that of galloping over these rolling, limitless prairies, rifle in hand, or winding my way among the barren, fantastic and grimly picturesque deserts of the so-called Bad Lands [sic]." Theodore Roosevelt, 1884 (NPS, 2012).

Roosevelt was not the first to marvel at the windswept vastness of the Dakota badlands. In the early 1800s the Corps of Discovery, led by Meriwether Lewis and William Clark, explored the area and recorded remnants of numerous Native American camps along with their first grizzly bear sighting (McKenzie County Tourism Bureau, n.d.). It is the legacy of these explorers that creates many amenity opportunities in McKenzie County.

Energy Development

McKenzie County is located in the Williston Basin's Bakken Shale formation and has seen oil and gas production increase significantly during the past few years. The number of new wells spudded by year in McKenzie County is shown in Exhibit 5.6 (NDIC Oil and Gas, 2013, June 10).

Exhibit 5.6 Number of Wells Spudded in McKenzie County

Year	Number of Wells Spudded
2009	72
2010	219
2011	376

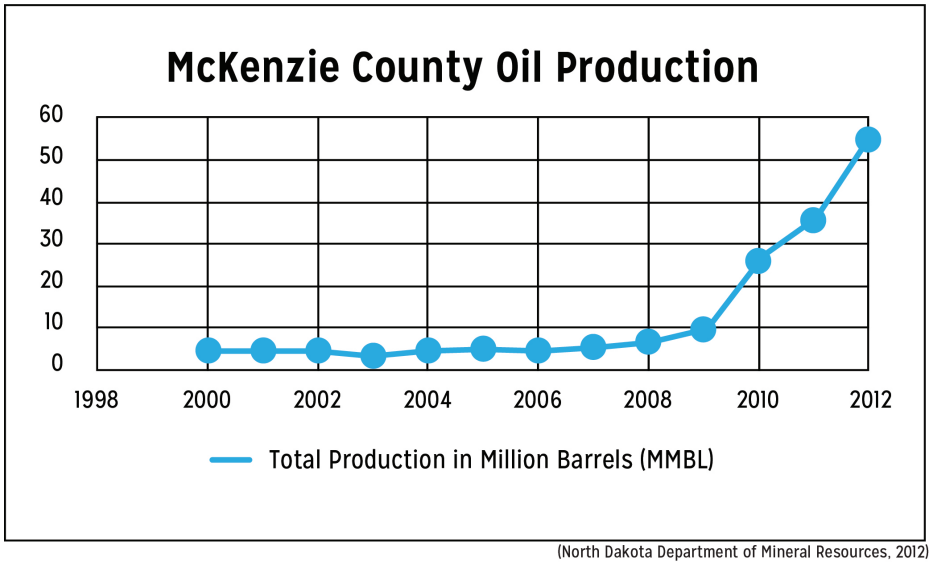
(NDIC Oil and Gas, 2013, June 10)

The county produced about 5.4 million barrels of oil per year up until the late 2000s, but in the last few years that number has greatly increased. In late 2012 McKenzie produced over 5 million barrels of oil for two consecutive months,

reaching a total of just over 56 million barrels of oil for the year (North Dakota Department of Mineral Resources, 2012). Additionally, in August of 2012 McKenzie County had almost 1,700 wells capable of producing petroleum products (Ruggles, 2012).

Exhibit 5.7 shows annual oil production in McKenzie County over 12 years. Production remained fairly constant from 2000 to 2008 increasing from 5.4 million barrels to 7.6 million barrels of oil. After 2009, oil production skyrocketed, reaching just over 56 million barrels in 2012.

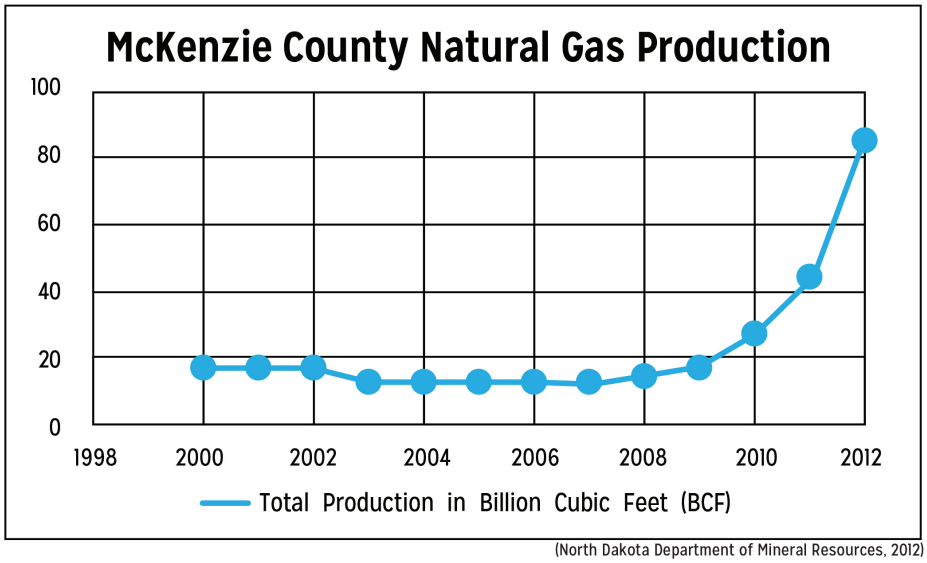
Exhibit 5.7



(North Dakota Department of Mineral Resources, 2012)

McKenzie County also produces a significant amount of natural gas. As illustrated in Exhibit 5.7, production stayed relatively constant from 2000 to 2007, and then slowly grew from 2008 to 2010. After 2010 production soared, increasing to 85 BCF gas in 2012 (North Dakota Department of Mineral Resources, 2012). Lynn Helms, director of the North Dakota Department of Mineral Resources, expects the growth in both oil and gas production to continue. She said, "it will be quite a day when that county hits 12.5 million barrels of oil a month and 4,800 wells" (Ogden, 2012).

Exhibit 5.8

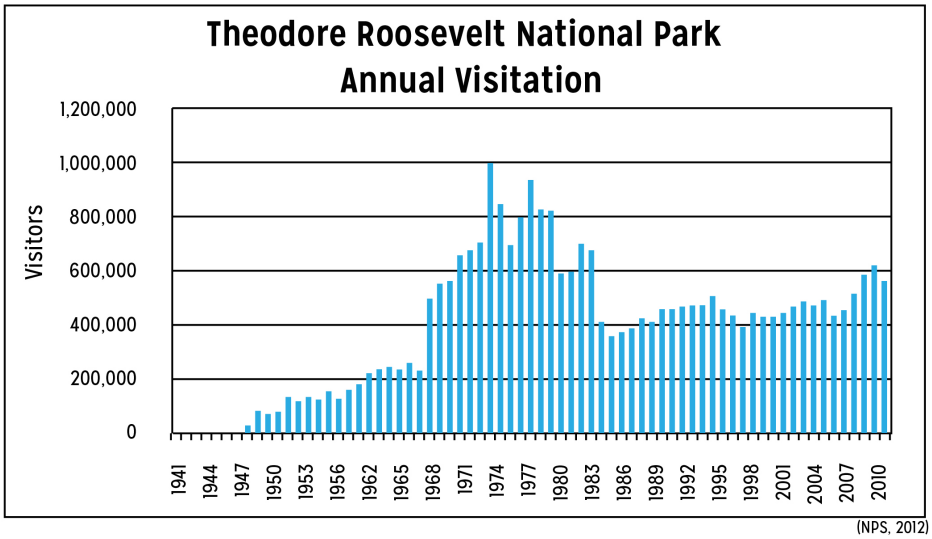


(North Dakota Department of Mineral Resources, 2012)

Amenity Development

Early explorers to North Dakota greatly influenced the amenities offered in the area. The confluence of the Little Missouri and Yellowstone Rivers remains much as it was when Lewis and Clark first arrived, with the addition of a visitor center. Just east of the confluence, Lake Sakakawea, named after Lewis and Clark's Native American scout, makes up the northern border of the county and offers boating, windsurfing, fishing, and scuba diving (McKenzie County Tourism Bureau, n.d.).

Exhibit 5.9



(NPS, 2012)

Theodore Roosevelt National Park was established in 1947 in honor of the former U.S. president, and includes over 70,000 acres that are home to a variety of wildlife including bison, wild horses, elk, deer, and over 186 types of birds (NPS, 2012). The park's visitor center is 15 miles south of Watford City, McKenzie's county seat, and offers information to visitors about hiking trails, wildlife, horseback riding, and camping (NPS, 2012). Park visitation peaked in the late 1960s to early 1970s, dropping drastically at the beginning of the 1980s. It then hovered around 500,000 until recent years. Since 2006, the number of visitors to the park has increased slightly, reaching about 624,000 visitors in 2010, and just over 640,000 in 2012 (Exhibit 5.8, NPS 2013). Visitation rates to the park do not appear to have declined as oil and natural gas production in the county has soared.

The Little Missouri National Grassland is part of the larger Dakota Prairie Grasslands that extends into both North Dakota and South Dakota. The Little Missouri portion is characterized by badlands. Visitors can view wildlife including whitetail deer, coyotes, and prairie dogs. Visitors are encouraged to hike, camp, backpack and hunt across the grasslands (USFS, n.d.). Included in this area is the Theodore Roosevelt Wilderness, which comprises 29,920 acres and is home to bison, bighorn sheep, and sharp-tailed grouse (University of Montana, n.d.). This area provides solitude along the 95 miles of trails (University of Montana, n.d.). McKenzie County has taken advantage of the cultural history of America's well-known explorers to create a reliable tourism industry.

Economic Indicators

McKenzie County is reaping the economic benefits of the state's booming oil and gas development. In November 2012 North Dakota received $18.9 million in revenue from oil and gas lease auctions; more than half of the leases sold were in McKenzie County (Ellerd, 2012). In 2011 McKenzie County took in $2.4 million in oil and gas taxes and another $1.3 million in oil and gas royalties (McKenzie County, 2011). In addition, continued development brings investment into the county. One company reported that each oil well drilled in the Bakken costs about $7.2 million (Filloon, 2012). Between 2008 and the end of 2011, 767 wells were drilled in McKenzie County (NDIC Oil and Gas, 2013, June 10). Using the $7.2 million cost estimate, over that period the drilling activity from new wells generated over $5.5 billion of investment in McKenzie County.

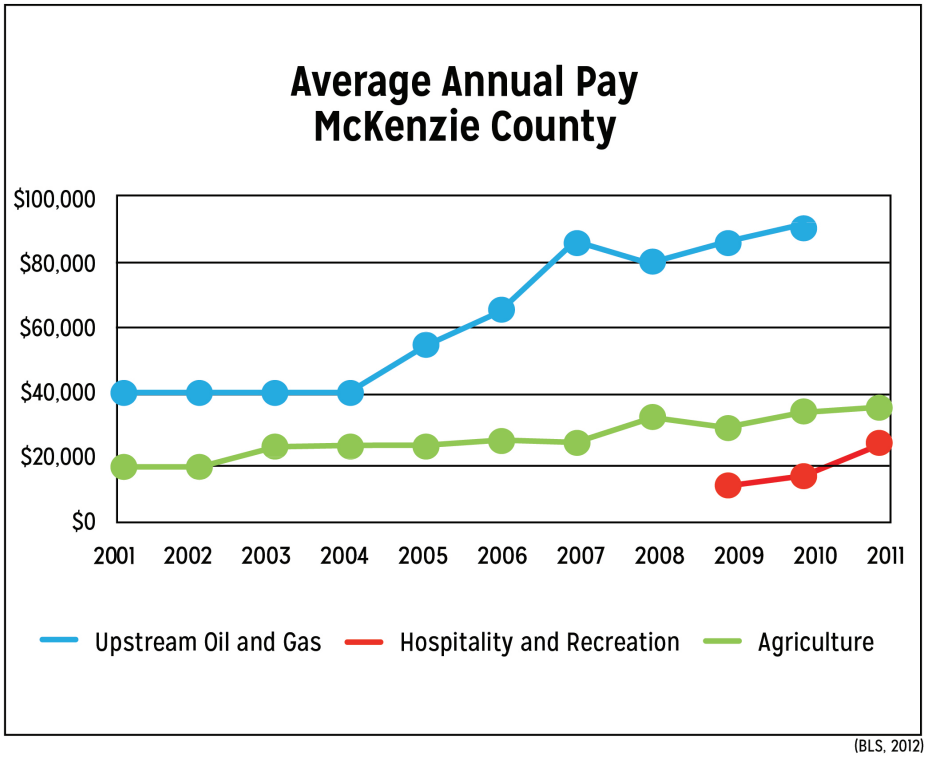
This revenue from the oil and gas industry has allowed McKenzie to build up its amenities and fund other development projects. The county spent $20,000 on the Watford City Airport, $5,000 on the Lewis & Clark Museum, $13,000 on the Pioneer Museum, and $25,000 on the McKenzie County Heritage Association. Another $11,500 went to the Tri-County Economic Development Corporation, and $58,330 was spent on the County Tourism Bureau (McKenzie County, 2011).

These examples show how McKenzie's booming oil and gas industry has played an important role in helping the county develop amenities and diversify its economy. This economic growth has also contributed to a lower unemployment rate and higher incomes. From 2000 to 2010, per-capita income has grown by over 50% in the majority of North Dakota's counties (U.S. Census Bureau, 2010). McKenzie County has also seen growth in the percentage of economic activity attributable to the energy sector. In 1990 about 14% of McKenzie County jobs came from mining and public utilities sectors. In 2010 that number grew to just over 29% of total jobs (U.S. Census Bureau, 2010). McKenzie County's unemployment rate as of December 2012 was just 1.7%, significantly lower than the statewide rate of 3.2% and even more impressive compared to the national average of 7.8% (Federal Reserve, 2013; BLS, 2012). Today jobs in the petroleum industry are not just more plentiful, but also pay significantly more than they have historically.

Average annual pay for upstream oil and gas jobs is drastically higher than agriculture jobs, and even more so than jobs in hospitality and recreation, as shown in Exhibit 5.10. Upstream oil and gas average annual pay has been increasing greatly since 2004, reaching $92,507 in 2010. Average annual pay for agriculture and hospitality and recreation jobs has also increased, but has never exceeded $40,000.[26]

[26] Average annual pay is reported in nominal dollars and has not been adjusted for inflation.

Exhibit 5.10



(BLS, 2012)

McKenzie County's government-sponsored natural and historical attractions have created a sizable base of government employees in the county. The U.S. Census Bureau estimates that in 2010 over 20% of McKenzie County's civilian labor force was made up of government workers (U.S. Census Bureau, 2010). In addition, a large portion of McKenzie County's economy remains amenity-based, with a strong tourism sector. As of 2010 roughly 9% of McKenzie County's jobs were in the arts, entertainment, recreation, accommodation, and food services sector (See Exhibit 5.4). Over one quarter of civilians over age 16 in McKenzie County are employed in agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset—that is 16.7% higher than the state average.

In Considine, Watson, and Blumsack's most recent update on the impacts of the Marcellus shale development on Pennsylvania (Considine, et al., 2011, July 20), they find that each well drilled generates about 26 direct oil and gas and construction jobs[27]. Though this estimate is for gas wells drilled in the Marcellus, the employment impacts for oil wells drilled in the Bakken are likely comparable as

[27] This estimate is already scaled to account for rigs that drill multiple wells per year.

the drilling techniques in both areas are similar (e.g. both primarily use horizontal drilling and hydraulic fracturing techniques). Using this estimate and the number of wells spudded by year in McKenzie County (see Exhibit 5.5), it suggests that employment from drilling activity in McKenzie County actually may have grown from about 1,800 jobs in 2009 to almost 9,800 jobs in 2011. A significant number of these jobs may have been filled by crews coming in from outside the county and state.

Not so long ago, the community's economic opportunities seemed gloomy, particularly after the county's population decreased from 1980 to 1990. From 2000 to 2010, this trend reversed and the county saw a 10.4% increase in population. Compared to a state average of only 1.7% growth over the same period, the county's recent growth is impressive and much of it can be attributed to the growing petroleum industry (U.S. Census Bureau, 2012).

As the county has grown, its infrastructure has been somewhat strained under the increasing load. In 2011 the county spent $200 million repairing roads damaged by oversize and overweight truck traffic, because the traffic has more than doubled over the past 3 years (Mufson, 2012). Schools and daycare providers are struggling to keep up with demand. Judicial systems are also struggling; crime rates in many North Dakota towns have increased with populations (Mckenzie county background, 2013). The increasing population is also driving demand for housing, raising property values, and increasing the cost of living. With these increases, some individuals filling the growing employment demands live outside the county and commute into work (see associated discussion in Renville County).

Despite some challenges associated with growth, McKenzie County has promising opportunities and one company in Watford City is taking advantage. McKenzie Building Center was founded in 1934 and for years it was the county's only lumber yard. In response to growing demand, McKenzie Building Center has expanded its operations and now offers mobile and manufactured homes, ready for move-in. The company's Park Model provides 900-square-foot homes for oil and gas field workers (Waldemar, 2012). At the same time, contractors are building permanent

homes as fast as they can, and demand for construction supplies is high. McKenzie Building Center is now offering up to $1 million in company credit to qualified applicants to encourage them to shop locally (Waldemar, 2012). With the North Dakota petroleum boom in full swing, the future looks bright for McKenzie Building Center and other companies like it.

Development Strategies

When Meriwether Lewis called the Dakota badlands "the handsomest plains I ever beheld," he had no idea that buried beneath those plains were some of the largest and most valuable petroleum reserves in the United States (ND Tourism, 2012; The Bakken Boom, 2011). As shown in Exhibit 5.2, active oil and gas wells are plentiful across the county, with some crossing into lands owned by USFS. As the oil and gas activity grows, there is still consistent visitation to McKenzie County's unique national park.

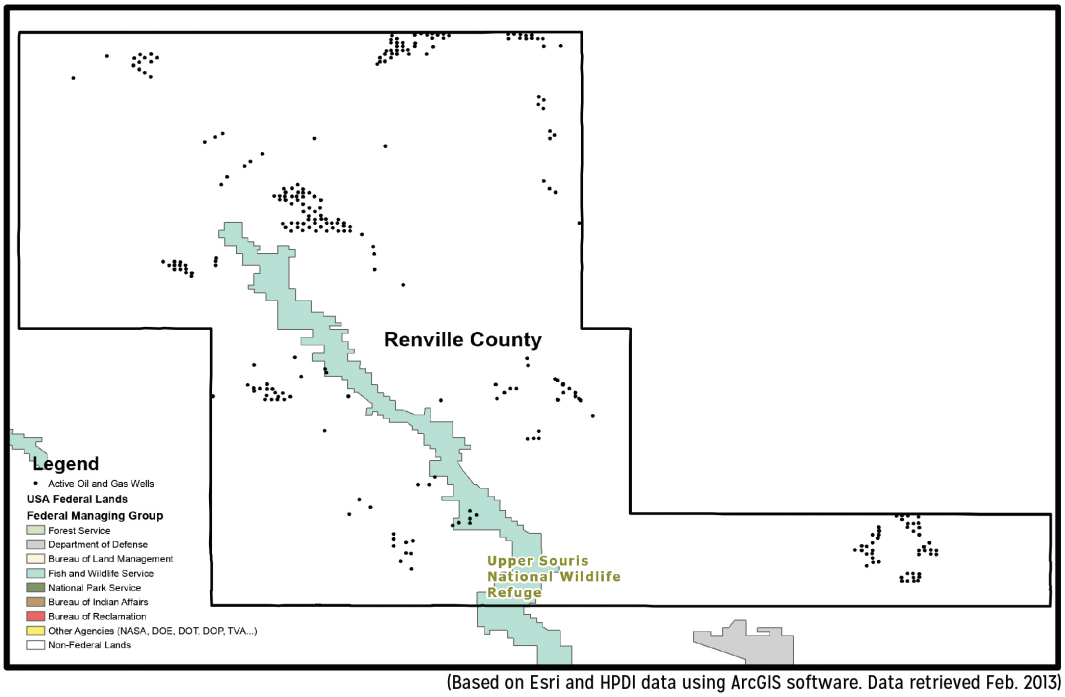
Although the state's badlands and historical sites have always attracted visitors, North Dakota's oil and gas boom is bringing new life to a once economically stagnated region. McKenzie County's economic growth is evidenced by job creation, population growth after a period of population decline, revenue increases, and construction, all of which can be tied back to the region's prospering extractive industries combined with an already-strong amenity base. The experience of McKenzie County illustrates that local communities do develop both amenities and energy extraction at the same time, to the extent they can, and that development of one resources does not have to occur at the expense of the other.

Renville County, North Dakota

Renville County, which is located along North Dakota's northern border with Canada, has historically been a small community focused on farming. Recently, however, the region's proximity to oil and gas development in the western part of the state has resulted in an influx of oil and gas workers looking for affordable housing, and oil-related businesses emerging to service the nearby development. These, in turn, have led to population growth and economic growth. Because of its lack of explored resources, Renville County has not experienced the full economic impacts of oil-rich places like nearby McKenzie County. However, Renville County still enjoys many benefits resulting from increased development in the nearby Bakken Shale formation.

Renville County covers 892 square miles, 4.5% of which is managed by the U.S. Fish and Wildlife Service (U.S. Census Bureau, 2013). Throughout most of its history, Renville County's economy relied primarily on agriculture, as has much of North Dakota. This industry remains hugely important in Renville County today. The county's primary crops include durum, barley, sunflowers, canola, corn, and red spring wheat (Renville County North Dakota Information, n.d.).

Exhibit 5.11 Active Oil and Gas Wells in Renville County, ND



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

As shown in Exhibit 5.11 (for larger exhibit see Appendix), Renville County contains much of the Upper Souris National Wildlife Refuge, which comprises 32,000 acres of habitat managed for migratory birds. Most oil and gas activity in the county is occurring in pockets that fall outside the refuge. Although Renville County currently has little energy development and has limited amenity potential (outside of agriculture), where the two do occur, they do not appear to come into conflict.

Energy Development

When asked if Renville County is experiencing an oil boom, Kristy Titus, the Community Development Coordinator for Renville County, said, "No. The oil is really dominant in the western part of the state but our county isn't seeing it as much. We have a lot of oil traffic, but we don't have any active drilling sites" (Kristy Titus, personal communication, 2013, April 24).

Although it does not have active drilling sites, Renville County is home to the Mission Canyon Play, though this formation "has just started to be experimented

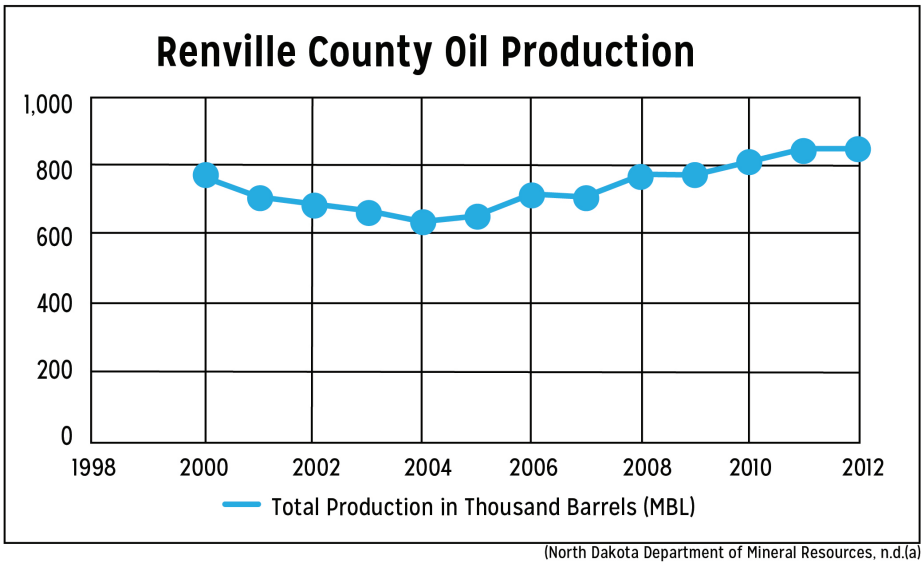
with" (Ogden, 2012). Renville County does have some oil and gas extraction however. Exhibit 5.12 shows the number of wells spudded by year in Renville County (NDIC Oil and Gas Division, 2013, June 10). In 2012 Renville County produced about 860,000 barrels of oil and almost 106 million cubic feet of natural gas (North Dakota Department of Mineral Resources, 2012). This production is very small, however, relative to the amount of production occurring in the state. In 2011 Renville County accounted for only 1% of North Dakota's oil production, and a mere 0.1% of the state's natural gas production.

Exhibit 5.12 Number of Wells Spudded in Renville County

Year	Number of Wells Spudded
2008	15
2009	5
2010	8
2011	11

(NDIC Oil and Gas, 2013, June 10)

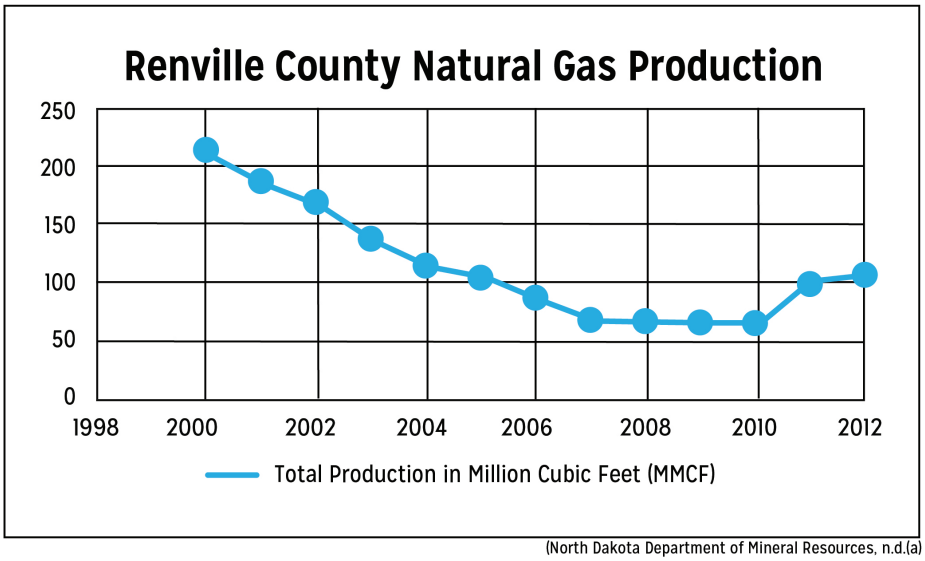
Exhibit 5.13



(North Dakota Department of Mineral Resources, n.d.(a)

As shown in Exhibit 5.13, oil production in Renville was just above 770,000 barrels in 2000. Production slowly decreased until it reached about 640,000 barrels in 2004. After that point production picked up, surpassing 800,000 barrels in 2010.

Exhibit 5.14



(North Dakota Department of Mineral Resources, n.d.(a)

Exhibit 5.14 shows gas production in Renville County from 2000 to 2012. Natural gas production declined by about 140 million cubic feet (MMCF) from 2000 to 2007. After 2007, production remained fairly stable for 3 years before beginning to grow again after 2010.

Despite the limited extraction activities occurring in Renville County, energy development in the surrounding region has brought oil-related businesses to the county. Several companies have cropped up to support the area's extraction activities by providing things like drilling equipment, rigs, and well servicing. Ham's Well Service is one such company that operates in Renville County. Their services include hot oil trucks, a winch truck, an acid truck, workover rigs, well servicing, and roustabout services. M&G Roustabout, another business operating in Renville County, also offers roustabout services. CanElson Drilling Inc., a drilling contractor with offices in Canada, Texas, and North Dakota, has their North Dakota operations office in Renville County. National Oilwell Varco, a multinational corporation that offers a range of equipment and services that support oil and gas operations, has a distribution service center in Renville County through which the company distributes and delivers its products. All of these businesses are tied to the energy development in the region, and bring jobs and revenue to Renville County.

Amenity Development

Agriculture has always played an important role in Renville County, which has almost 535,000 taxable agricultural acres (Fong, 2011, p. 1). The city of Mohall hosts the annual North Central Seed Show and Ag Expo, which includes the judging of seeds, explorations of the agricultural market, and speeches from local and national governmental leaders in the agricultural sector (Renville Bottineau Ag Improvement Association, 2012).

Additionally, North Dakota State University has a branch in Renville County where citizens can access resources to improve their agricultural services as well as access new seed varieties (North Dakota State University, n.d.). One such service is the Renville Bottineau Ag Improvement Association, which aims to help farmers and ranchers continue to use pure seeds and purebred stock animals, raise the standard of living for farming families, and provide scholarships to youth in Renville (Renville Bottineau Ag Improvement Association, 2012).

Besides agriculture, Renville County has limited amenity opportunities and so often promotes activities in surrounding counties in addition to its own. For example, one Renville County brochure highlights the annual Kenmare Goosefest in Ward County, which attracts goose hunters from all over the country (Renville County North Dakota Information, n.d.). There are also opportunities for hunting within Renville County: Waterfowl and upland bird hunting is plentiful, with many species of duck, geese, turkey, partridge, and grouse (Renville County, n.d.).

Renville County's parks and national wildlife refuge offer other amenity opportunities. The Upper Souris National Wildlife Refuge hosts up to 350,000 waterfowl, including blue heron and white pelican. Hunting and fishing are permitted in specified areas, and conditions for observing wildlife and canoeing along Lake Darling are excellent (Renville County, n.d.). Mouse River Park, located in the northern area of the wildlife refuge about 15 miles west of Mohall, provides camping and hunting areas, fishing, boating, and walking paths (Renville County Job Development Authority, n.d.). These areas comprise the majority of the amenity areas in Renville County.

Economic Indicators

Agriculture is the biggest industry in Renville County and it provides multiple economic benefits to the area. According to the most recent Census of Agriculture (2007), sales from Renville County agricultural products had a market value of over $106 million. This represented a large increase in value from the previous U.S. Census Bureau data (2002) when the market value of products sold was only $44 million. Renville County farms also received government payments totaling almost $5.5 million in 2007, an average of almost $17,000 per farm; this was a 26% increase from the government payments received in 2002 (U.S. Department of Agriculture, 2007).

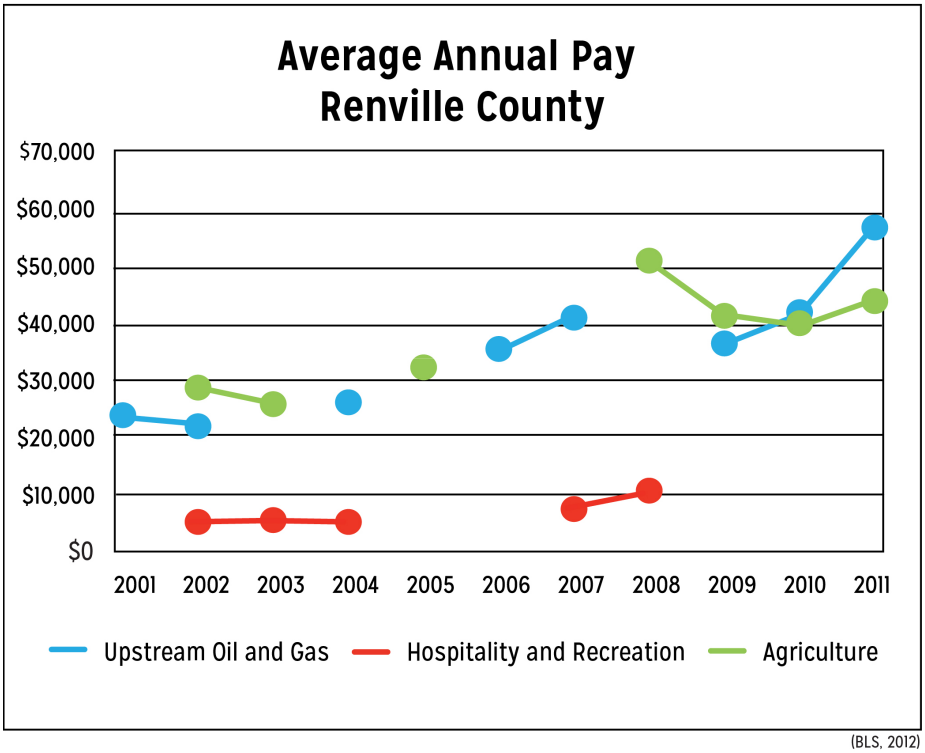
Although Renville County is not experiencing an oil boom, the county still sees economic benefits from energy development. The county's own extraction activities, though somewhat small, bring investment to the county. One company reported that each oil well drilled in the Bakken costs about $7.2 million (Filloon, 2012). Between 2008 and the end of 2011, 39 wells were drilled in Renville County (NDIC Oil and Gas, n.d., Custom query). Using the $7.2 million cost estimate, over that period the drilling activity from new wells generated about $280 million of investment in Renville County.

Renville also reaps benefits from its proximity to the larger growth and continuing development in the Bakken Shale formation in other counties in the region. One of these benefits is population growth. Renville County has historically had difficulty attracting visitors and retaining its population. From 1980 to 1990, Renville County experienced population loss of 12.4% (U.S. Census Bureau, 2012). From 1990 to 2010, Renville County's population shrunk by another 21.8 percent. After decades of losing population, the county finally grew 3.6% from 2010 to 2012 (U.S. Census Bureau, 2012).

Kristy Titus, the Community Development Coordinator for Renville County, said that many people are moving to Renville County because of the lower cost of living and the high level of job opportunities. She explained, "We have people that move into the area because they can't find housing in other counties that are high in the oil industry" (Kristy Titus, personal communication, 2013, April

24). The increased demand for housing in the county is also partially fueled by a U.S. Air Force base about 50 miles south, and a 2011 flood in nearby Minot (the county seat of neighboring Ward County), which destroyed around 4,100 homes. According to Titus, many of those who move to Renville commute to nearby Minot or other towns within 20 to 50 miles (Kristy Titus, personal communication, 2013, April 24).

Exhibit 5.15



(BLS, 2012)

For those who hold oil and gas jobs in Renville County, average annual pay is higher than other sectors. As shown in Exhibit 5.15, average oil and natural gas salaries have recently surpassed those in agriculture, and have consistently been higher than those in hospitality and recreation. In 2011 the average salary for oil and gas employees was $58,170, which was about $15,000 more than the average salary for agriculture employees. Previous to this spike in growth, both upstream oil and gas and agriculture followed a similar pattern of growth for the data available, from 2001 to 2006. This pay data is reported in nominal dollars and has not been adjusted for inflation. Average annual pay for hospitality and recreation never exceeded $10,000 for the data available.

In Considine, Watson, and Blumsack's most recent update on the impacts of the Marcellus shale development on Pennsylvania (Considine, et al., 2011, July 20), they find that each well drilled generates about 26 annual, full-time direct oil and gas and construction jobs[28]. Though this estimate is for gas wells drilled in the Marcellus, the employment impacts for oil wells drilled in the Bakken are likely comparable as the drilling techniques in both areas are similar (e.g. both primarily use horizontal drilling and hydraulic fracturing techniques). Using this estimate and the number of wells spudded by year in Renville County (see Exhibit 5.15), it suggests that employment from drilling activity in Renville County may have been about 390 jobs in 2008 and almost 290 jobs in 2011. Some of these jobs may have been filled by crews coming in from outside the county or state.

In addition, the nearby Bakken Shale development and oil boom still positively impacts employment in the county. Titus explained that Renville County has "oil-related businesses," such as businesses that perform maintenance for oil companies. These jobs "are oil-related, just not specifically for drilling" and includes businesses like those mentioned earlier, such as CanElson Drilling and Ham's Well Service (Titus, personal communication, 2013, April 24). Despite having limited production of its own, Renville is thus still able to reap benefits from the region's increased energy development.

Exhibit 5.4 shows employment by sector in the civilian population age 16 and older in Renville County. Over one quarter of the Renville County workforce is employed in agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset. This is the largest sector in Renville County and is about three times higher than the state average. Its prominence reflects the importance of agriculture and hunting in the county, as well as mining and related activities, to the economy in terms of employment opportunities. Educational services, health care, and social assistance is the next largest sector in the county, employing about 18% of the civilian population 16 and older, though this is lower than the state average. The arts, entertainment, recreation, accommodation, and food services sector accounted for only about 5% of employment in Renville County, slightly less than the state average and indicative of the relatively smaller role of tourism in the county economy.

[28] This estimate is already scaled to account for rigs that drill multiple wells per year.

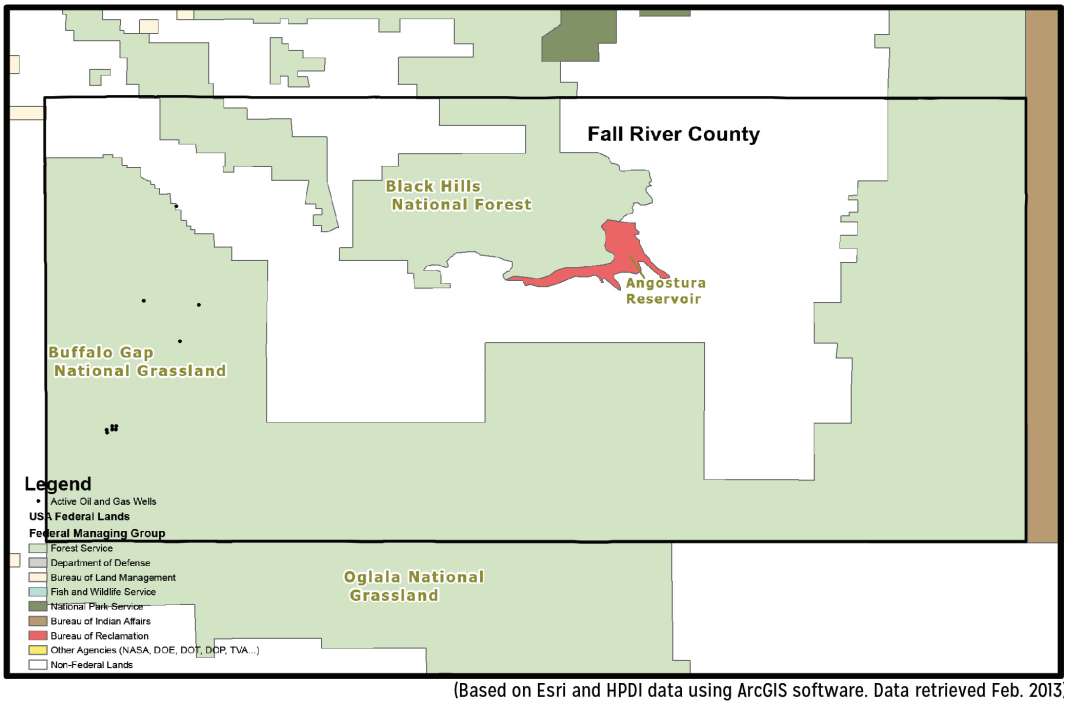
Development Strategies

Although Renville County is not the home of extensive new energy development, the county does enjoy economic benefits thanks to its proximity to the booming Williston Basin and Bakken Shale formation. As one county brochure explains, "Our area is located in oil production country. Oil drilling activity is very strong right now due to the high price of crude oil. We have many businesses that serve the needs of both the agriculture and oil industries" (Renville County North Dakota Information, n.d.). The amenities in Renville County continue to grow while the county also benefits from indirect and induced effects of energy development in the region. Renville County is an excellent example of how extractive industries can lead to extensive economic growth, even in neighboring counties where significant oil and gas production is not actually taking place.

Fall River County, South Dakota

Fall River County, located in the southwest corner of South Dakota, is a popular destination for outdoor enthusiasts and recreationists. Located in the Black Hills region, the county has well-developed amenity opportunities, including state parks and national forests and grasslands. These areas benefit the local community by providing a strong tourism sector, creating jobs, and providing local communities a source of revenue. Fall River County also has relatively undeveloped extractive energy opportunities compared to the other profiled counties in this section.

Exhibit 5.16 Active Oil and Gas Wells in Fall River County, SD



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Fall River County contains the Buffalo Gap National Grassland and the Black Hills National Forest, both administered by the USFS, and the Angostura Reservoir. Fall River County is a prime spot for visitors travelling to popular vacation destinations just north of the county. These sites include Mount Rushmore National Park, Badlands National Park, Crazy Horse Memorial, and historical Old West landmarks such as Deadwood mining town and Sturgis, home to the well-known biker rally (Black Hills, Badlands, and Lakes, 2012). However, none of

these popular vacation destinations lie within Fall River County and so will not be discussed in this section.

Nina Steinman is a Fall River County resident who benefits from its natural beauty and amenity opportunities. Steinman regularly takes advantage of the region's Angostura State Park and goes boating and fishing at the lake. Still, she is excited about the possibility of oil and gas extraction in the county. Nina has seen the population of South Dakota diminish due to economic downturns, while neighboring states like Wyoming and North Dakota have greatly benefited from the petroleum industry. Believing it will only help the economy, she remarked, "if [oil] is there we should use it" (Nina Steinman, personal communication, December 05, 2012).

Energy Development

Along with abundant natural amenities, South Dakota also enjoys prime oil and gas extraction opportunities. The state's petroleum potential has often been overlooked in recent years. Attention has instead gone to big oil and gas producing projects in North Dakota. "We have a geologically enticing area that needs to be explored," said South Dakota School and Public Lands Commissioner Jarrod Johnson. "We have oil in South Dakota, without a doubt. We are under-explored. It's just a matter of getting the seismic information" (AP, 2011, October 17). Further exploration of the untapped energy potential in the county could help diversify the amenity-focused economy and have positive economic benefits. The 1980s brought a small wave of oil and gas production in Fall River County but this did not prove sustainable as production levels were low. Almost all of the few active wells shown in Exhibit 5.11 were completed during this period.

The South Dakota Board of Minerals and Environment recently approved the establishment of an oil and gas production field near Edgemont City, one of Fall River's larger cities, on November 19, 2012 (Associated Press, 2012, November 19). Currently, oil and gas extraction occurs primarily on private property, although increasing leases and permits could allow petroleum to also be extracted on the county's many federal lands (Department of Energy and Natural Resources, 2012).

Amenity Development

Hot Springs, Fall River's county seat, has 3,711 residents and is the most populated city in the county (U.S. Census Bureau, 2013, May 10). In 2009 the National Trust for Historic Preservation awarded Hot Springs the Distinctive Destination Award given "to cities and towns that offer an authentic visitor experience by combining dynamic downtowns, cultural diversity, attractive architecture, cultural landscapes and a strong commitment to historic preservation, sustainability and revitalization" (National Trust for Historic Preservation, 2012). Easily accessible to the surrounding amenities, Hot Springs borders rugged canyon and pine forests, Wind Cave National Park (located in Custer County to the north), Pioneer History Museum, Mammoth Sight, Black Hills Horse Sanctuary, South Hills Golf Course, and Angostura State Recreation Area (Hot Springs, 2010).

The Black Hills Horse Sanctuary, owned by the Institute of Range and American Mustang, is dedicated to preserving natural wildlife and rescuing abandoned or mistreated horses (Black Hills Horse Sanctuary, 2012). Its natural beauty was displayed in popular films such as Hidalgo in 2004 and Into the Wild in 2007 (Hot Springs, 2010).

Fall River County has a portion of one national grassland and one national forest within its borders. The county also borders Oglala National Grassland, which has 94,000 acres of prairie grassland and offers cycling, camping, and hiking (USFS, n.d.(a)). The Buffalo Gap National Grassland inside the county allows visitors to freely "rockhound," or collect rocks, minerals, and gemstones available within the grasslands (Black Hills Badlands & Lakes Association, 2013). With a permit, visitors can also collect vertebrate fossils for education or scientific purposes. Additionally, many abandoned homes remain from the Homestead Act era and serve as habitats for the over 100 species of animals within the grasslands (Black Hills Badlands & Lakes Association, 2013). Fall River County also hosts a portion of Black Hills National Forest, which, according to the USFS, receives millions of visitors each year (USFS, n.d.(b)). Fall River County has a wide variety of landscapes for those visiting South Dakota, ranging from expanding grasslands, to the gulches and lakes of the Black Hills.

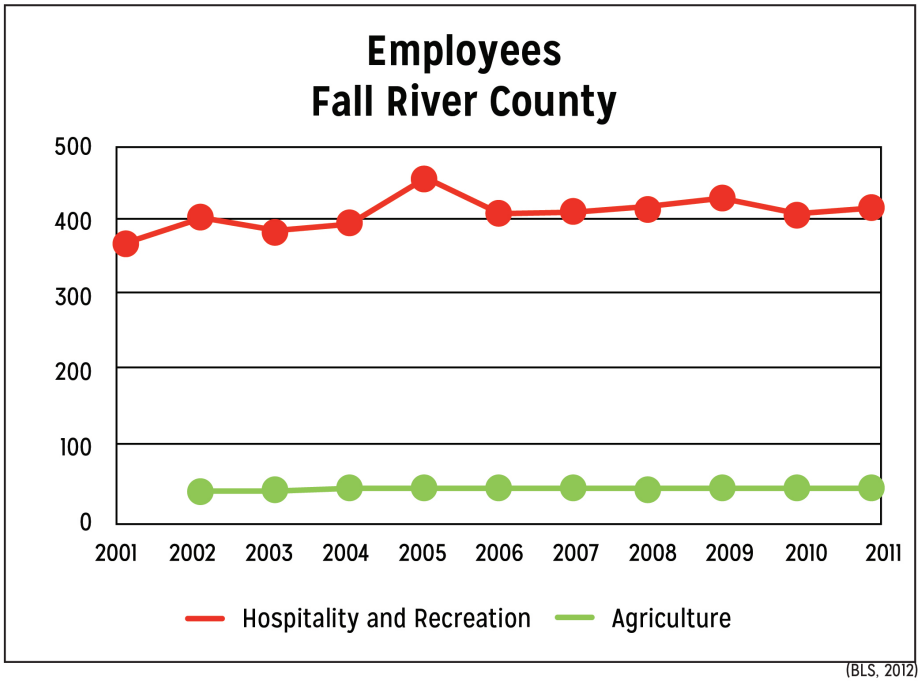
Economic Indicators

In 2010 recreation made up a significant amount of Fall River County's economy with 19.4% of the employed population over 16 years old in the arts, entertainment, recreation, accommodation, and food services, making it the second largest sector (U.S. Census Bureau, 2010). A sizable portion of this labor force is employed in the educational services, health care, and social assistance sector—27.75%. Fall River County is thus heavily dependent on these two sectors for almost half of its labor force. The recreation industry provides jobs, opportunities for small businesses, and tax revenue for local schools, though like any expanding industry it also brings some challenges. For example, "jobs created by tourism are often seasonal and poorly paid," and tourism can "[pose] a threat to... natural and cultural resources, such as water supply…and heritage sites, through overuse" (Simm, n.d.). Currently, jobs in agriculture, forestry, fishing and hunting, and mining jobs contribute to the county as the fourth largest employer with 8.4% of the population working in that industry (see Exhibit 5.3).

From 2010 to 2012, the county's population shrunk by about 1.7% (U.S. Census Bureau, 2013, January 10). Without strong job opportunities in Fall River County, residents may be enticed to move by the economic growth in neighboring communities in Wyoming and North Dakota. Counties like McKenzie in North Dakota have seen an increase in population and a decrease in unemployment since they began developing their petroleum resources. Unemployment in Fall River County in October 2012 was 4.7% but has in the past decade been as high as nearly 8% (Federal Reserve Bank of St. Louis, n.d.). In addition, unemployment is lowest during the late summer months when the tourism industry is at its peak (Federal Reserve Bank of St. Louis, n.d.).

More people are employed in the hospitality and recreation sector in Fall River County than in the agriculture sector. Hospitality and recreation has seen slow but steady growth over the decade, which agriculture employment has remained static and low. The low number of agriculture employees is likely due to collection and inclusion issues with the BLS data, such as the exclusion of agricultural workers on small farms. A fuller discussion of the data is in Part I.

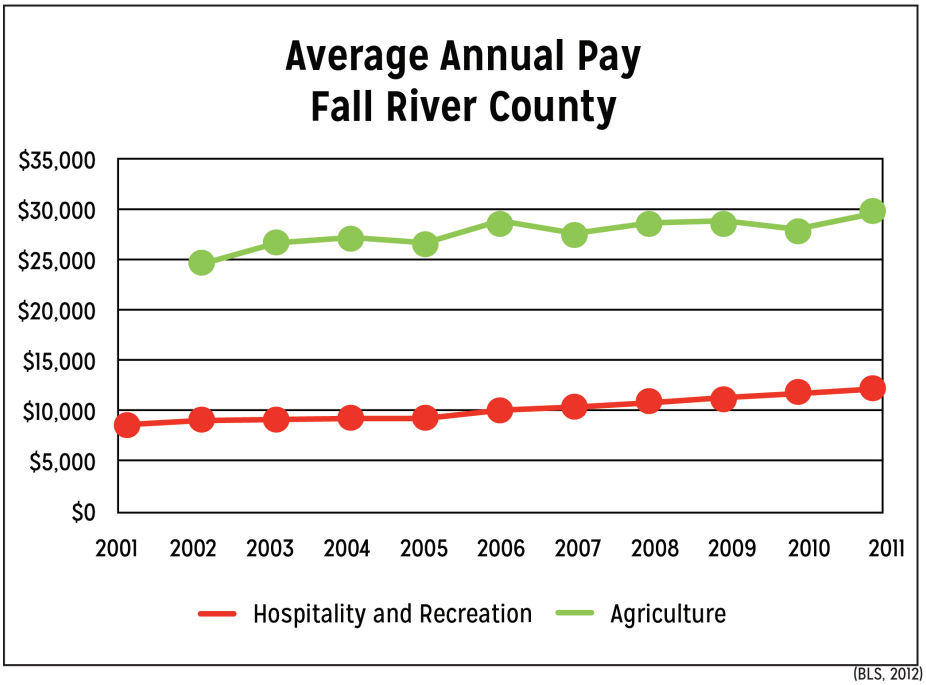
Exhibit 5.17



(BLS, 2012)

Exhibit 5.17 shows the average annual pay for workers in hospitality and recreation. The average annual pay for those working in the hospitality and recreation sector in 2010 was almost $12,000, significantly less than South Dakota's per-capita income in that same year of almost $25,000 (U.S. Census Bureau, 2010). In 2011 the average annual pay for these employees was still only just under $12,200, which is quite low compared to the pay in agriculture. In addition, these pay numbers are reported in nominal dollars and have not been adjusted for inflation. The average annual pay for agriculture workers was $29,400 in 2011.

Exhibit 5.18



(BLS, 2012)

Development Strategies

With many federal lands that provide an abundance of recreation opportunities, Fall River County has focused their economy on amenities. Some county residents like Nina Steinman are anxious to build on that amenity base and see the benefits from oil and gas production in the county. Exploring their energy resources could lead to more growth in a diversified economy. If Fall River County's energy potential is further explored and developed like other areas in the region, residents would likely see the positive benefits of a county balanced with both energy extraction and amenities development.

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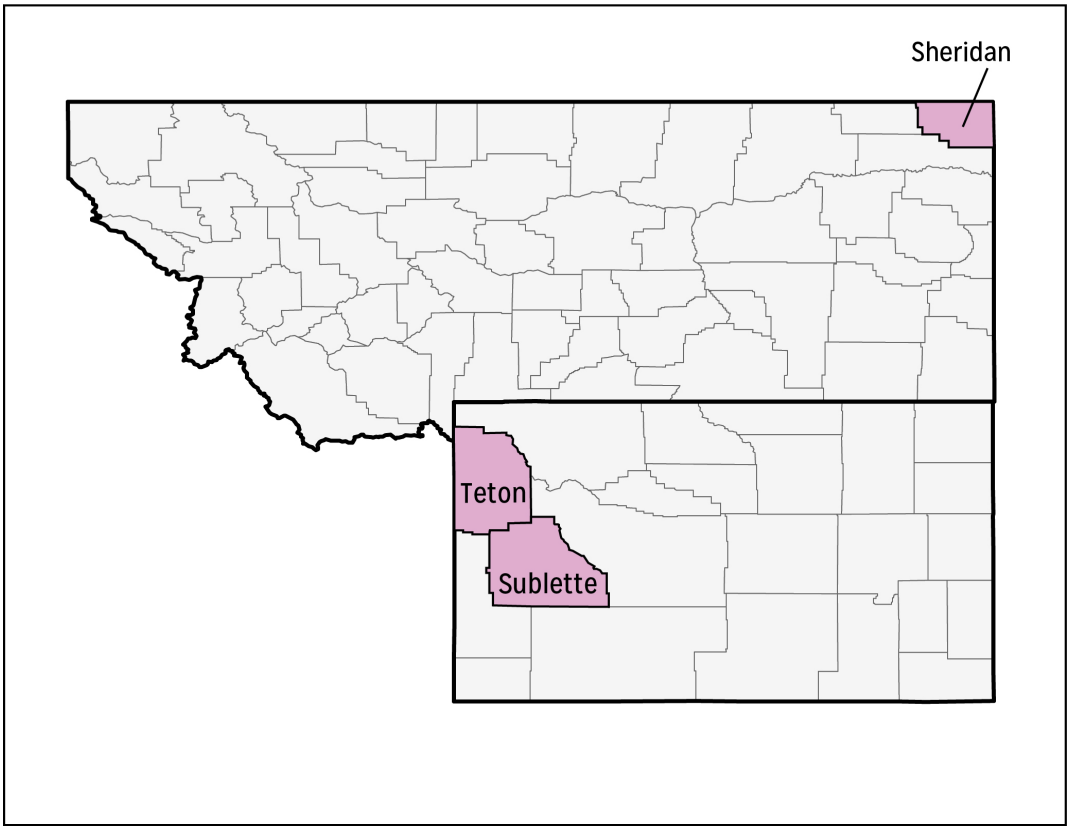
Northern Rockies

The states of Montana and Wyoming make up the Northern Rockies area for this study. In these states, whose landscapes and economies are diverse and varied, this study examines Teton County and Sublette County in Wyoming, and Sheridan County in Montana. In the Northern Rockies, the oil and gas industry and the tax revenues it generates play an important role in some county economies. However, the following case studies will demonstrate that amenity development and energy extraction can coexist, and that county economies may fare better when they do.

Exhibit 6.1 **Map of the Northern Rockies (WY and MT) with Select Counties**

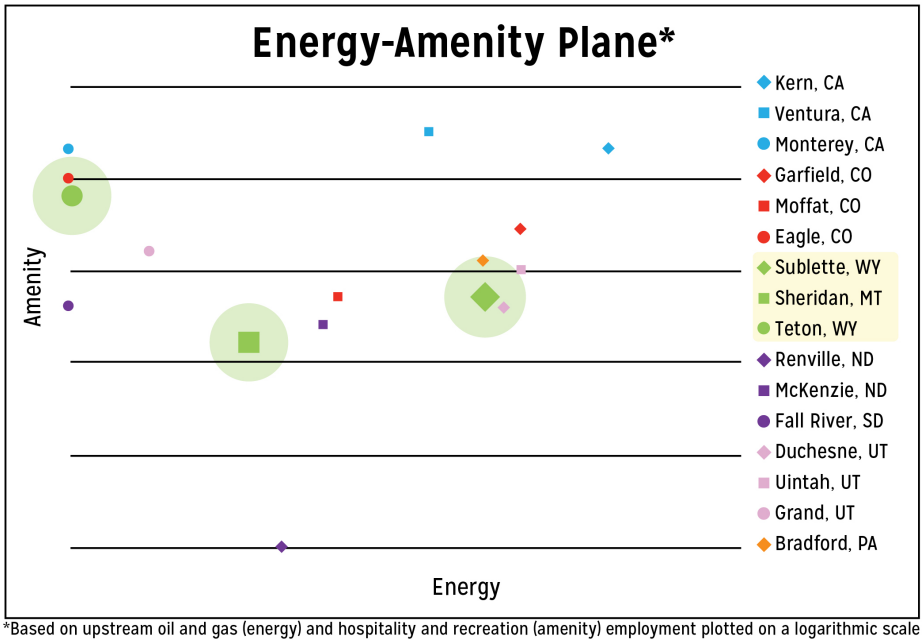


Amenities play an important role in Teton County, which has no energy extraction activities. While there are considerable amenity resources in Sublette County, they play a small role in the economy relative to oil and gas. Sublette County's Pinedale is the quintessential boomtown and demonstrates the rapid growth that can result during the start of energy extraction activities. Small, rural communities

like Sheridan County rely heavily on tax revenues from the oil and gas industry to cover the costs of its school systems and other services.

Exhibit 6.2 shows Teton, Sublette, and Sheridan counties and where they fall on the energy-amenity graph, with Sublette County most focused on energy development, Sheridan County more balanced, and Teton County currently without active oil and gas development.

Exhibit 6.2



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

In Wyoming, the oil and gas industry supported[29] 61,065 jobs and contributed $7 billion to the state economy in 2009. The average salary of oil and natural gas workers in Wyoming is $74,538, which is $33,200 higher than the state average of $41,258 (AmericanEnergyWorks.org, 2012(b)).

Similar economic benefits are observed in Montana, where 40,276 jobs were supported[30] by energy extraction in 2009, and $4 billion was contributed to the state economy. The average salary of oil and natural gas workers in Montana is $72,886, more than double the state average of $33,244 (AmericanEnergyWorks.org, 2012 (a)).

[29] This support includes direct, indirect, and induced jobs.
[30] This support includes direct, indirect, and induced jobs.

Exhibit 6.3 shows that in Sublette and Sheridan counties, average annual pay (reported in nominal dollars) in the upstream oil and gas sector is significantly higher than in the sectors of hospitality and recreation, and agriculture. Teton County does not have pay information in upstream oil and gas due to the lack of petroleum activity, but its hospitality and recreation workers earn slightly more than workers in this same sector in Sublette and Sheridan counties.

Exhibit 6.3

Average Annual Pay in Selected Northern Rockies Counties, 2011

	Upstream Oil and Gas	Hospitality and Recreation	Agriculture
	Average Annual Pay	Average Annual Pay	Average Annual Pay
Sublette, WY	$76,947	$22,858	$34,715
Sheridan, MT	$46,913	$13,743	$26,752
Teton, WY	-	$24,896	-

(BLS data from 2011)

Exhibit 6.4 shows employment by sector for the civilian employed population over age 16 in Sheridan, Teton, and Sublette counties. Employment in oil and gas is included in the agriculture, forestry, fishing and hunting, and mining sector. As the table shows, Sublette County has the highest percentage employed in this sector. Sheridan County's employment is more mixed, while Teton County has the highest percentage (25.11%) employed in the arts, entertainment, recreation, accommodation, and food services sector.

Exhibit 6.4 Percent Employed by Sector in Select Northern Rockies Counties, 2011[31]

Sector	Sheridan	Montana	Teton	Sublette	Wyoming
Agriculture, forestry, fishing, and hunting, and mining*	20.9%	7.10%	3.60%	32.70%	11.8%
Construction	8.80%	8.50%	13.30%	10.10%	8.7%
Manufacturing	1.50%	4.80%	1.40%	1.70%	5.00%
Wholesale trade	1.70%	2.70%	0.80%	0.70%	2.20%
Retail trade	11.90%	12.30%	8.60%	8.70%	11.20%
Transportation, warehousing, utilities	8.60%	5.00%	3.90%	5.60%	6.60%
Information	1.80%	1.90%	2.30%	1%	1.70%
Financial, insurance, real estate	6%	5.69%	7.66%	2.30%	4.42%
Professional, scientific, management, administrative, and waste management services	3.88%	8.14%	10.97%	6.20%	6.55%
Educational services, health care, and social assistance	18.78%	22.42%	17.17%	15.50%	21.96%
Arts, entertainment, recreation, accommodation, and food services	5.59%	10.57%	25.11%	6.50%	9.25%
Public administration	5.53%	4.71%	3.17%	4%	4.26%
Other services	4.89%	6.11%	2.13%	4.90%	6.41%

*Oil and gas is a subset of mining

(U.S. Census Bureau data from 2011)

[31] Due to rounding and data structure issues, the percentages may not add up to 100 percent.

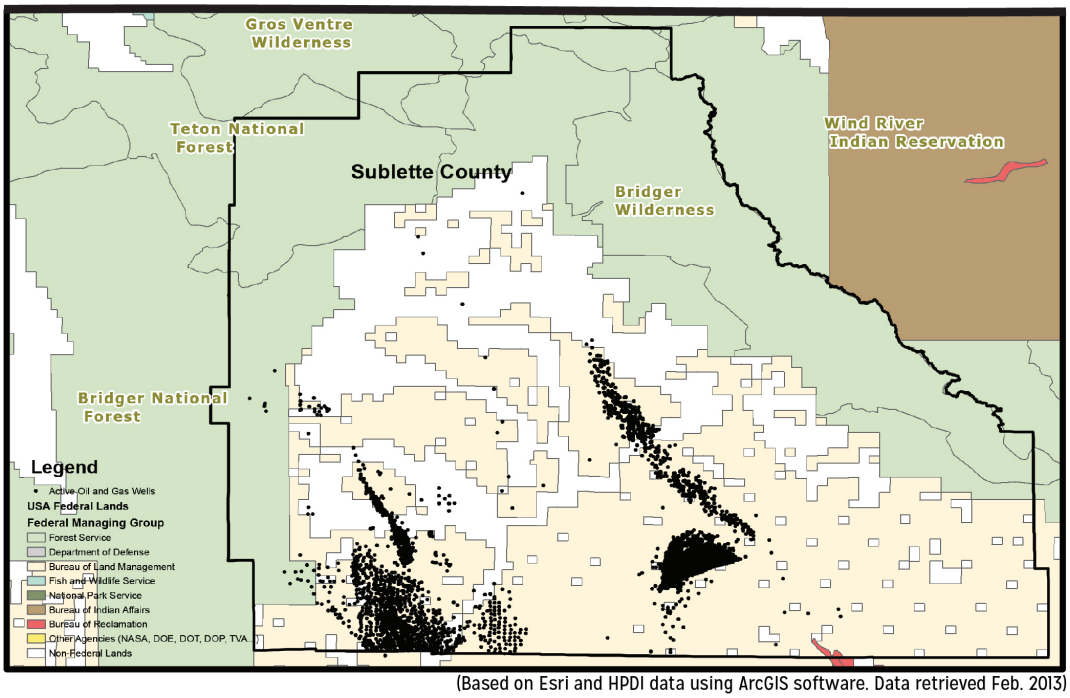
Small communities in the Northern Rockies often must rely on the natural resources available in the county for developing their economic base. This dependence can lead to an uncertain economic climate and cyclical employment, regardless of the natural resources that are being developed. By diversifying their economies, communities in the Northern Rockies may improve economic outcomes and reduce the magnitude of cyclical fluctuations.

Sublette County, Wyoming

Sublette County residents are experiencing the benefits and challenges that come with developing energy and amenity resources in a once-rural economy. Surrounded on three sides by wilderness and national forest lands, Sublette County has many amenity opportunities. The county also has concentrated pockets of oil and gas drilling. Both of these industries contribute to the economy, albeit in different ways. County Commissioner Joel Bousman describes the current economic climate of Sublette County as both "exciting and challenging" (Ecosystem Research Group, 2009, p. ES-1).

Southeast of Jackson Hole, Sublette County houses a small ranching community; the county has only 6,000 residents (Pinedale Online, 2009). The county is part of rural Wyoming—there are no stoplights anywhere in the county—where suburban developments are separated by hundreds of miles. A petroleum boom in the county has driven economic growth. While some drawbacks have accompanied this growth, including a reliance on a non-resident workforce and rising costs of living, Sublette County demonstrates the important role that the oil and gas industry can play in providing tax revenue and boosting the economy as well as contributing to the nation's energy supplies.

Exhibit 6.5 Active Oil and Gas Wells in Sublette County, WY



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 6.5 (for larger exhibit see Appendix) shows that oil and natural gas extraction occurs away from areas of the county where designated federal lands and wilderness amenities are located. Most extractive activities occur on lands administered by BLM and non-federal lands in the central and southern parts of the county. Parts of the Bridger Wilderness, Teton National Forest, Gros Ventre Wilderness, and Bridger National Forest are located within Sublette County, as well as some Reclamation lands.

Energy Development

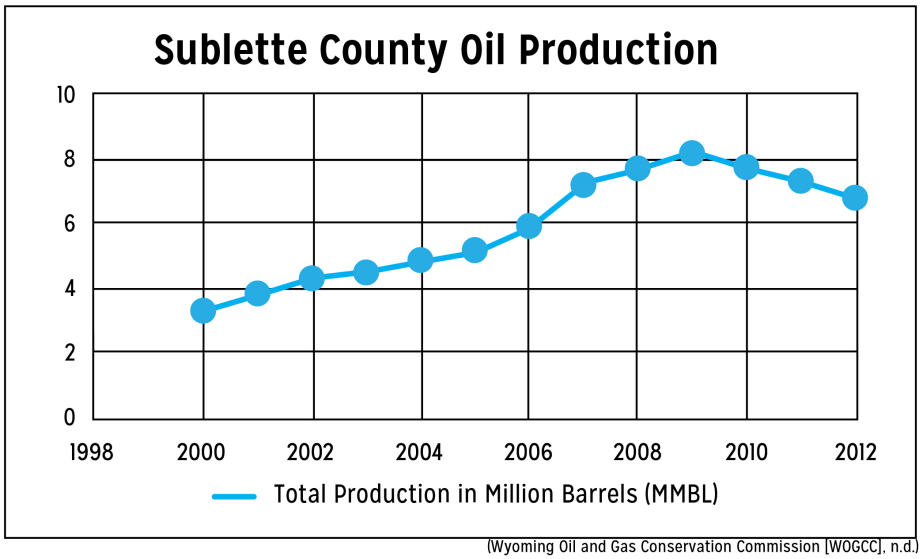
Wyoming has more oil and gas leases than any other state in the United States, with companies leasing over 25% of the state's land. Sublette County houses a large portion of these leases (Fuller, 2008, October 27). In 2007 Sublette County produced more natural gas than any other county in Wyoming (Bender, et al., 2008, p. 3). The boom began in the early 2000s as companies used new technologies to access previously unreachable resources, and citizens were optimistic about development (Fuller, 2008, October 27). The Pinedale Anticline and Jonah Field are the largest producing areas in the county.

The Pinedale Anticline Project Area consists of about 197,000 acres in central Sublette County and is the third largest gas field in the United States (Noble, 2010; Shell, n.d.). The BLM operates 80% of the anticline's surface. The remaining 20% is divided between the State of Wyoming (5%) and private ownership (15%). Gas reserves in the field are estimated at 40 trillion cubic feet, and the area is one of the most productive fields in the United States (Noble, 2010). Operators first drilled there in 1939 looking for oil, but abandoned the site when they found gas instead. Subsequent activity in the field was difficult because the tight sandstone formations made conventional drilling methods nearly impossible. However, thanks to improvements in technology and high prices for natural gas in the early 2000s, extraction in the Pinedale Anticline began to flourish. Today, Shell, Ultra Petroleum, and QEP Energy Resources are primary leaseholders in the field. Shell alone has "drilled more than 400 natural gas wells, operating 21,000 acres and producing 350 million cubic feet of natural gas per day" (Shell, n.d.).

The Jonah Field, near the Pinedale Anticline, has a similar geographical makeup and was rediscovered in the early 1990s. It is considered one of the most significant recent natural gas discoveries. Covering 21,000 acres, the field is estimated to contain approximately 10.5 trillion cubic feet of natural gas, with 98% of the field managed by the BLM and the remaining portion split between state and private ownership (Noble, 2010).

Production in the Pinedale and Jonah fields began slowly as pipelines and infrastructure were needed to support significant production. However, once the infrastructure was in place, there was a jump from 150 wells in 1999 to 300 wells by July 2001 (Noble, 2010). This, combined with advances in technology and new methods of extraction, such as hydraulic fracturing, created a boom in gas production from these previously unproductive fields. During the 2008 recession, natural gas prices fell, reducing drilling activities in a slowdown that has persisted since (Noble, 2010). Exhibit 6.6 shows total oil production in Sublette County between 2000 and 2012. Oil production grew steadily from 2000 until 2009, peaking just below 8 million barrels in 2009. Production has dropped off since 2009 to 6.8 million barrels of oil in 2012.

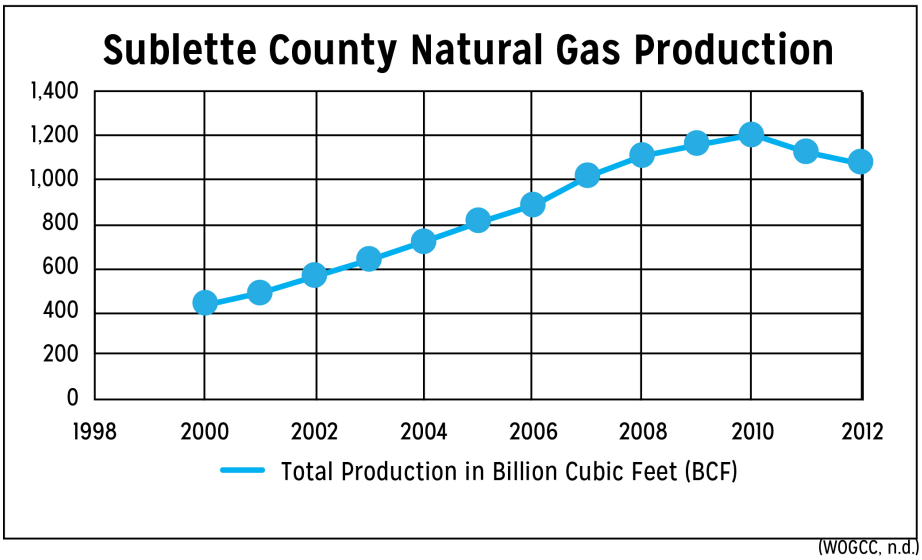
Exhibit 6.6



(Wyoming Oil and Gas Conservation Commission [WOGCC], n.d.)

Gas production, shown in Exhibit 6.7, has experienced growth similar to oil. Production grew from 2000 to 2010, peaking at 1.2 TCF. Production has since declined, falling to a little under 1.1 TCF in 2012.

Exhibit 6.7



(WOGCC, n.d.)

Amenity Development

In addition to its oil and natural gas resources, Sublette County has numerous amenity opportunities. Over 80% of Sublette County's lands are public (U.S. Census Bureau, 2012). Sublette County includes parts of the Bridger National Forest, Bridger Wilderness, Gros Ventre Wilderness, and the Teton National Forest. The Wind River Mountains are also part of the county. The highest peak in Wyoming, Gannett Peak, along with 14 of the state's other highest peaks, provide ample opportunities for hiking and recreation (Pinedale Travel & Tourism Commission, 2012).

Fremont Lake, Wyoming's second largest natural lake and the seventh deepest in the United States, is located in the county, along with nearly 1,300 other lakes, providing fishing and water recreation opportunities. Sublette County is home to more active glacial fields in the contiguous United States than any other county (Pinedale Online, 2009). Big game from the Yellowstone ecosystem winters in the northern part of the county (Fuller, 2008). The natural environment of the county is ideal for backpacking, hiking, biking, four-wheeling, snowmobiling, golfing, hunting, skiing, and wildlife viewing.

Sublette County is the home of cultural and historical sites. Visitors can visit portions of the Astorian Route, Oregon Trail, Mormon Emigrant Trail, Overland Trail, Lander Trail, and Pony Express Route. Sublette was the location of the first mountain man rendezvous in 1825, and today a 4-day celebration accompanies the Green River Rendezvous (Pinedale Online, 2009). Ranching also continues to attract visitors, with several ranches offering traditional ranch activities to tourists such as cattle drives and horseback riding (Pinedale Travel & Tourism Commission, 2012). Built in 1897, the Gros Ventre Lodge is believed to have been the first full-time dude ranch in Wyoming.

Ranching became an industry in Sublette County after 1877, once the railroad made the shipping of stock possible from Wyoming to Oregon (Pinedale Travel & Tourism Commission [PTTC], 2012). Some of the rancher families that first settled Sublette are still ranching in the county today, five or six generations later (Wyoming State Historical Society, n.d.). Ranchers continue to walk their cattle

along the Green River drift, in use since 1896, to move their herd from summer to winter grazing areas (Wyoming State Historical Society, n.d.).

Economic Indicators

Ranching remained the primary source of economic activity in Sublette County until recently, when the petroleum boom caused a shift in the economy. Today, the county describes its major industries as oil and gas, tourism, recreation, and government (Sublette County Chamber of Commerce, 2012). Oil and natural gas provide the largest share of the county's revenue.

Increasing demand for natural gas dramatically changed Sublette County's economy. From 2000 to 2005, Sublette County's permanent population grew by 20% and 500 new homes were built (Jacquet, 2007). By 2007, 50% of those employed in the county worked in the natural gas industry. For every dollar spent in the county, 50 cents was from the natural gas industry (Jacquet, 2007). This growth spiked the median household income to $70,147 in 2010, 30% higher than the state average. This also reduced the poverty level to less than half of the state average (USA.com, 2013). Today, energy extraction remains an important economic base for Sublette County.

Between 2001 and 2006, sales tax revenue in Sublette County increased by 271%, while use tax revenue increased by over 300% (Jacquet, 2006(a), p. 2). The mining industry, which includes oil and gas activity, accounted for 51% of the sales tax revenue and 45.6% of the use tax revenue (Jacquet, 2006(a), p. 2). In 2006, despite its low population, Sublette County ranked sixth in the state for tax revenue generation and fifth for total taxable sales transactions. Sublette County accounts for 6.5% of sales and use tax revenue in the state and 7.21% of total sales activity in the state (Jacquet, 2006(a), p. 4).

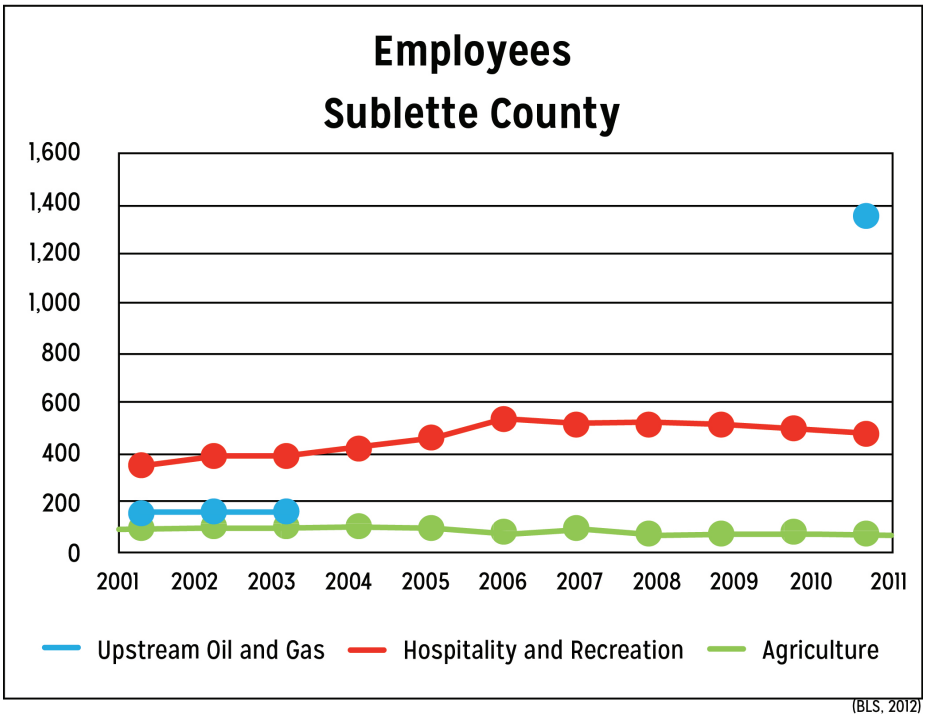
Sublette County sees large contributions to its budget from oil and gas companies. In 2012 oil and gas companies comprised the top 10 taxpayers in Sublette County, with a total assessed value of $3.9 billion (Sublette Board of County Commissioners, 2013, p. 7). Energy companies in Sublette paid $1.1 billion in taxes on oil and gas production in 2008 and Sublette County and its municipalities received 5.86% of that revenue (Ecosystem Research Group, 2009, p. ES-2).

Also in 2012, Sublette collected almost $31 million in sales tax from the mining industry, which includes oil and gas. These revenues offset the costs associated with increased energy development. Funding for infrastructure improvements has been identified as the biggest challenge facing local governments in Sublette County (Ecosystem Research Group, 2009, p. ES-3).

Tax revenue is also generated by the recreation and hospitality sector, though not to the same magnitude as the oil and gas industry. In 2012 agriculture, forestry, fishing and hunting contributed $1,523 in sales taxes to Sublette County (Department of Administration and Information, 2012, p. 27). The leisure and hospitality sector meanwhile contributed almost $985,000 in sales taxes the same year (p. 27). In 2012 the retail trade, accommodation, and food services sector generated nearly $8.3 million in sales tax revenue for the county (Department of Administration and Information, 2012, p. 32). Only Pinedale, Sublette County's seat, imposes a lodging tax, for which it collected about $200,000 in revenue in 2012 (p. 68).

As can be seen in Exhibit 6.8, employment in upstream oil and gas, although only recently publicly available, is much higher than that of agriculture or hospitality and recreation. With over 1,400 employees, upstream oil and gas employed 950 more people than did the hospitality and recreation sector in 2011. Employment in hospitality and recreation grew from 2001 to 2006, but has since slightly declined. These employment numbers are likely low, however, due to issues with the BLS data as discussed in Part I. Employment in agriculture has been quite steady, with an average of only 75 employees.

Exhibit 6.8

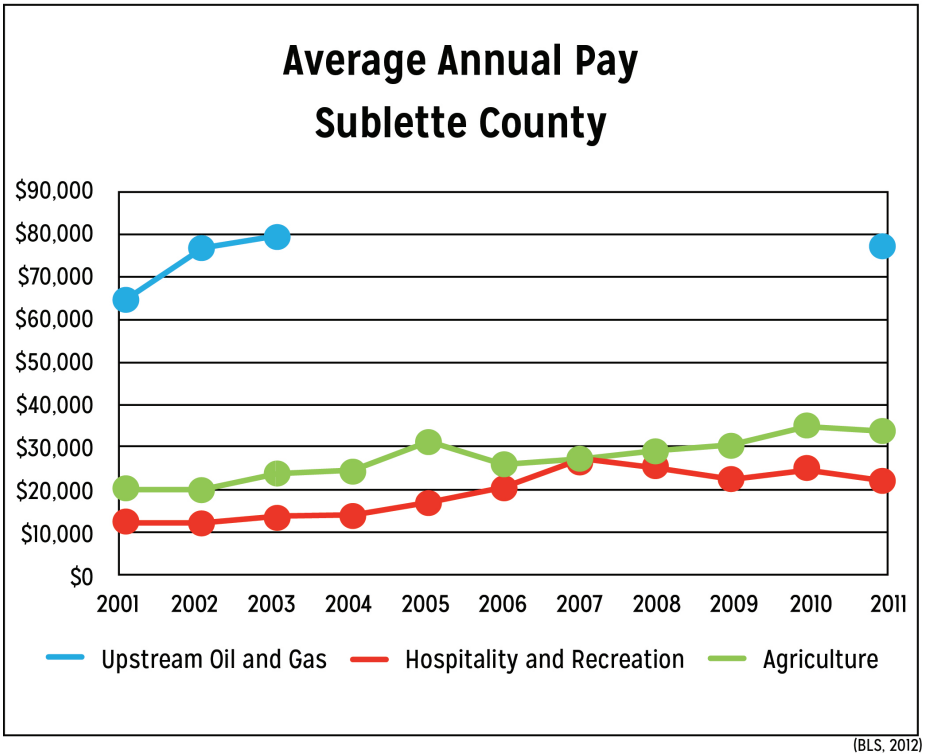


(BLS, 2012)

With the advent of energy extraction activity in Sublette County, the nature of employment and wages has changed drastically. For example, before the natural gas boom in the early 2000s, seasonal unemployment was high due to the county's focus on tourism, agriculture, and ranching. Since 2000, however, these fluctuations have been greatly reduced (Jacquet, 2006(b), p. 10). As of December 2012, Sublette County's unemployment rate was a mere 3.6% (See Exhibit 6.17 in Teton County; Google Public Data, 2013). Wages in the petroleum industry are now some of the highest in Sublette County, even for unskilled workers, and ample opportunities exist for wage advancement and overtime (Jacquet, 2006(b), p. 7). The cost of living in Sublette County, however, is about 19% higher than the rest of Wyoming, and second only to Teton County (Sublette County, n.d.). As can be seen in Exhibit 6.9 those employed in upstream oil and gas make far more annually than those employed in amenity sectors—almost three times as much in years for which data is available.[32]

[32] Average annual pay is reported in nominal dollars and has not been adjusted for inflation.

Exhibit 6.9



(BLS, 2012)

Exhibit 6.4 shows, 32.7% of Sublette County's civilian population over age 16 is employed in agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset. This percentage is much higher than the Wyoming average of 11.8% for employment in the same sector. Employment in arts, entertainment, recreation, accommodation, and food services at 6.6% is lower in Sublette County than in the state.

Development Strategies

Sublette County is an example of an area with a booming energy industry that has not detracted from amenity development. The county retains its strong amenity sector thanks to its many natural attractions and its conscious development policies. Mary Lynn Worl, a board member of Wyoming's Citizens United for Responsible Energy Development, said, "We don't believe that public health and the quality of life in our communities need to be traded away for economic activity. We can have both." (Earthjustice, 2011).

With the arrival of the oil and natural gas boom, Sublette County has seen many positive changes. The county has collected millions of tax dollars as a result of petroleum production, which is money that can be spent on community improvement projects and infrastructure—projects that improve the county now as well as help develop the area for future potential enterprises. Numerous jobs have been created for local residents, and companies active in Sublette County's gas fields have invested heavily in organizations serving the community and improving the environment (Noble, 2010). Many of these activities have sprung up out of necessity to lessen the impacts of energy development on the environment. For example, a portion of the increased tax revenue the county receives is used to build infrastructure such as underground pipelines for material transport, lessening the need for above-ground transport and its impacts on the community (Noble, 2010).

Energy development has also brought changes to Sublette County's local community. Housing, schools, and public services like law enforcement and health care, have been stretched thin as a large, primarily non-resident and temporary workforce has moved into the community (Noble, 2010). The county has been able to adjust fairly well to the increased non-resident and temporary workforce, however, and private sector housing and services have experienced rapid growth in response to the increased demand (Noble, 2010). The petroleum companies operating in Sublette have contributed to the community by funding infrastructure such as road improvement, a drug counseling center, a domestic abuse shelter, a new sheriff's office and jail, and an indoor community swimming pool (Fuller, 2008). Further, natural gas workers book nearly 75% of hotel rooms, helping hoteliers during the winter months (Jacquet, 2007).

The natural gas boom in Sublette has impacted the environment, but the impacts are being addressed. Though air pollution has significantly increased since 2005 air quality monitoring is now required and actions are in place to help reduce the problem (Citizen's guide, n.d.). Companies have generally been responsive to the ozone advisories, reducing or suspending operations until the advisories end, and have further taken voluntary, "aggressive action to identify sources and reduce emissions" (p. 10). Some of these actions include "using low-sulfur or ultra-low-sulfur diesel fuel to reduce particulate emissions;" "converting some engines on drill rigs used in Sublette County to run on lower-emission natural gas;" and "adding Selective Catalyst Reduction technology to reduce NOx emissions up to 90 percent

on diesel-powered drill rig engines." (p. 10-11). Although natural gas production increased 8% from 2008 to 2010, emissions actually decreased, attributable to increased regulation and voluntary actions from the industry (Urbigkit, 2011, March 9).

Wildlife in the county is also being impacted by the development. The Pinedale Anticline includes important migration corridors and habitat for species such as mule deer, pronghorn antelope, pygmy rabbits, sage grouse, and bald eagles (Shell, n.d.). To mitigate impacts, wells were initially required to be 80 acres apart. Since then however, spacing has been reduced to 5 acres between some wells (Fuller, 2008). Ongoing efforts to mitigate impact have led many companies to use directional drilling. Directional drilling concentrates several wells in a single site to reduce the need for roads and reduces the number of pad sites. These efforts have resulted in 70% fewer roads and 100 fewer well pads (Noble, 2010).

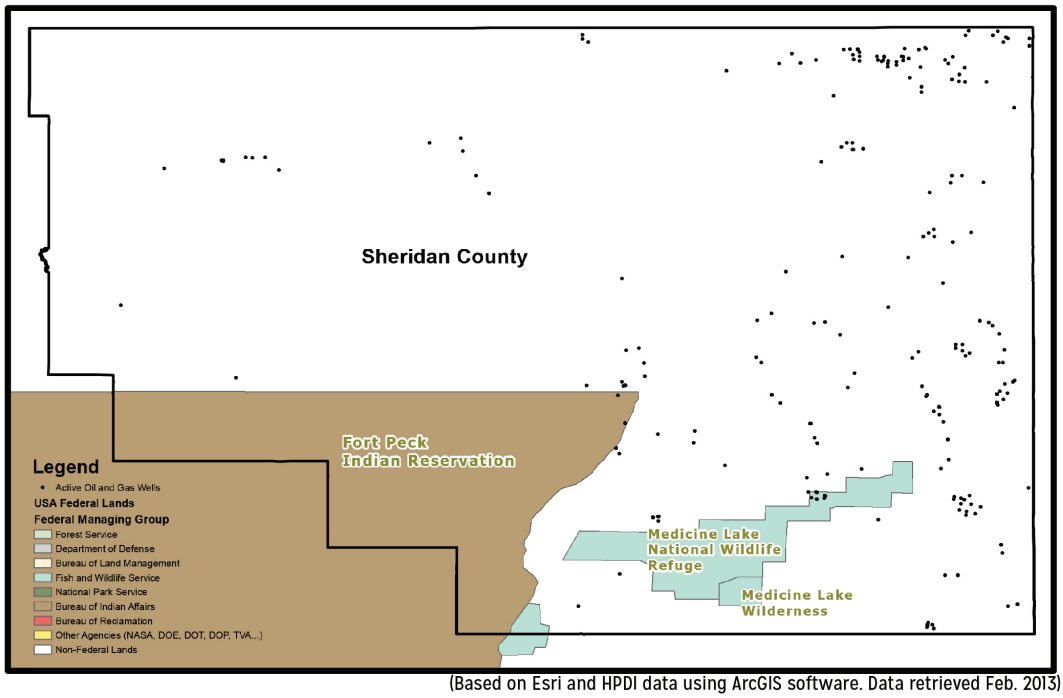
Sublette County has certainly faced, and will continue to face, tradeoffs between a healthy outdoor amenity sector and energy development. The advent of natural gas development in Sublette County has brought some challenges, but it has also greatly lifted the county's economy and led to many positive economic outcomes. Sublette County continues to learn how to manage the tradeoffs in order to continue to see energy and amenities develop together, bolstering the county economy.

Sheridan County, Montana

Sheridan County is a small, rural community located in the northeastern corner of Montana. Sheridan County's economy is focused on oil and gas and agriculture, with a brief yearly economic boost during the hunting season. Flat and largely treeless, Sheridan County attracts few tourists. The majority of the land is private, with about 14% under the jurisdiction of the federal government or Native American Tribes (U.S. Census Bureau, n.d.). The county's history demonstrates the vital role the oil and gas industry plays in rural communities, particularly where amenity development is not a viable economic option. The county population and employment trends closely follow the cyclical booms and busts of the local oil and gas industry (Sheridan County, 2013, p. 4).

Continued expansion of drilling in the Bakken Shale formation, which extends into Sheridan County, presents the single biggest potential for economic growth in the area. Exhibit 6.10 (for larger exhibit see Appendix) shows active oil and gas wells in Sheridan County. The map also shows that very little of Sheridan County's land area is federally owned. Medicine Lake National Wildlife Refuge and Medicine Lake Wilderness are the exceptions, and both are located in the southeastern portion of the county.

Exhibit 6.10 Active Oil and Gas Wells in Sheridan County, MT



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

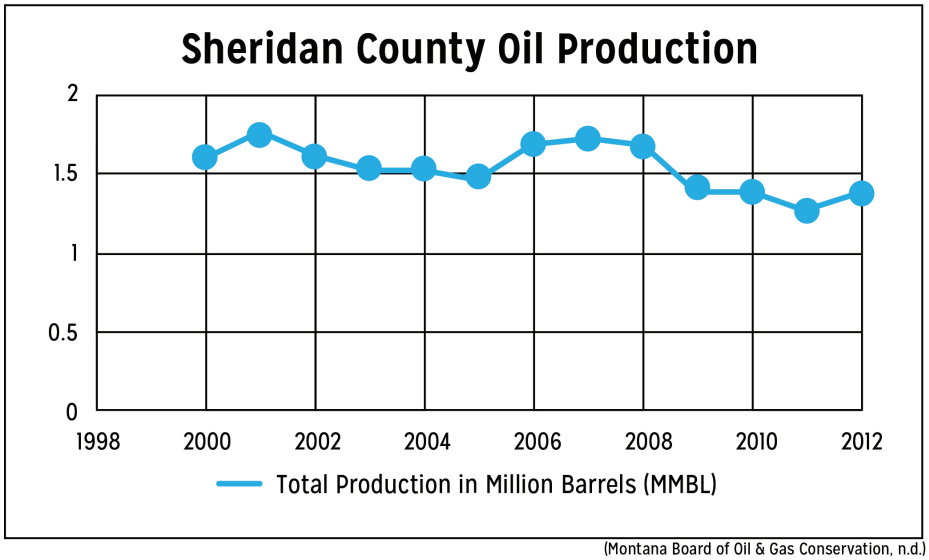
Energy Development

Oil was first discovered in Sheridan County in 1951, and the county experienced its first oil boom from the late 1950s into the early 1960s. As demand later declined, so did the county's production. Oil output in Sheridan County flattened again through the late 1970s and then peaked in 1985 (Bill Nyby, Personal Communications, December 18, 2012). After 1985 the area's oil industry entered a period of long decline that has continued until the present day. The county's negative population growth correlates with the drop in oil production. Population peaked around 1985 at about 5,800 people, fell to a low of approximately 3,200 around 2007, and has since recovered slightly; the county population is now about 3,400 (U.S. Census Bureau, n.d.).

Exhibit 6.11 shows the county's oil production from 2000 to 2012. Production varied slightly between 2000 and 2007 and declined after 2008, though there was slight growth from 2011 to 2012. In 2011 Sheridan County produced nearly 1.3 million barrels of oil, and in 2012 production increased to almost 1.4 million barrels (Montana Board of Oil and Gas Database, n.d.). This accounted for

about 5% of total oil production in Montana in 2012 (Montana Board of Oil and Gas Database, n.d.).

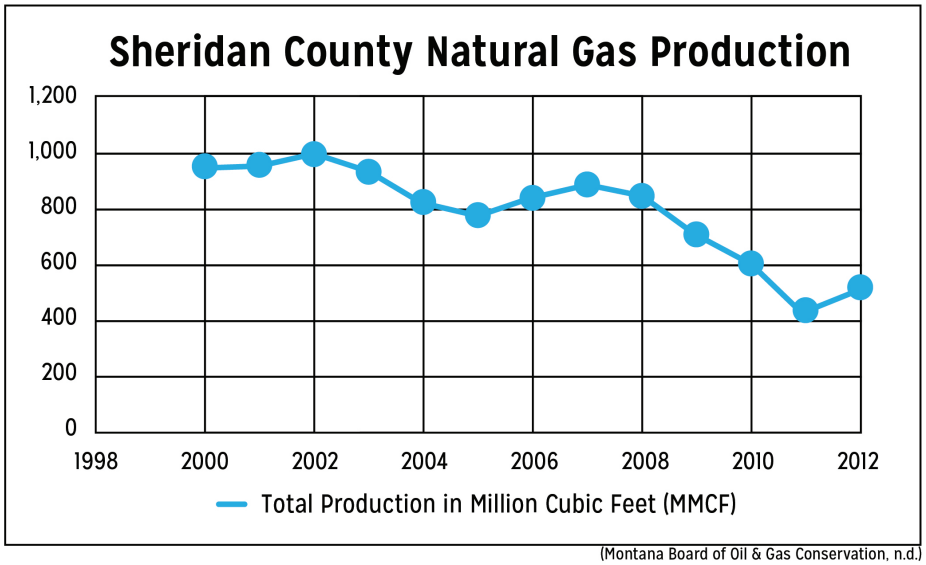
Exhibit 6.11



(Montana Board of Oil & Gas Conservation, n.d.)

Along with oil, Sheridan County also produces natural gas. Exhibit 6.12 shows total gas production from 2000 to 2012. Gas production reached a high, during the decade shown, of 997.6 million cubic feet of gas in 2002. Sheridan County's gas production has trended downward and substantially declined after 2007, reaching 511.3 million cubic feet in 2012, which represented only about 2.5% of total gas production in the state that year (Montana Board of Oil and Gas Database, n.d.).

Exhibit 6.12



(Montana Board of Oil & Gas Conservation, n.d.)

Sheridan County is geographically similar to the neighboring counties of Daniels and Roosevelt, but has historically produced more oil and gas than either of them. In the past few years, however, Roosevelt County has significantly increased its production of oil, surpassing Sheridan County. This change is due to activity in Roosevelt County in the Bakken Shale formation. Though Sheridan County is also geographically part of the formation, County Commissioner Bill Nyby reports that they have not yet begun those energy extraction operations in the county (Personal Communications, December 20, 2012). Companies, however, have already begun purchasing land in the area in preparation for future development, and one company has acquired as much as 24,000 acres there (Kemmick, 2012). With farming and trade in decline, future expansion of Bakken Shale oil and gas extraction into Sheridan County is the single largest potential source of economic growth for the county.

Amenity Development

Sheridan County has limited amenity opportunities, though the county does have a few attractions. The county has the nation's fifth largest population of white pelicans and 225 other bird species. Many of these bird species reside in Medicine Lake National Wildlife Refuge. The site is a sanctuary for duck and geese populations, and serves as a breeding habitat for the migrating waterfowl

(McKinney, 2004). Administered by the USFWS, the refuge reported 16,000 visitors in 2004 according to the most recent data available (Caudill and Henderson, 2005, p. 384). The refuge's most popular attractions are the nature trails and observation platforms. Hunting and fishing is also prevalent on the land, and attracted 3,000 visitors also in 2004 (Caudill and Henderson, 2005, p. 384).

Brush Lake State Park, also known as "Oasis on the Prairie," is a spring-fed lake that became a state park in 2003 (Brush Lake State Park, n.d.). The lake is less than 300 acres, but is popular with locals for water sports (Sheridan County Chamber of Commerce and Agriculture, n.d.(a)). Administrators of Brush Lake State Park are working to develop the park's amenities to include tent and recreational vehicle camping facilities, day-use and picnic areas, boat ramps, and boat docks. Administrators would also like to see rental cottages and shower facilities (Brush Lake State Park, n.d.).

Visitors can also spend time in the Sheridan County Museum, which features a mural of the history of the county. This mural is the longest indoor mural in all of Montana (Sheridan County Chamber of Commerce and Agriculture n.d.(b)). Because Sheridan County is very rural, it doesn't boast the same visitation as other counties profiled in this report. It is expected the county will have a difficult time attracting the large number of tourists seen in Teton County, for example, due to the lack of internationally—or even nationally—known landmarks.

Though the tourism industry is limited, Sheridan County does have agricultural activities. There were 1.06 million acres of land in farms in the county in 2007—almost 98% of the county's total 1.09 million acres (USDA, 2007). Three quarters of the land in the county is tillable land, with soil that is of glacier origin, which makes it ideal for grain production (Sheridan County, n.d.). Sheridan County's agricultural sector produces mostly durum wheat, which is used in pastas and cereals, and also has significant lentil and dry edible peas production. Each year the county hosts a Farm Expo, which brings together farmers from Montana and Canada for seminars, a Farm and Ranch Appreciation Breakfast, and a bread fair for kids (Montana Official State Travel Site, 2010).

Economic Indicators

Sheridan has historically been dependent on agriculture and trade with Canada (Bill Nyby, Personal Communications, December 20, 2012). From 2002 to 2007, the Census of Agriculture showed that the market value of crop and livestock sales in the county increased by 111% (USDA, 2007). However, U.S. Census Bureau data shows that the number of individuals employed in the agricultural sector has decreased significantly over time, from 2,352 individuals in 1978 (a full 40% of county residents at the time) to only 648 individuals in 2005 (only 18% of residents that year) (U.S. Census Bureau, n.d.). The county also receives agricultural subsidies, which have risen substantially over the last 15 years; in 2011 Sheridan County received over $8.6 million in agricultural subsidies, although there are large amounts of variation in subsidies over the years (Sheridan County, Montana Wheat Subsidies, n.d.).

Because it is located on the border with Canada, international trade has also historically played a role in the Sheridan economy. Regina, a city in the Canadian province of Saskatchewan, is just north of Sheridan, and with a population nearing a quarter million, has provided demand for American goods and services, which are often brought through Sheridan County. In recent years, however, this trade has declined (Bill Nyby, Personal Communications, December 20, 2012).

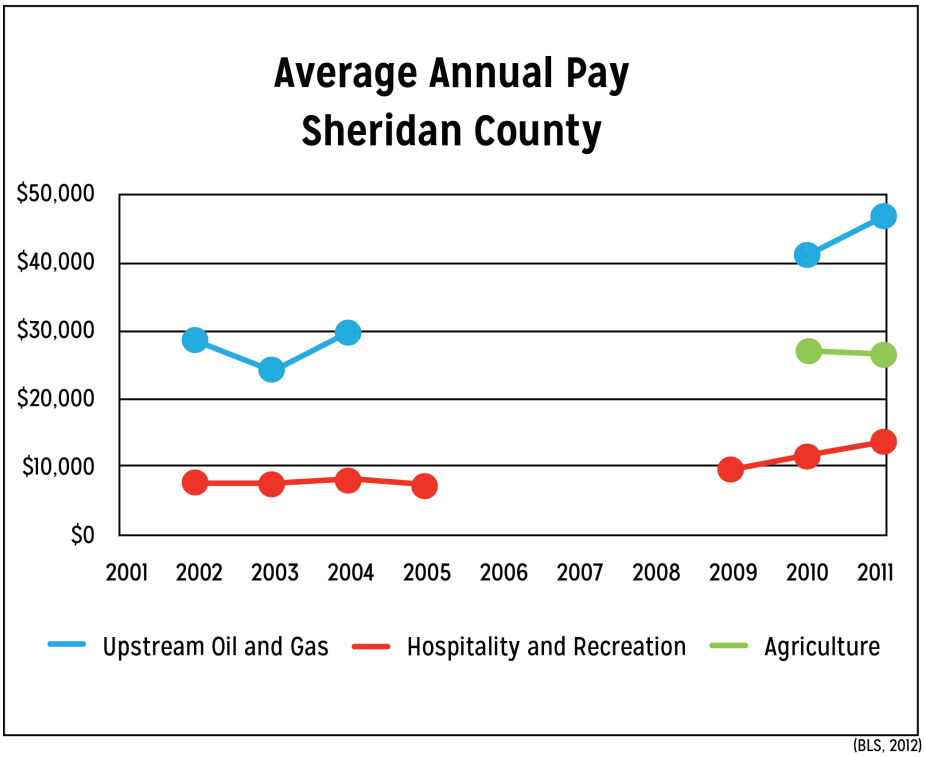
Sheridan County has seen significant growth in tax revenues from the petroleum industry. Nyby reported that revenues have increased significantly in the past 10 years, despite a decrease in gas production. In 2003 Sheridan County received just over $5 million in revenues from the petroleum industry, and by 2011 that number had increased to nearly $11 million. Between 2003 and 2011, Sheridan County received a total of $90 million in revenues from petroleum, $23 million of which was specifically allocated to county schools (Bill Nyby, Personal Communications, December 20, 2012). Tax revenues represent an important benefit that oil and gas development bring to Sheridan County. Future development of the Bakken Shale formation would likely increase these revenues even more, bringing added benefits to the local economy.

The oil and gas industry makes up a small but significant portion of employment in Sheridan County. Exhibit 6.4 shows the civilian employed population over 16 by sector. Oil and gas employment are included within the agriculture, forestry, fishing and hunting, and mining sector. In Sheridan County nearly 21% of employment is in this sector. That number is nearly three times the state average of 7.10%, and reflects the importance of extractive industries and agriculture within Sheridan County. Only 5.59% of the county's employment was in arts, entertainment, recreation, accommodation, and food services; that number is much lower than the state average of 10.57%, reflecting the county's limited amenity development.

Due to data inclusion and limitations issues such as the exclusion of self-employed workers and proprietorships, the BLS employment data for Sheridan was incomplete over the period and likely highly misleading for both the agriculture and upstream oil and gas sectors. That data is thus not included here.

Oil and gas production has a significant impact on workers the county in the form of higher average annual pay. Exhibit 6.13 shows average annual pay in Sheridan County by sector. Average annual pay in the upstream oil and gas sector is much higher than annual pay in agriculture or hospitality and recreation. Hospitality and recreation saw a pay increase of about $4,000 from 2009 to 2011. In recent years, average annual pay in oil and gas has also moved upwards, increasing by $6,500 from 2010 to 2011, while pay has decreased slightly in agriculture. These pay numbers are reported in nominal dollars and have not been adjusted for inflation. In 2011 average annual pay for upstream oil and gas workers was about three times the average annual pay for hospitality and recreation. With expected future development of the Bakken Shale formation, this upward trend for oil and gas employees is likely to continue.

Exhibit 6.13



(BLS, 2012)

Development Strategies

Sheridan County has chosen a development path consistent with its resource endowments and has both energy and amenity development. The county participates in programs like the state-funded Reclamation and Development Grants Program (RDGP), a portion of which is funded by oil and gas taxes. The RDGP allows Montana communities, counties, universities, conservation districts, and others to apply for funding to complete projects that "indemnify the people of the state for the effects of mineral development on public resources" (Stanley, 2013, p. 1). In addition, the Governor's 2013 Budget recommends funding a $300,000 project in Sheridan County that would reclaim abandoned coalmines on privately owned agricultural land in the county using revenues from oil and gas taxes. The project would close these abandoned mines, allowing them to once again become productive agricultural lands that contribute positively to the county's economy. It would also create short-term construction jobs and protect public health by preventing potential contamination of groundwater that could occur if the mines were left open (Stanley, 2013, p. 56). This project is just one example of

how Sheridan County balances development of natural amenities and extractive industries.

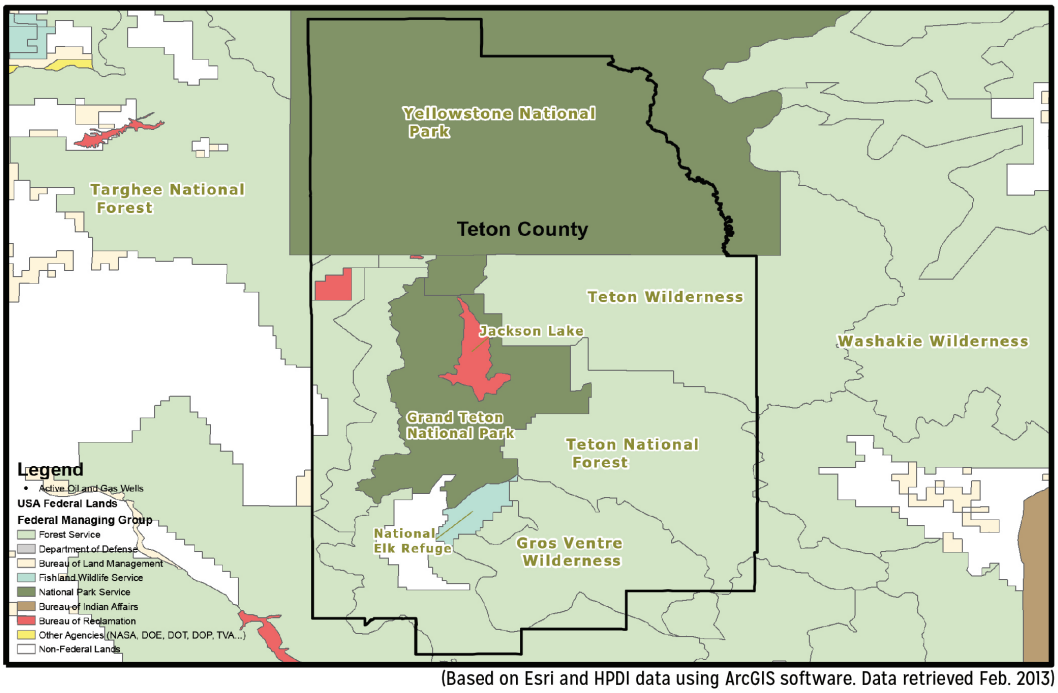
In Sheridan County, extractive industries have developed alongside the county's natural amenities, mainly its agricultural sector as Sheridan County's other amenity potential is limited. As shown in Exhibit 6.10, some oil and gas development is occurring alongside the amenity development the county does have (e.g. in the Medicine Lake National Wildlife Refuge).

With little opportunity to develop amenities (outside of agriculture) and decreasing trade, oil and gas production is expected to become more prominent in the Sheridan County economy. Oil and gas production brings in millions of dollars in tax revenue each year. Although decreased production in the past has proved challenging to the county, Sheridan stands to gain enormously from expanding development of extractive industries in the Bakken Shale formation.

Teton County, Wyoming

Located in the northwestern corner of Wyoming, Teton County was established as a small ranching community at the base of the majestic Teton Mountain Range. The area remained primarily ranching land until the creation of Teton National Park in 1929, when economic focus shifted from ranching to tourism and recreation. The county contains many protected public lands, including national parks, national forests, wilderness areas, and a wildlife refuge. Exhibit 6.14 (for larger exhibit see Appendix) shows the location of federal lands, which include Grand Teton National Park, Targhee National Forest, Teton National Forest, the National Elk Refuge, Jackson Lake, the Gros Ventre Wilderness, the Teton Wilderness, and over 40% of Yellowstone Park. These public lands comprise 97% of the county; private lands make up the remaining 3% (Board of County Commissioners, n.d.). Because Teton County is overwhelmingly owned by the federal government, county officials have limited influence over what happens in their county and instead are subject to decisions at the federal level.

Exhibit 6.14 Active Oil and Gas Wells in Teton County, WY



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Natural recreation sites within Teton County attract more than 2.7 million visitors each year, fueling the area's tourism and amenity-based economy (NPS, 2011(a)). During the winter, local ski resorts attract tourists; however, the majority of visitors come to Teton County in the summer months. This seasonal cycle of tourism can be difficult for the county economy; this is an issue that faces many counties with single-focus economies, including counties that focus exclusively on oil and gas development. While not as predictable as seasonal cycles, the oil and gas sector also faces boom and bust periods. As shown in Exhibit 6.14, Teton County has no active oil and gas activity, which is not surprising based on its land composition.

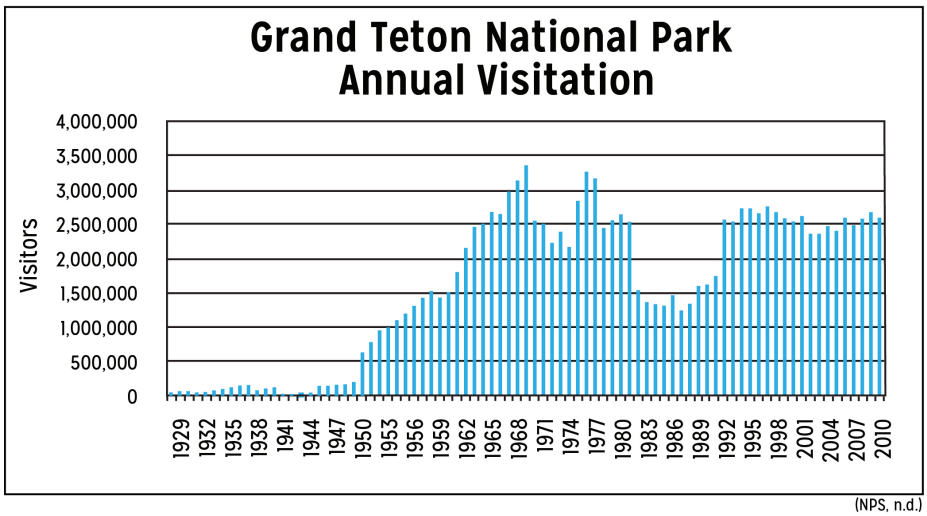
Energy Development

According to data from the Wyoming Oil and Gas Conservation Commission, there are no active oil and gas wells or visible potential for petroleum development in Teton County (Wyoming Oil and Gas Conservation Commission, 2013). Additionally, even if gas and oil resources were found in Teton County, it could be difficult to access because 97% of Teton County consists of protected federal lands.

Amenity Development

With Grand Teton National Park, John D. Rockefeller National Monument, and large portions of Yellowstone National Park all located within Teton County, there is a large seasonal influx of tourists. During the months of June, July, and August, Teton County receives the most visitors; these months are the most popular time to visit Teton County to take advantage of the many outdoor recreation opportunities, like hiking and camping, that the county offers (Town of Jackson, 2002).

Exhibit 6.15



(NPS, n.d.)

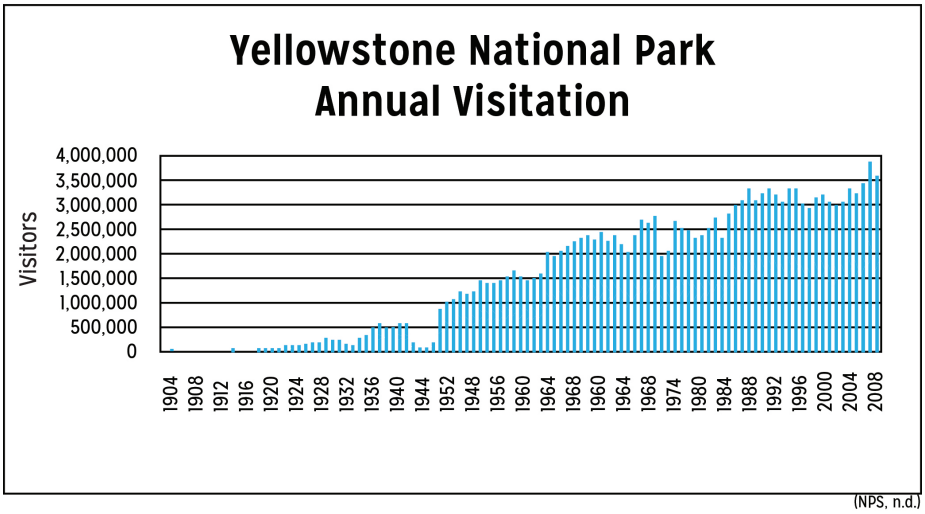
Exhibit 6.15 shows annual visitation to Grand Teton National Park from its founding in 1929 through 2010. Visitation increased almost every year from 1952 to 1970. After 1970 visitation was more variable and dropped significantly from 1983 to 1992. After 1992 visitation picked up and remained fairly constant with visitation dipping below 2.5 million only 5 years between 1992 and 2010.

The Grand Teton National Park is located in central Teton County. The national park offers backcountry camping, rock climbing, and cross-country skiing. The truly adventurous can climb the granite summit of the Grand Teton that rises 13,770 feet above sea level (Wyoming Tourism, 2013(a)). Visitors can also hike, boat, fish, kayak, and photograph the mountain scenery. This national park is also home to over 300 species of birds, 6 species of game fish, and 60 mammal species (Wyoming Tourism, 2013(a)). Within this park is a portion of the Snake River offering world-class fishing, as well as 11 lakes that allow recreation, ranging from jet skiing to windsurfing (NPS, 2013, March 27). In the winter the visitors can enjoy private snowmobile rentals, snowshoeing, backcountry and snowmobile tours, sleigh ride dinners, and skiing and snowboarding on the Grand Tetons (Grand Targhee Resort, n.d.).

In 1972 Congress created the John D. Rockefeller Jr. Memorial Parkway between Grand Teton National Park and Yellowstone National Park. Grand Teton National Park administers this parkway. The sloping hills at the end of the Teton Range characterize this parkway and provide "a natural link between the two national

parks," as these slopes give way to the volcanic flows of Yellowstone (Wyoming Tourism, 2013(b)).

Exhibit 6.16



Yellowstone National Park is one of America's most iconic national parks. Designated as a National Park in 1872, Yellowstone is considered by some to be a "living museum," and covers over 2.2 million acres in Wyoming, Montana, and Idaho (Wyoming Tourism, 2013(b)). The most famous sites inside the national park include Old Faithful, Lower Falls, and Yellowstone Lake. Visitors are cautioned to drive slowly and plan extra time to account for wildlife that often crosses the roads within the park (Wyoming Tourism 2013(b)). Exhibit 6.16 shows visitation to Yellowstone National Park from 1904 to 2011. Visitation to the national park has generally increased since 1946. In 2010 the park saw a record 3.6 million visitors.

Yellowstone offers activities outside of those normally offered within a park including pack trips, stagecoach rides, and old west cookouts. More traditional national park activities are also offered; visitors can hike, view wildlife, take horseback tours, fish, and boat. In the winter, when road conditions allow, visitors can cross-country ski and snowshoe. Visitors who want to stay within the park have lodging options that offer more amenities than a traditional campground, although that option is also available; within the park there are eight hotels or cabins (Wyoming Tourism, 2013(b)).

Teton County also has the National Elk Refuge, which celebrated its centennial in 2012 (USFWS, 2013, April 1). Composed of almost 25,000 acres, this reserve has been designated to conserve the Jackson elk population after development in the late 1800s pushed the animals out of their traditional habitat into much more difficult terrain (USFWS, 2013, April 1).

Visitors looking to experience wilderness areas can visit the Gros Ventre and Teton Wilderness. Established in 1984, the Gros Ventre Wilderness currently totals 317,874 acres, and is known "internationally for its wildlands, wildlife, geological features, scenic beauty and recreation opportunities" (University of Montana, n.d.). The nearby Jackson elk population uses this area as a calving ground for its young. Grizzly bears, bison, bighorn sheep, and mountain lions also live in the area (University of Montana, n.d.). North of the Gros Ventre Wilderness is the Teton Wilderness. Comprising over 585,000 acres, this area offers approximately 450 miles of trails, hunting and fishing, and wildlife ranging from trumpeter swans to grey wolves (University of Montana, n.d.).

Jackson Hole, Wyoming, is a popular, year-round destination in Teton County. This area includes the Jackson Hole Mountain Resort with an average of 459 inches of snow each year (Jackson Hole, n.d.(a)). The city of Jackson has over 20 art galleries, restaurants that have been featured on the Food Network, and is home to the Grand Teton Music Festival, during which live broadcasts from the Met Opera in Manhattan are shown to "complement the flow downslope" of the Tetons (Jackson Hole, n.d.(b)). Overall, Teton County hosts almost every recreation activity available in the western United States, and Jackson Hole offers a small-town, yet urban vibe.

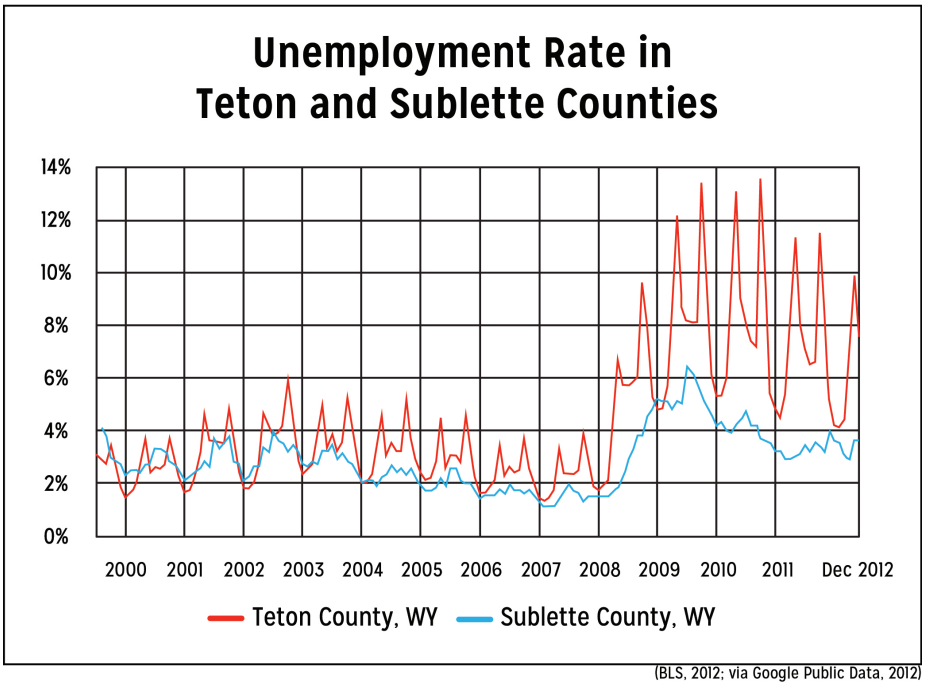
Economic Indicators

Teton County's primary economic focus has been, and will continue to be, tourism encouraged by its abundant natural amenities. The county's vision is to "preserve and protect the area's ecosystem in order to ensure a healthy environment, community, and economy" (Teton County Planning Commission Executive Summary). This focus on tourism provides important jobs and revenue to the

county, and also brings some challenges, such as low-wages and seasonality (Coupal et al., 2000).

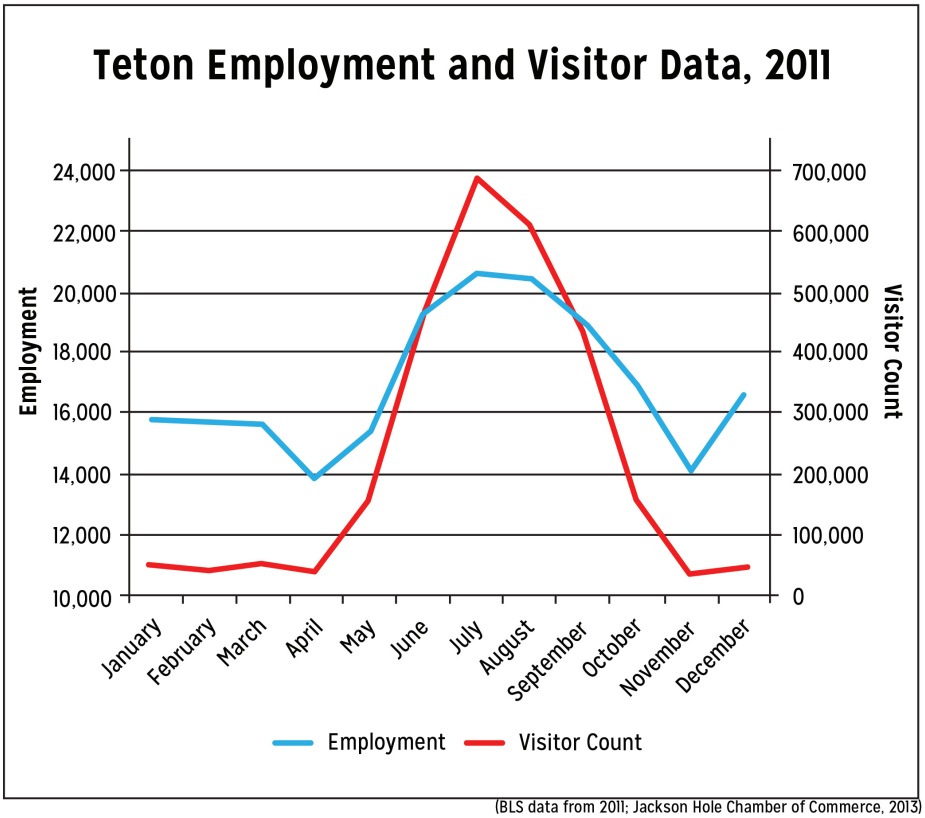
Currently, as shown in Exhibit 6.17, the unemployment rate spikes in Teton County during the winter months, reflecting the seasonal nature of the tourism industry. Sublette County's unemployment rate, also shown on the graph, is much more stable, reflecting its more balanced economy that does not rely so heavily on seasonal industries. This is further seen in Exhibit 6.18, which shows the correlation between Teton County's seasonal influx in visitors and employment numbers. When tourism hits its peak in July, with a visitor count of about 643,000, county employment also reaches its peak with almost 21,000 employees (BLS, 2012; see Exhibit 6.18). As visitors to the county increase, seasonal jobs are created; however, at the end of the season the visitor count decreases and the demand for seasonal jobs declines.

Exhibit 6.17



(BLS, 2012; via Google Public Data, 2012)

Exhibit 6.18



(BLS data from 2011; Jackson Hole Chamber of Commerce, 2013)

One notable aspect of the seasonal job growth and off-season decline is the attraction of non-resident employees to the area. In fact, seasonal jobs offered by Teton County attract nearly 5,000 out-of-state employees (Wyoming Department of Employment, 2002). Seasonal, non-resident employees tend to spend their wages outside of Teton County, mostly benefitting the communities where these employees live (though some do reside in the county during their working period), and Teton County is unable to capture the potential benefits these jobs create in the form of tax revenues. Aiming to increase both year-round occupancy and visitor spending to capture more benefits within the county, Teton County is working to attract more second home owners and retirees to their communities (Teton County Planning Commission, 2012, p. CV-3-13).

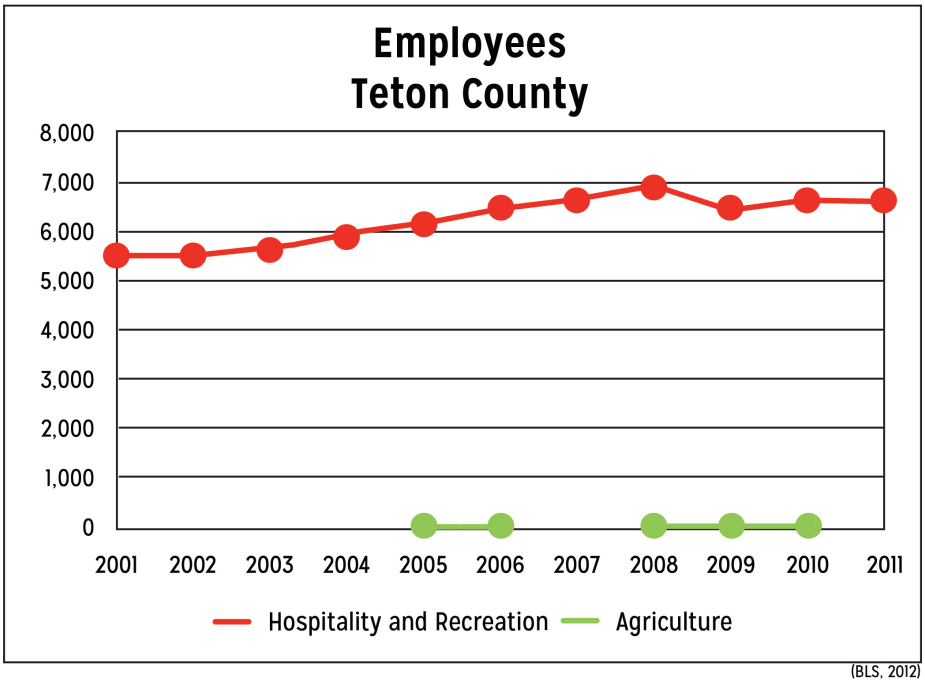
Recognizing the need for greater stability, the Teton County Planning Commission, in conjunction with Jackson County, included "[promoting] a stable and diverse economy" as one of its principles in the 2012 comprehensive county plan (the county plan focuses on the 3% of land in the county that is private). The commission is

careful to note, however, that "tourism will continue to be the basis of our economy," and aims to create more stability and diversification by enhancing tourism, encouraging local entrepreneurial opportunities (particularly "green" opportunities), and promoting "light industry" (Teton County Planning Commission, 2012, p. CV-3-11-Cv-3-13). The goal is to "develop the existing economy to be better, not necessarily bigger" (Teton County Planning Commission, 2012, p. CV-3-10).

In 2010 Teton County residents voted to reintroduce a 2% lodging tax after 15 years. Any visitors who stay in Teton County's hotels or rental properties for under 30 days pay this tax. In 2012 Teton County collected over $3.97 million from this tax (Department of Administration and Information, 2012, p. 68). In an effort to more fully capture the benefits of Teton County's tourism industry, this tax has been called the "tax you don't pay," because money is collected solely from visitors, not from residents (JH Travel and Tourism Joint Powers Board, 2012). Of the funds collected, the Jackson Hole Travel and Tourism Joint Powers board are responsible for allocating 60% to government operations, while Teton County and Town government is responsible for the remaining 40% (JH Travel and Tourism Joint Powers Board, 2012). Revenues gathered from the lodging tax have been put to use in funding tourism and recreation activities like the Western Wyoming Shoot-Out and a local sled dog race (JH Travel and Tourism Joint Powers Board, 2012). These activities seek to boost the local economy by attracting additional visitors to the county.

As is visible in Exhibit 6.19, the hospitality and recreation sector has grown for the majority of the decade. Employment began with about 5,500 individuals in 2001 and grew to almost 7,000 in 2008. After a decrease of over 500 employees in 2009 this sector grew slightly to 6,600 employees in 2012. This BLS data is likely a fairly accurate representation of employment in the hospitality and recreation sector as this sector is not as impacted as other sectors by the data limitations discussed in Part I.

Exhibit 6.19

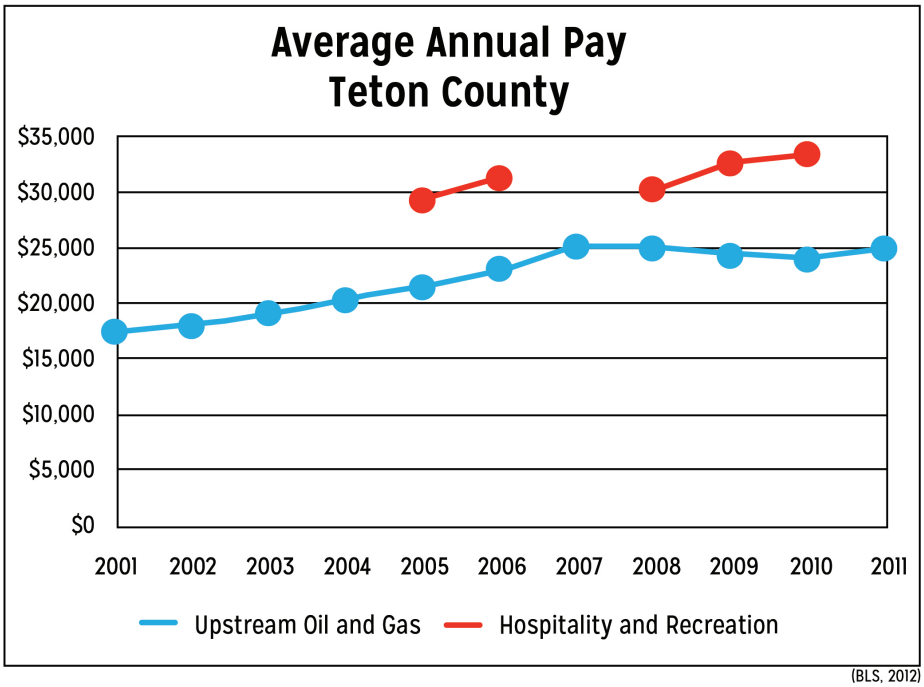


(BLS, 2012)

As shown in Exhibit 6.4, in 2010 one quarter of Teton County's civilian employees over the age of 16 were employed in the arts, entertainment, recreation, accommodation and food services sector; this is almost 16% higher than the state average. Teton County also has significant portions of its civilians employed in the construction; professional scientific, management, administrative, and waste management; and education services, health care, and social assistance sectors.

Exhibit 6.20 shows average annual pay for Teton County employees in the hospitality and recreation and agriculture sectors. Although hospitality and recreation provides more jobs in Teton County than does agriculture, employees in hospitality and recreation earn lower wages than those working in agriculture. Over the decade, those employed in hospitality and recreation did see steadily increasing wages, from just over $17,000 in 2001 to just under $25,000 seven years later, though this data is reported in nominal dollars and has not been adjusted for inflation. Since 2008 wages have remained fairly static for this sector. Though limited data is available for the agriculture sector, average annual pay here appears to have been growing in recent years.

Exhibit 6.20



(BLS, 2012)

In 2012 Teton County collected almost $41 million in taxes from the retail, trade, accommodation and food services sectors, nearly $11.7 million of which came from accommodation alone (Department of Administration and Information, 2012, p. 32; p. 43).

Development Strategies

Teton County has developed a vibrant community with well-known amenities that attract millions of tourists each year. The Teton County Commission believes, however, that the county would benefit by diversifying the tourism industry that has grown out of what was once a small ranch community (Teton County Planning Commission, 2012). In order to maintain their community's roots and grow the economy, officials have developed a plan for growth that focuses on ecosystem stewardship, growth management, and quality of life (Teton County Planning Commission, 2012, p. ES-9). Officials are using existing policy tools to protect wildlife habitats, natural skylines, and sustainability programs. Additionally, county officials work closely with towns to ensure that there is affordable housing and "year-round lifestyle-based tourism" that will create a more insulated economy (Teton County Planning Commission, 2012, p. ES-14). Diversification of the

economy would create jobs valuable to the local community (Coupal et al., 2000). Teton County demonstrates that county economic growth can occur in a way that is consistent with the community's character and resources.

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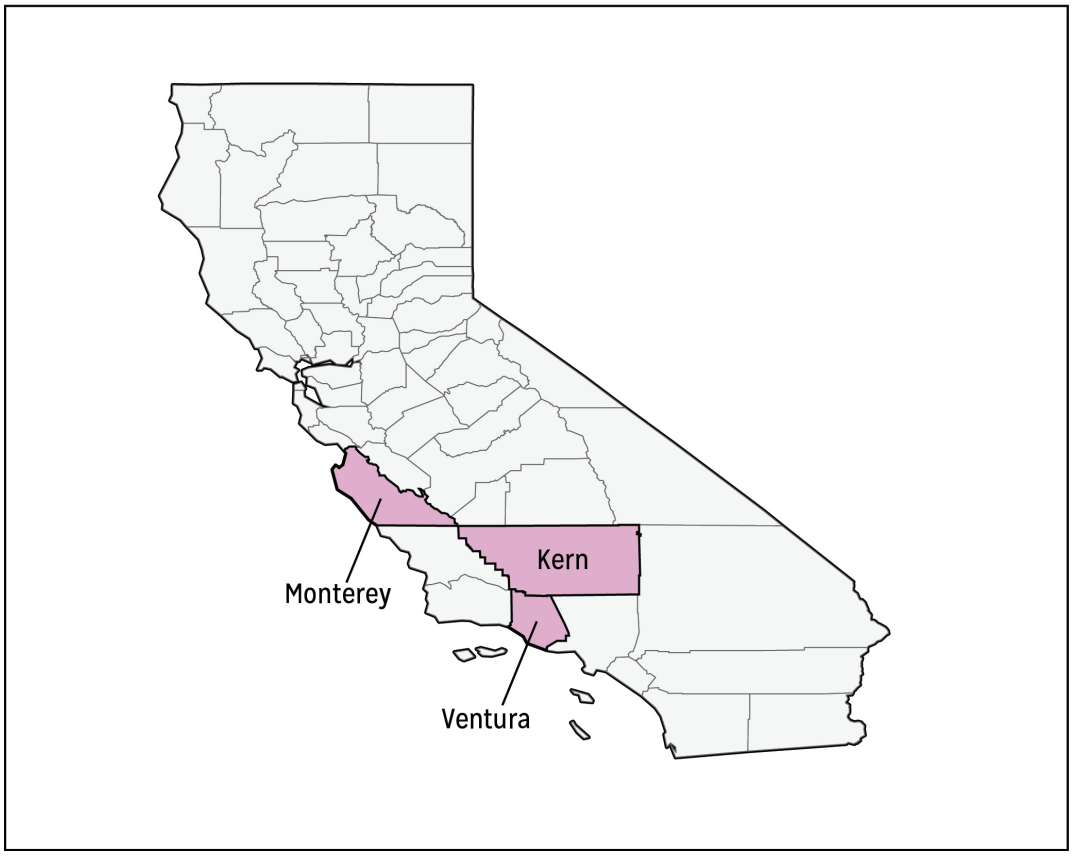
California

California has some of the United States' most beautiful natural landscapes, as well as significant energy resources. Just one shale formation in California, the Monterey Shale, is thought by IHS CERA to hold 400 billion barrels of oil (Hargreaves, 2013). The EIA estimates that 15.4 billion barrels in the Monterey Shale are currently technically recoverable, which makes up almost 65% of the total undeveloped technically recoverable shale oil resources in discovered shale plays in the lower 48 states (U.S. Energy Information Administration, 2011). While preserving natural amenities and developing energy are sometimes considered mutually exclusive endeavors, the California counties profiled in this study (Ventura, Kern, and Monterey counties) demonstrate otherwise. Although the mix of amenity and energy resources and development differs in these counties, given their available opportunities they are each developing both to some degree.

Exhibit 7.1 Map of the State of California with Select Counties

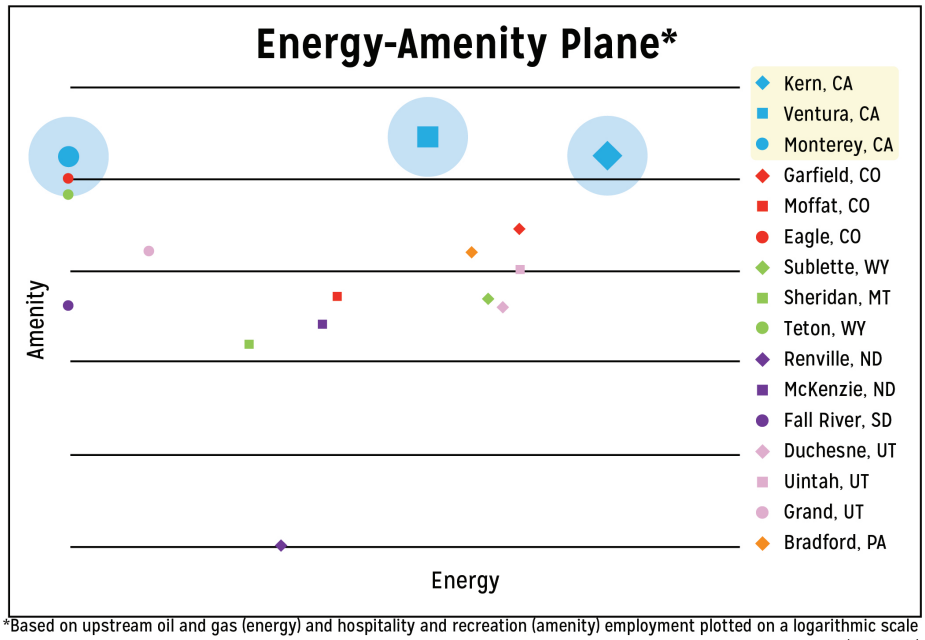


The oil and natural gas industry provides many economic benefits to the State of California. It is estimated that 908,801 jobs were supported by the industry in the state in 2009.[33] This created $62.3 billion in labor income and contributed $131.6 billion to California's economy. Additionally, the average salary in the industry, $116,079, is more than twice the state's average salary of $52,553 (AmericanEnergyWorks.org, 2012). Increasing energy development in California would heighten these benefits to the state, supporting even more jobs and generating significant additional revenue that could help alleviate some of the economic problems facing the state.

This section examines three counties in California—Ventura, Kern, and Monterey. As Exhibit 7.2 illustrates, Monterey County is economically focused on agriculture and amenities, though it has potential for developing its energy resources, and some extraction has already begun. Ventura County boasts plentiful amenities, and also engages in oil production, particularly offshore production. Kern County is economically dependent upon oil extraction, but still maintains an active amenities sector. Kern and Ventura counties hold mixed economic portfolios that have some balance between energy and amenities development, and Monterey County is mostly focused on its already prominent amenity sector.

[33] This support includes direct, indirect jobs, and induced jobs.

Exhibit 7.2



*Based on upstream oil and gas (energy) and hospitality and recreation (amenity) employment plotted on a logarithmic scale (BLS, 2012)

The three counties have varying employment mixes. Exhibit 7.3 shows the share of employment of civilians age 16 and older by sector for each of the three selected counties in California. In some sectors of employment, such as construction and retail trade, the three counties are very similar to each other and the state average. In Kern County and Monterey County, however, far more of the population is employed in agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset. A slightly higher percentage of Monterey County's workforce is engaged in arts, entertainment, accommodation, and food services than in the other counties of interest and the state average.

Exhibit 7.3 Percent Employed by Sector in Select California Counties, 2011 [34]

Sector	Monterey	Ventura	Kern	CA Average
Agriculture, forestry, fishing, and hunting, and mining*	15.01%	4.68%	14.49%	2.23%
Construction	6.08%	6.20%	6.71%	6.55%
Manufacturing	5.4%	10.59%	5.48%	10.35%
Wholesale trade	3.07%	3.51%	3.00%	3.42%
Retail trade	11.10%	11.04%	11.07%	11.02%
Transportation, warehousing, utilities	3.48%	3.35%	5.24%	4.7%
Information	1.66%	2.93%	1.29%	3.01%
Financial, insurance, real estate	4.39%	8.70%	4.32%	6.75%
Professional, scientific, management, administrative, and waste management services	9.42%	12.43%	8.16%	12.34%
Educational services, health care, and social assistance	19.49%	18.56%	19.56%	20.54%
Arts, entertainment, recreation, accommodation, and food services	10.72%	8.27%	8.41%	9.42%
Public administration	4.8%	4.71%	4.80%	5.29%
Other services	5.38%	5.04%	7.46%	4.7%

*Oil and gas is a subset of mining

(U.S. Census Bureau data from 2011)

Exhibit 7.4 compares average annual pay and employment in the oil and gas, hospitality and recreation, and agricultural sectors. Across counties in California, workers in upstream oil and gas earned a higher nominal wage than those employed in amenity industries, about four times as much in Kern County and three times as much in Ventura County.

Exhibit 7.4 Employment and Average Annual Pay in Selected CA Counties, 2011 [34]

	Upstream Oil and Gas		Hospitality and Recreation		Agriculture	
	Employment	Average Annual Pay	Employment	Average Annual Pay	Employment	Average Annual Pay
Kern	10,570	$86,162	20,634	$15,434	48,716	$23,396
Ventura	495	$113,141	31,405	$18,441	25,308	$25,504
Monterey	-	-	20,196	$24,165	46,224	$28,277

(BLS data from 2011)

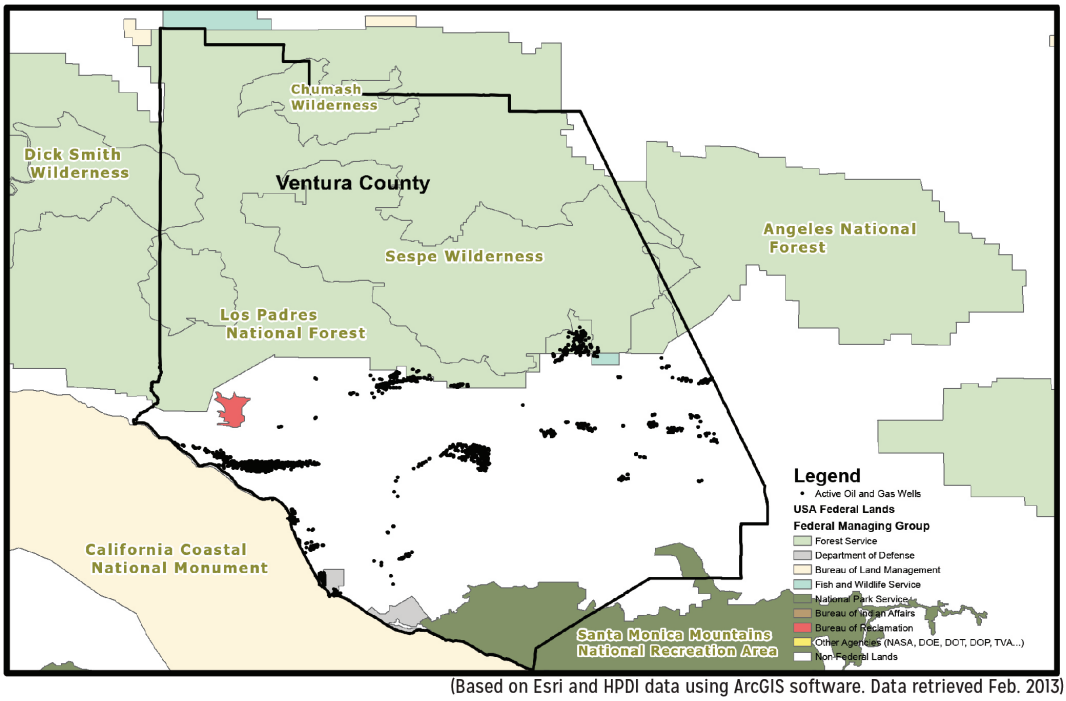
[34] Due to rounding and data structure issues, the percentages may not add up to 100 percent.

Ventura County, California

One of the stated goals in Ventura County's General Plan is to "minimize incompatibility between the extraction and production of the [mineral] resource and neighboring land uses and the environment" (Ventura County General Plan, 2010, p. 14). As Ventura County continues to diversify among varying land uses such as oil and gas extraction, agriculture, and amenities, balancing these interests becomes increasingly important. Ventura County has abundant amenities, evidenced by its seven out of seven ranking by the USDA on its Natural Amenities Scale (United States Department of Agriculture, 2012). Alongside abundant amenities, Ventura County also has significant oil production. Within the county, there are 135 active oil and gas permits, 57 currently operating oil companies, and 2 operating refineries. Coastal processing facilities handle crude oil extracted from several platforms that are part of federal and state offshore leases (County of Ventura, n.d.). By balancing these interests, Ventura County has generally minimized conflicts among oil and gas extraction, agriculture, and amenities.

Chase Atkins, a former employee on an oilrig off the coast of Ventura County, emphasizes the importance of cooperation between oil companies and environmental interests. Chase worked on an oil platform for 6 years before being laid off following the Deepwater Horizon oil spill in the Gulf of Mexico. Although the drilling moratorium started a chain of events away from Ventura County that eventually led to Mr. Atkins' job loss, he speaks positively about the Obama Administration's decision. "I think [Obama] did what he had to do for our country to kind of slow things down and stand back and take a look at where we're at with our oil industry and offshore drilling and how we run things" (Chase Atkins, personal communication, December 15, 2012). Mr. Atkins believes this was a necessary response to ensure that energy development can continue in Ventura County without harming the environment (Chase Atkins, personal communication, December 15, 2012). Positive interventions can come from private organizations as well. For example, The Center for Offshore Safety is an industry-led organization that promotes safety for offshore drilling by promoting good leadership, effective management systems, and independent third-party auditing and certification (Center for Offshore Safety, 2013).

Exhibit 7.5 Active Oil and Gas Wells in Ventura County, CA



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 7.5 (for larger exhibit see Appendix) shows that oil and natural gas extraction in the county generally occurs away from areas where amenities are located. The majority of oil and gas wells, represented by black dots, are outside the county's federal lands. The USFS administers much of the northern portion of the county, including the Las Padres National Forest and Angeles National Forest. Within these lands are three wilderness areas: Dick Smith, Sespe, and Chumash. In the southernmost section of the county, the National Park Service administers the portion of the Santa Monica Mountains National Recreation Area (SMMNRA) that extends into southern Ventura County. The BLM manages the California Coastal National Monument, which is located along the coast of Ventura County. Further off shore, the Channel Islands National Park is the county's closest national park. Small areas of U.S. Bureau of Reclamation (BOR) and DOD lands are also located in the county.

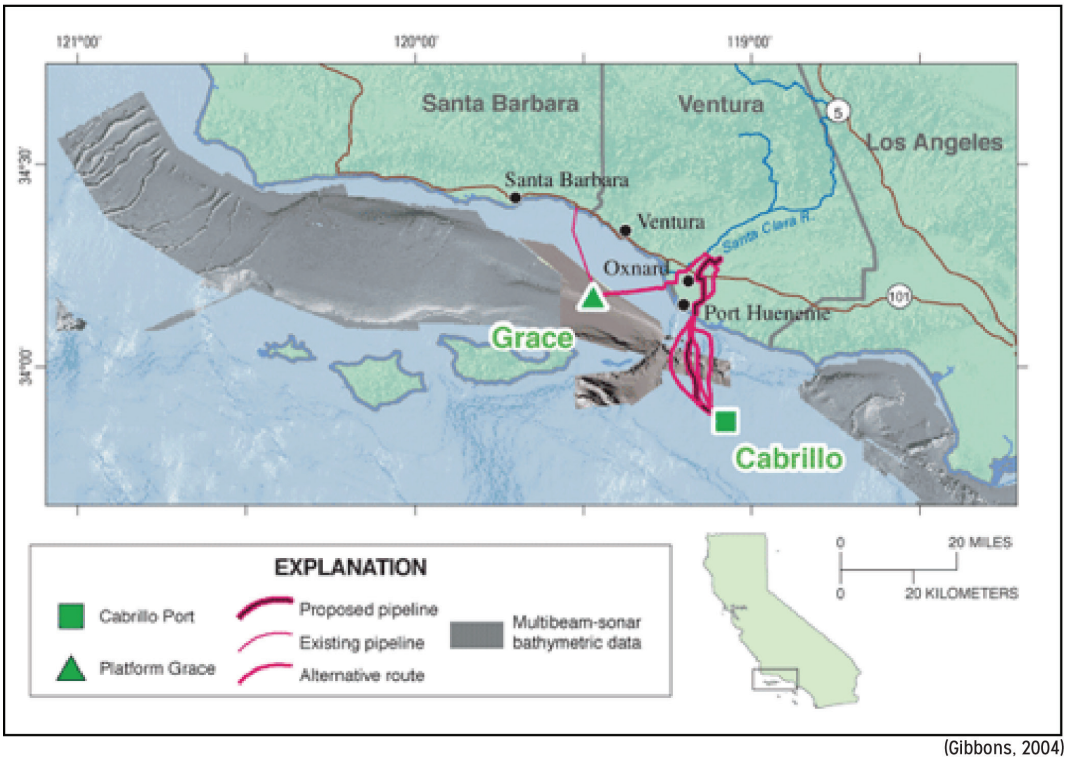
As Exhibit 7.5 shows, the majority of active wells are on non-federal lands. The Sespe Oil Field contains a pocket of active production in the county; it is located on lands operated by the USFS and USFWS, though this area represents a small percentage of the federal lands in the county. Generally, oil and gas exploration and amenity preservation occur in different geographic areas.

Energy Development

Oil development has a long history in Ventura County and occurs both onshore and offshore. Exploration first began in Ventura County in the mid 1800s, and by the 1880s the majority of California's oil production was occurring there. The first commercial oil well in California was located in Ventura County, and up until the Great Depression, oil discoveries led to economic growth that drew many people to the area. Since World War II, most oil discoveries in Ventura have been significantly smaller and related to expanding operations in existing fields (Ventura County General Plan Resources Appendix, 2011, p. 39-40). In 2012 onshore and offshore oil and gas activities in Ventura included 4,800 producing wells that produced a total of 8.77 million barrels of oil and 8.2 BCF of gas (State of California Department of Conservation, 2011).

Offshore oil exploration and activities in Ventura County began in the 1960s and falls primarily under federal and state control (Ventura County General Plan Resources Appendix, 2011, p. 40). The Outer Continental Shelf (OCS) off the coast of Ventura County is under federal jurisdiction. Permitting for offshore oil activities in the OCS involves waters under state jurisdiction and local onshore authorities. Ventura County's offshore fields include the Hueneme Field, Santa Clara Field, Rincon Field, Dos Cuadras Field, Carpinteria Field, and West Montalvo Field. New oil and gas leases on state submerged lands, the 3-mile area stretching from the coast to the boundary defining the OCS, are currently restricted (County of Ventura, n.d.). Despite the fact that oil and gas operations are offshore, they have significant positive impacts on employment and economic activity in the county.

Exhibit 7.6 Oil Platforms off Ventura County's Coast

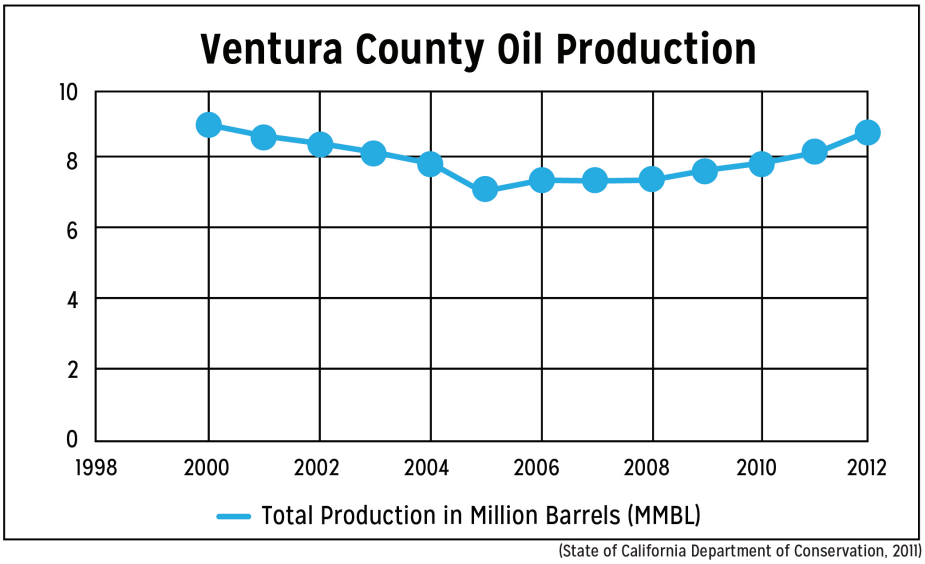


(Gibbons, 2004)

Exhibit 7.6 (for larger exhibit see Appendix) shows some of the offshore oil and gas activity that occurs off Ventura County's coast. Offshore oil and gas drilling was approved here in 1979 (Prisament and Thuman, 1983). Because this activity occurs at least 3.7 miles off the shore, the amenities of the SMMNRA are not negatively affected (Bureau of Safety and Environmental Enforcement, n.d.).

Ventura County also lies atop a portion of the Monterey Shale. The shale underlies 1,752 square miles of California and, according to the EIA, is estimated to hold 15.4 billion barrels of deposits (United States Department of Energy, 2011). This area represents about 64% of the recoverable shale oil reserves in the lower 48 United States (U.S. Energy Information Administration, 2011). Development of the Monterey Shale is expected to make major economic contributions to the State of California, in terms of employment, government revenues, and value added (IHS Global Insight, 2012, p. 5). Ventura County has the potential to benefit substantially from that development.

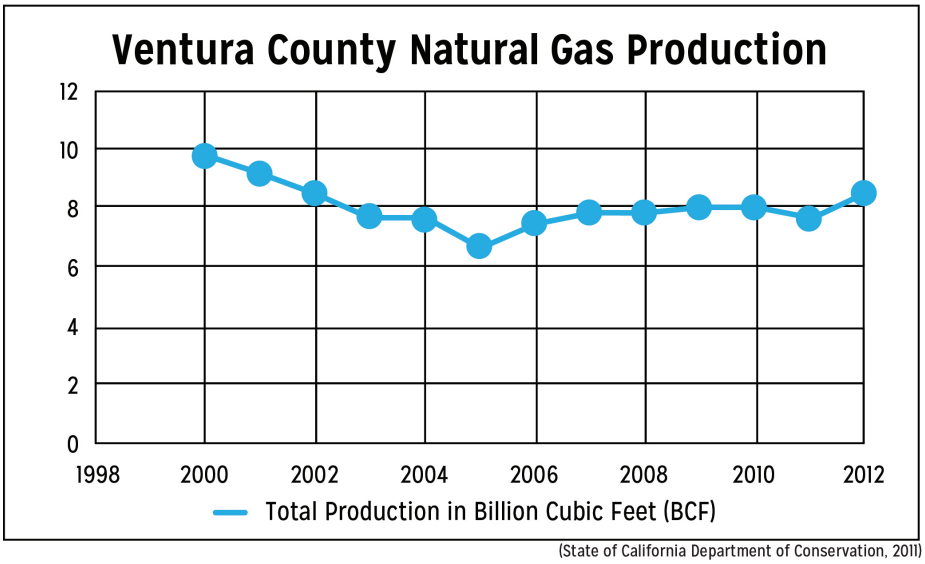
Exhibit 7.7



(State of California Department of Conservation, 2011)

As shown in Exhibit 7.7, in 2000 Ventura County was producing just over 9 million barrels of oil per year. Oil production gradually declined until it reached a low of just under 7 million barrels per year in 2005. Then, beginning in 2006, production slowly and steadily increased and had nearly returned to 2000 production levels in 2012 with 8.77 million barrels of oil produced.

Exhibit 7.8



(State of California Department of Conservation, 2011)

Gas production in Ventura County has seen a similar pattern over the past 12 years. As Exhibit 7.8 shows, production gradually declined from a decade high of 9.6 BCF in 2000 to a low of 6.7 BCF in 2005. There was an increase in production

in 2006, and by 2012 production had reached 8.2 BCF. Unlike the oil production numbers, gas production has failed to return to 2000 levels, although it has regained some of the production declines from 2001 to 2005.

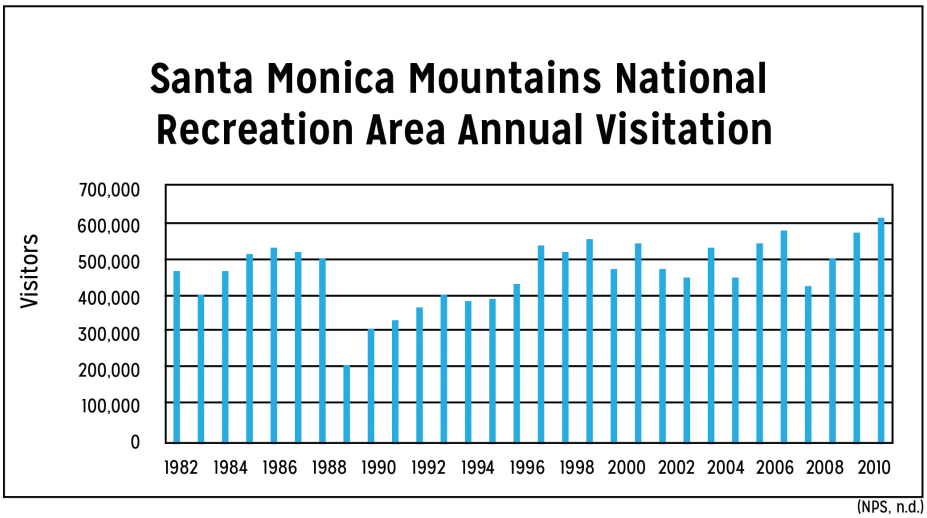
Amenities Development

Ventura County has a strong amenity sector and markets itself as "The Real California" (Ventura CA Official Website, 2012). The county contains part of the Angeles National Forest, Los Padres National Forest, the SMMNRA, Dick Smith Wilderness, and Hopper Mountain National Wildlife Refuge, which is home to endangered condors. These national protected areas provide many trails for hiking, biking, and other amenity activities, complimented by year-round daytime temperatures of around 70 degrees Fahrenheit (Ventura CA Official Website, 2012).

Ventura County boasts beautiful beaches that have been celebrated in popular songs such as "Surfin' USA" by the Beach Boys and "Ventura Highway" by the band America. In addition, the Channel Islands National Park is located off the coast and includes a marine protection area, which is home to thousands of plant and animal species, 145 of which cannot be found anywhere else in the world (NPS, 2012). The park was established by the U.S. Congress in 1980 and includes five of the eight Channel Islands off Ventura County's coast. A boat ride to the islands is a unique experience in and of itself, but once on the islands, visitors can camp for several days if desired. Hiking trails on the islands are also popular and can expose tourists to many different kinds of plants and natural environments (Ventura Visitors & Convention Bureau, n.d.).

Ventura also offers historical and cultural tours and attractions, including wineries, agricultural attractions, and the California Oil Museum in the city of Santa Paula. Ventura County is also a popular filming location for movies and advertisements, thanks in part to its location near Hollywood and its diversity of natural landscapes and settings.

Exhibit 7.9



(NPS, n.d.)

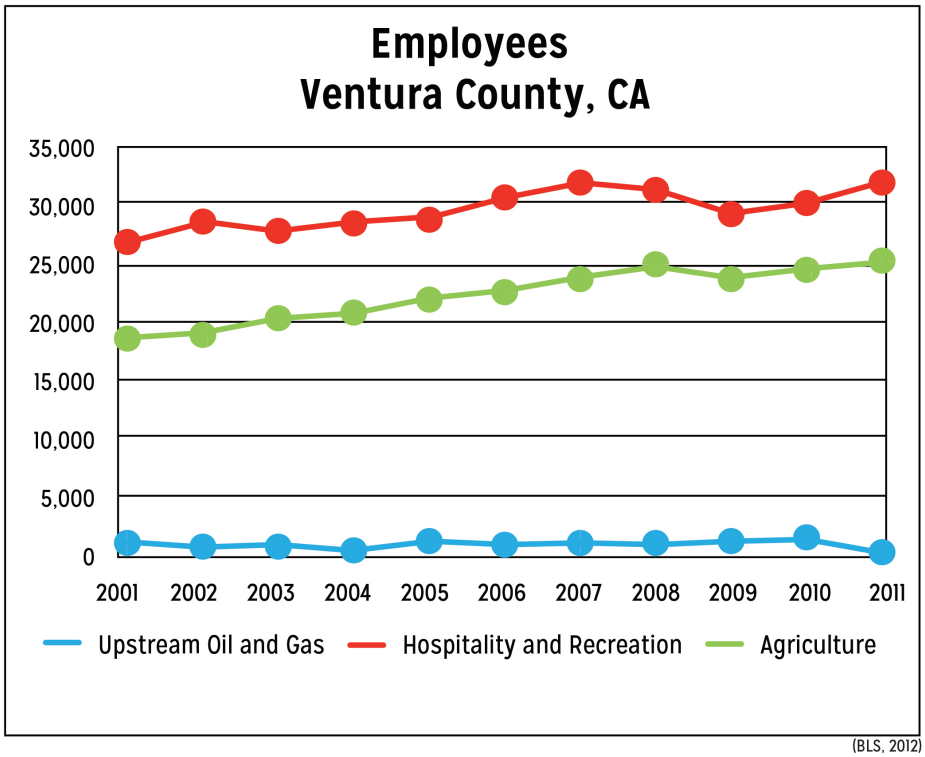
Exhibit 7.9 illustrates visitation to the SMMNRA, one of the county's premiere recreation areas. The SMMNRA is located at the southern tip of Ventura County, facing the Pacific Ocean. It was designated as a National Recreation Area in 1978 (NPS, n.d.). The drop-off and slow growth from 1988 onward could be related to United Nations Educational, Scientific and Cultural Organization's designation that year of the Golden Gate Biosphere Reserve, which encompasses 13 protected areas in the greater San Francisco Bay area, and could have drawn visitation away from the SMMNRA (United Nations Educational, Scientific, and Cultural Organization, 2002). As expected, there is a visitation drop-off during the 2008 financial crisis, but since then, growth has occurred, resulting in higher visitation in 2010 than ever before.

Economic Indicators

With its close proximity to Los Angeles, Ventura County has become the destination of many middle-class working families, and is now one of the more affluent counties in California. Median household income has grown by 26% since 2000, and is higher than both the state and national averages. During the same period, the housing values have greatly increased, doing so at a faster rate than state and national averages (USA.com, 2012).

Employment of civilians age 16 years and older in Ventura County can be seen in Exhibit 7.3. Agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset, employed 4.68% of the civilian population age 16 years and older in 2007, double the state average. Ventura County has slightly lower employment than the state average in arts, entertainment, recreation, accommodation, and food services with 8.27% of the civilian labor force over 16 years in this sector.

Exhibit 7.10



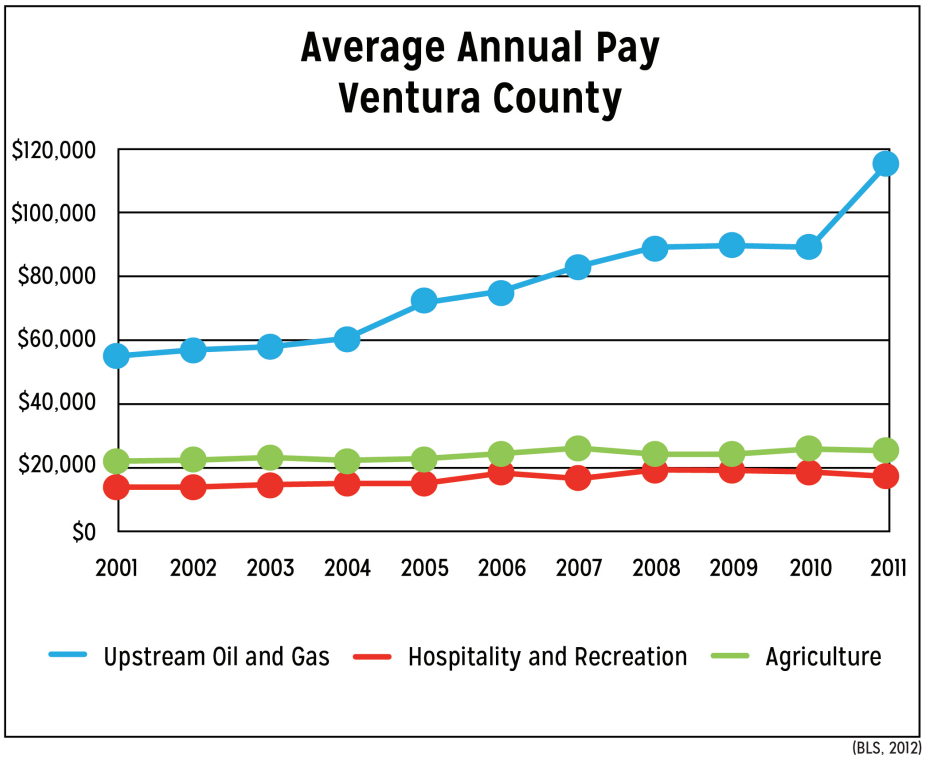
(BLS, 2012)

Exhibit 7.10 shows how employment has developed in Ventura County from 2001 to 2011. Employment numbers in hospitality and recreation and agriculture are high and rising. Employment in oil and gas is substantially lower but has remained constant over the period.

In addition to employment by sector, another important indicator in the county is average annual pay by sector.[35] As shown in Exhibit 7.11, average annual pay for hospitality and recreation and agricultural employees has changed little over the past decade in Ventura County. However, employees in the oil and gas industry have seen their average annual pay nearly double over the same period.

[35] The average annual pay data is reported in nominal dollars and so has not been adjusted for inflation.

Exhibit 7.11



(BLS, 2012)

The oil and gas industry provides many economic benefits to the county, particularly in terms of county tax revenues. During fiscal year 2012–2013, three of Ventura County's top 10 taxpayers (in terms of highest annual tax bills) were energy companies. These companies—Aera Energy, Vintage Petroleum, and Southern CA Gas Co.—together generated over $20 million in tax revenue (Ventura County Treasurer-Tax Collector, 2012).

Development Strategies

Amenities and energy extraction activities in Ventura County have been coexisting since the 1800s. Sailors and other recreationists are able to continue their usual activities around offshore oil platforms. Oil companies follow strict protocols to ensure that even small oil spills are cleaned up and reported. In addition, the impacts of platforms on wildlife are closely monitored to protect the surrounding ecosystem. The industry's strict adherence to safety and environmental regulations and procedures helps protect all of Ventura County's natural and amenity resources.

Residents of California have been recovering oil and gas from natural oil and gas seeps that occur off the coast since before the arrival of European settlers (USGS, 2011, January 19). Some residents of the county, however, assume that natural oil and gas seepage in the area is actually a result of irresponsible petroleum companies. Coal Oil Point in the Santa Barbara Channel is one of the most active oil and gas seeps in the world, naturally emitting globules of crude oil and gas that end up on beaches and in the ocean throughout Ventura County (Jablonowski, 2012). Some environmentalists nevertheless claim that oil companies "use the natural seeps as a cover" for leaks from the oil platforms (Stolz, 2009). Chase Atkins, a former oil rig employee in Ventura County, has a different opinion, stating "that's one thing that people misconstrue a lot, especially on that coastline … the oil out there is so highly concentrated underneath that seabed that it finds its way to the surface. It's all naturally produced from mother nature" (Chase Atkins, personal communication, December 15, 2012).

Jean Landy, who worked on oil platforms off the coast of Ventura and has been a resident of Ventura County since 1966, believes that since drilling started more earnestly off the coast of Ventura, the amount of oil tar ending up on beaches has decreased significantly (Jean Landy, personal communication, December 16, 2012). In 1982 ARCO Oil and Gas Company installed a seep gas capture device in the Coal Oil Point to route the naturally emitting gas to commercial pipelines. This capture device was the first of its kind and not only provided natural gas, but also reduced air pollution (Ger et al., 2002, p. v). Deep-water drilling on Platform Holly, located off the coast near the Santa Barbara Channel, has also been shown to reduce natural seepage in the area. In 1999 the University of California Santa Barbara's Energy Institute and the U.S. Minerals Management Service published a study showing that pumping oil reduces pressure in the seepage (Jablonowski, 2012).

On shore, the Los Padres National Forest in Ventura County provides one example of how energy extraction and amenities may coexist. Los Padres is the only national forest in California with commercial oil and gas activity (Los Padres ForestWatch, 2012). The Sespe Oil Field extends into the Las Padres National Forest boundaries and contains a total of nearly 300 active wells inside and outside the forest (Los Padres ForestWatch, 2012). The Hopper

Mountain National Wildlife Refuge, Sespe Condor Sanctuary, Coldwater Canyon Ecological Reserve, and the Sespe Wild and Scenic River also border the Sespe Oil Field. Oil extraction in the Sespe Field has been occurring since the 1960s. This extraction sometimes involves hydraulic fracturing. At other times oil beneath the forest is accessed by slant drilling, which allows aboveground activities to continue to occur undisturbed (Los Padres ForestWatch, 2012). Using these less-invasive technologies allows Ventura County to enjoy the benefits of both energy and amenity development.

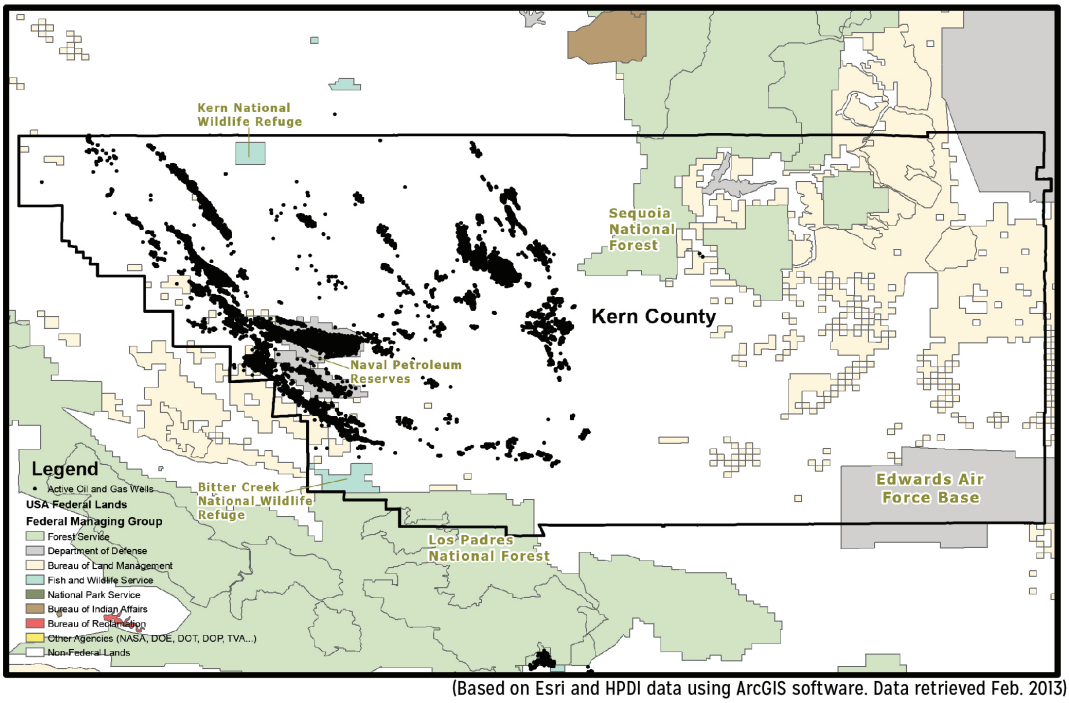
Ventura County offers an abundance of amenity and energy opportunities, and has been developing both resources in the county. The extent to which they will continue to be developed remains an open question for county residents and politicians to determine.

Kern County, California

For many Kern County residents, petroleum is an integral part of everyday life that creates jobs and tax revenue for the county. Prior to the discovery of oil in the San Joaquin Valley, Kern County was economically focused on agricultural production. Since the discovery, the economy has diversified substantially. While the oil industry constitutes a substantial portion of the county's economy, the county has also taken significant steps toward developing its amenities and attracting visitors.

Often referred to as the "Golden Empire," Kern County is known for its rich history of agriculture, gold production, and oil production (Jones, 2011). Located at the southern end of the California Central Valley, the county covers just over 8,100 square miles of mostly fertile land, rich in a variety of natural resources (U.S. Census Bureau, 2011). In 2010 agricultural activities were valued at $4.76 billion in Kern County, while $1.24 billion of value came from tourism and related activities (California Department of Food & Agriculture, 2010; Eyewitness News, 2011).

Exhibit 7.12 Active Oil and Gas Wells in Kern County, CA



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

As shown in Exhibit 7.12 (for larger exhibit see Appendix), Kern County is home to a large number of oil and gas wells, represented by black dots on the map. The county is also home to a variety of federal lands. A substantial amount of BLM lands are located primarily in the eastern part of the county. The DOD manages Edwards Air Force Base and the Naval Petroleum Reserve in Kern County. Two national forests are partially located in the county, Sequoia and Los Padres. Additionally, two wildlife refuges in the USFWS system (Bitter Creek Wildlife Refuge and Kern Wildlife Refuge) have been preserved in the county and are used for a variety of activities.

Kiavah Wilderness and Domeland Wilderness areas are located in the northeast portion of Kern County. The vast majority of oil and gas production is occurring on non-federal lands in the western part of the county. Only in the Naval Petroleum Reserve, an area specifically designated for this purpose and managed by DOD, does a substantial amount of production occur on federally owned land.

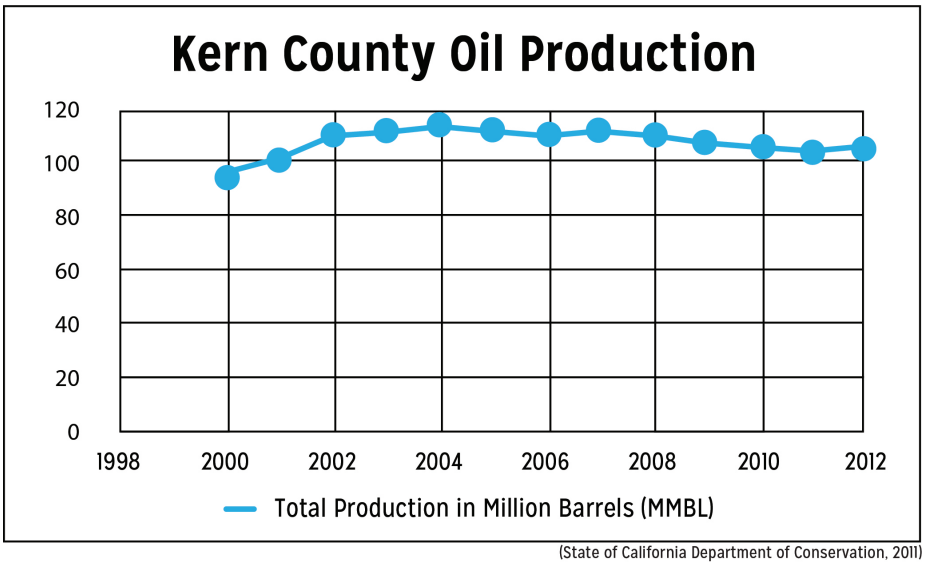
Energy Development

Kern County includes part of the Monterey Shale formation, which extends from Central California to just north of Santa Barbara County and includes offshore and island areas further south. Estimated to contain approximately 15.42 billion barrels of technically recoverable oil, this area represents about 64% of the recoverable shale oil reserves in the lower 48 United Sates (U.S. Energy Information Administration, 2011). Development of the Monterey Shale is expected to make major economic contributions to the State of California and, if significant reserves are found, to Kern County as well, in terms of employment, government revenues, and value-added (IHS Global Insight, 2012, p. 5).

Like many of Kern County's residents, Dan and Annette Swainston work for Aera Energy in Bakersfield and rely on the county's oil industry for their livelihood. Aera is one of the largest privately owned U.S. oil companies, operating more than 12,000 wells and representing about 30% of California's total production. Aera is jointly owned by Shell and ExxonMobil, though is operated as a stand-alone company, and works with hundreds of contractor companies throughout the state, employing around 1,200 people (Oil & Gas Financial Journal, 2009). Most of the oil in Kern County comes from the San Joaquin Basin. In 2011 Kern County

accounted for about 73% of the state's overall oil production (State of California Department of Conservation, 2013). Kern County has also become a major producer of natural gas, with about 62% of the state's total production coming from Kern County gas fields in 2011 (State of California Department of Conservation, 2013). In 2011 Kern County had just over 42,000 active wells with production in the county, which produced about 103.5 million barrels of oil and 115 BCF of gas (State of California Department of Conservation, 2011).

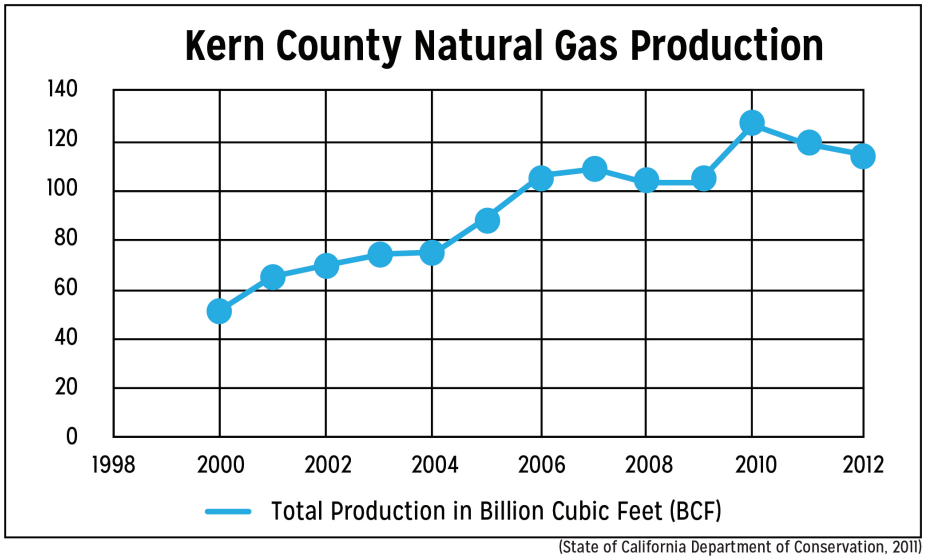
Exhibit 7.13



(State of California Department of Conservation, 2011)

In 2000 Kern County produced almost 95.5 million barrels of oil. Oil production increased rapidly until 2002, posting a production increase of just over 12% over the 2-year period. Production continued to increase at a slower rate over the following 2 years and reached the 2000–2012 high of 110.2 million barrels per year in 2004. In the 2 years after that, production declined slightly before rebounding from 2006 to 2008, when it reached 109.7 million barrels. After 2008 production decreased, dropping to 102 million barrels in 2011, just above the 2001 production levels. In 2012 production increased to 103.5 million barrels, about 53% of California's total crude oil production that year.

Exhibit 7.14



(State of California Department of Conservation, 2011)

Gas production in Kern County has followed a different course than oil production. In 2000 production was 51.2 BCF. Production increased year by year from 2001 to 2007, reaching 109.4 BCF in 2007. Production declined slightly from 2007 to 2009 before rebounding to the high of 125.7 BCF in 2010. Since 2010, however, production has declined to 115.1 BCF in 2012. In 2011, Kern County's gas production represented 42% of the total natural gas gross withdrawals in the state. Unlike the oil production, gas production is now more than double 2000 levels; it is higher by 63.8 BCF than the 2000 production.

Amenity Development

Kern County's amenities represent an important sector of the local economy. Kern County markets itself as the "Gateway to Southern California," and is easily reachable from Los Angeles, San Francisco, and Las Vegas. Outdoor enthusiasts are attracted to the Kern River with its plentiful white-water rapids and the nearby Giant Sequoia National Monument. Kern County includes parts of Los Padres National Forest and Sequoia National Forest. Lake Isabella, along with four other lakes, offer excellent fishing and camping. In eastern Kern County's vast desert there is Red Rock Canyon State Park and Randsburg, a living ghost town (Kern Co. Board of Trade and Tourism Commission, 2012).

Kern County is home to the Kern National Wildlife Refuge, which provides habitat for migratory waterfowl and shorebirds (USFWS, 2010; USFWS, 2011). Bitter Creek National Wildlife Refuge provides land for the California condor and several federally designated endangered species such as the San Joaquin kit fox, blunt-nosed leopard lizard, and the giant kangaroo rat (USFWS, 2012).

Kern County has several wilderness areas within its borders including the Kiavah and Domeland Wilderness areas (University of Montana, 2011(a)). Kiavah Wilderness is an 88,290 acre area providing hiking and horseback riding trails through diverse terrain (University of Montana, 2011(a)). The area boasts a variety of animal and plant species and terrain that transitions between the Mojave Desert and the Sierra Nevada Mountains (University of Montana, 2011(a)). Several notable species in the area include raptors, rare rodents, reptiles, and a variety of migrant and resident bird species. The Domeland Wilderness encompasses 133,160 acres of primitive and rugged terrain, providing opportunities for the adventurous (University of Montana, 2011(b)). The terrain in Domeland Wilderness is a mountainous area along the South Fork Kern River which includes several sensitive plant species, and large deer herds (University of Montana, 2011(b)).

The film industry is an active secondary industry in the county. Production companies travel from Los Angeles to film in Kern County because of the diversity of the natural landscape (Film California, 2012).

Agriculture also represents a major industry in Kern County and agricultural tourism provides amenity opportunities for visitors and residents. Several farms and ranches throughout the county offer visitors a chance to experience agriculture's contributions to the county and state (Regents of the University of California, 2013). There are 2.4 million acres of farmland in Kern County with just over 2,000 farms. Among Kern's top crop items (by acre) are almonds, grapes, and vegetables, which are commercially harvested. Farms in Kern also have the highest inventory of sheep and lambs in the state, and the second highest in the United States (USDA, 2007).

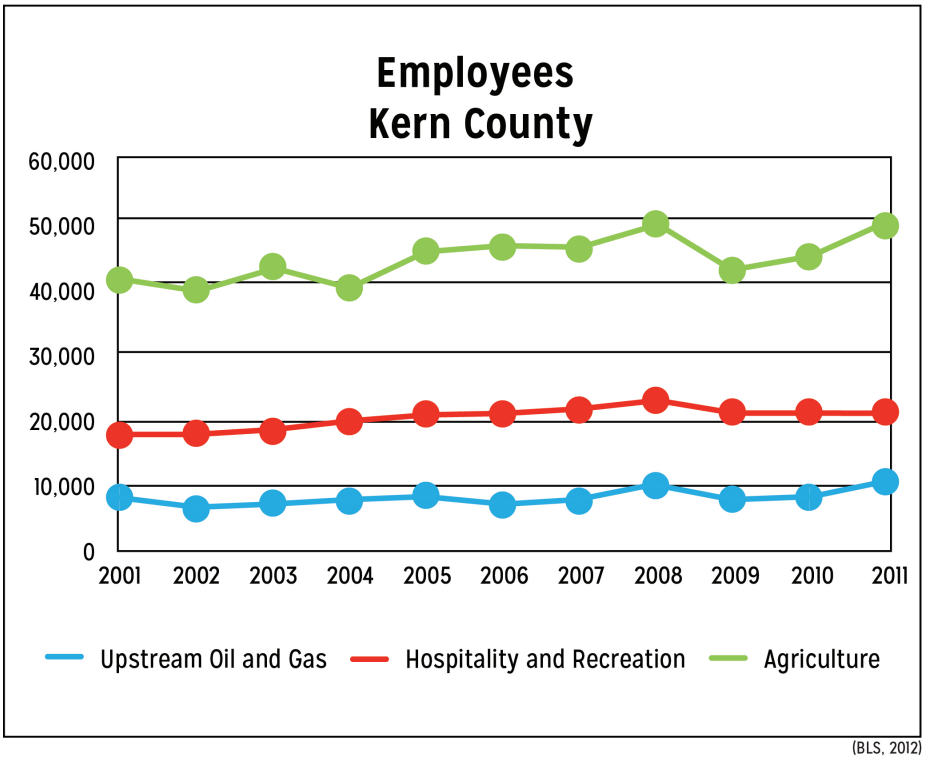
Economic Indicators

Kern County has experienced impressive economic growth. A BLS report showed that Kern County had the highest number of new jobs for a single county in the United States during the last quarter of 2011—a 5.3% increase. Officials at the Kern County Career Services Center report that strong growth in oil field and oil field construction jobs are fueling the county's overall job growth (23abc, 2012). As jobs are created in the petroleum industry, others spring up in associated industries. Ross DeVol, the Director of Regional Economics at the Milken Institute, estimates that for every job created at Chevron (one of Kern County's biggest employers) an additional six jobs are created that tie back to its activities. "The ripple effects are just huge," he says (Chevron, 2010). Revenues and job growth provided by the oil industry are both key to Kern's economic growth, especially as state funding for community services like education has declined over the last 10 years (Dan Swainston, personal communication, November 27, 2012).

Employment of civilians age 16 years and older in Kern County can be seen in Exhibit 7.3. Other than the educational services category, the sector of agriculture, forestry, fishing and hunting, and mining (of which oil and gas is a subset) employs the most people; this sector accounted for 14.49% of the civilian population age 16 years and older in 2007 (approximately 6 times the state average). This result is not surprising given the active agriculture and oil and gas sectors in the county that are included in this sector. Employment in the arts, entertainment, recreation, accommodation, and food services sector made up 8.41% of the civilian labor force over 16 years old, slightly lower than the state average.

Exhibit 7.15 illustrates, there are less people employed in the oil and gas industry in Kern County than in agriculture or hospitality and recreation. In the most recent years, employment in agriculture and oil and gas have risen, while jobs in hospitality and recreation have remained stable or decreased slightly.

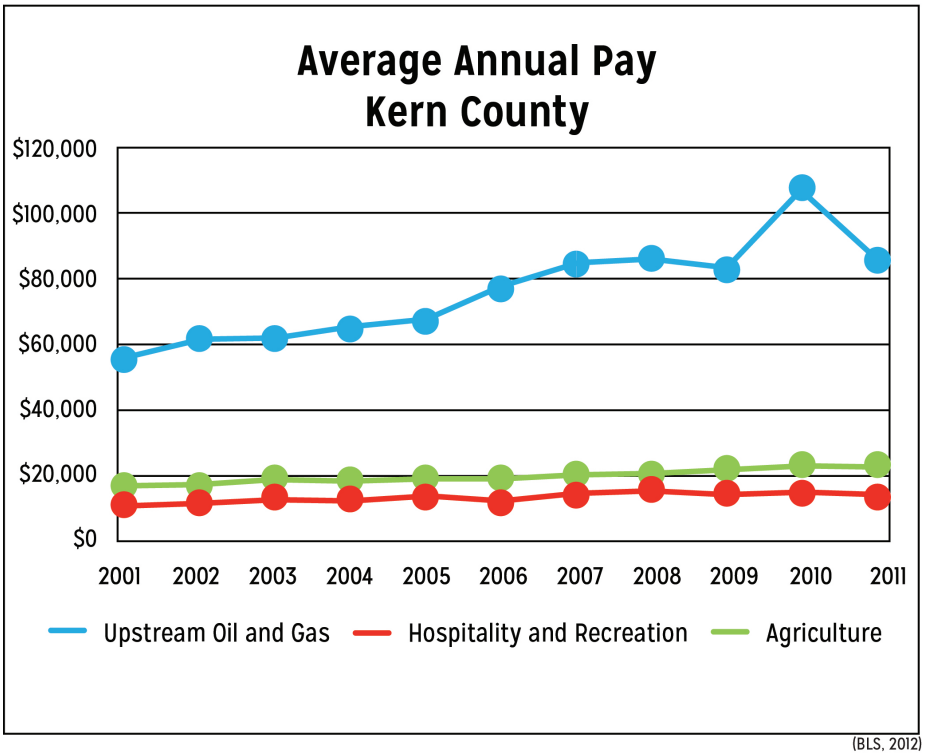
Exhibit 7.15



(BLS, 2012)

Although the quantity of jobs in oil and gas is low relative to the other industries of interest, average annual pay in oil and gas is much higher than in hospitality and recreation or agriculture. At the start of 2001, oil and gas average annual pay was roughly three times as much as the other sectors. By the end of the decade, this grew to be four times as much as hospitality and recreation and agriculture. Further, growth in annual pay was steeper in oil and gas than in the other industries from 2001 to 2011, though this data is in nominal dollars and has not been adjusted for inflation.

Exhibit 7.16



(BLS, 2012)

While pay is not as high, the agriculture industry employs the most people of the three sectors; it is an important part of the county economy. Commodities grown in Kern County are shipped to 85 countries around the world and had a 2009 value of $3.6 billion. In 2009 the five top commodities grown in the area made up over $2.2 billion in gross total value (Bakersfield Chamber of Commerce, 2009).

When it comes to amenities, Kern County is seeing economic growth. In real terms, visitors to Kern County spent $1.16 billion in 2010—the sixth consecutive year in which revenues totaled over $1 billion—with $15 million going directly to local governments (including Kern County) in the form of tax revenues (Edelhart, 2012). Only Sacramento County experienced a bigger real-dollar increase in visitor spending than Kern County in 2010. Additionally, despite job numbers being down by 100 from the previous year, from April to May of 2010, 700 leisure and hospitality jobs were added in Kern County (Edelhart, 2012).

Development Strategies

Dan Swainston has been employed by Shell Oil or its affiliates since 1989. He believes that extractive industries and outdoor recreation can coexist in the same area, "but both have to work together" (Personal communication, November 27, 2012).

The Kern County Tourism Promotion Grant Program provides up to $100,000 in grants to 501(c) organizations that promote the county as a visitor destination (23abc, 2011). Oildorado Days, a festival celebrating 100 years of a bustling oil-based economy, is one successful product of the grant program (Kern Co. Board of Trade and Tourism Commission, 2012). Held every five years, Oildorado Days celebrates the county's oil history. The 2010 event included the unveiling of a new oil worker monument to honor the men and women who have worked in the county's oil fields. Eric Cooper, the president of Taft Oildorado, Inc., said of the festival, "Every community needs something to celebrate. ... Other cities have lilacs, but we have oil." (Oildorado Returns, 2010, April 27). Oildorado Days is one example of Kern County's successful attempts to maintain a strong amenity sector that plays on the historical significance of oil and gas in the county to attract visitors.

It is easy to see one reason that energy and amenities are able to coexist here: The respective activities are occurring away from each other (see Exhibit 7.12). Energy development in Kern is not encroaching on the attractive amenity areas in the county: The Sequoia National Forest, Bitter Creek National Wildlife Refuge, Kern National Wildlife Refuge, and Los Padres National Forest—amenity areas that Kern is trying to promote—house no oil or gas development. Rather, as shown in the map, the energy extraction is taking place away from these areas, mainly on non-federal lands or land specifically designated for energy extraction (e.g. the Naval Petroleum Reserves). By maintaining distance between the amenities lands in Kern County and the county's oil and gas extraction, both are able to continue to develop without hindering the progress of the other.

This mutual growth can been seen as oil and gas development fuels Kern County's economy and has been a large source of job and wage growth in recent years, while agriculture also remains a significant source of employment and a

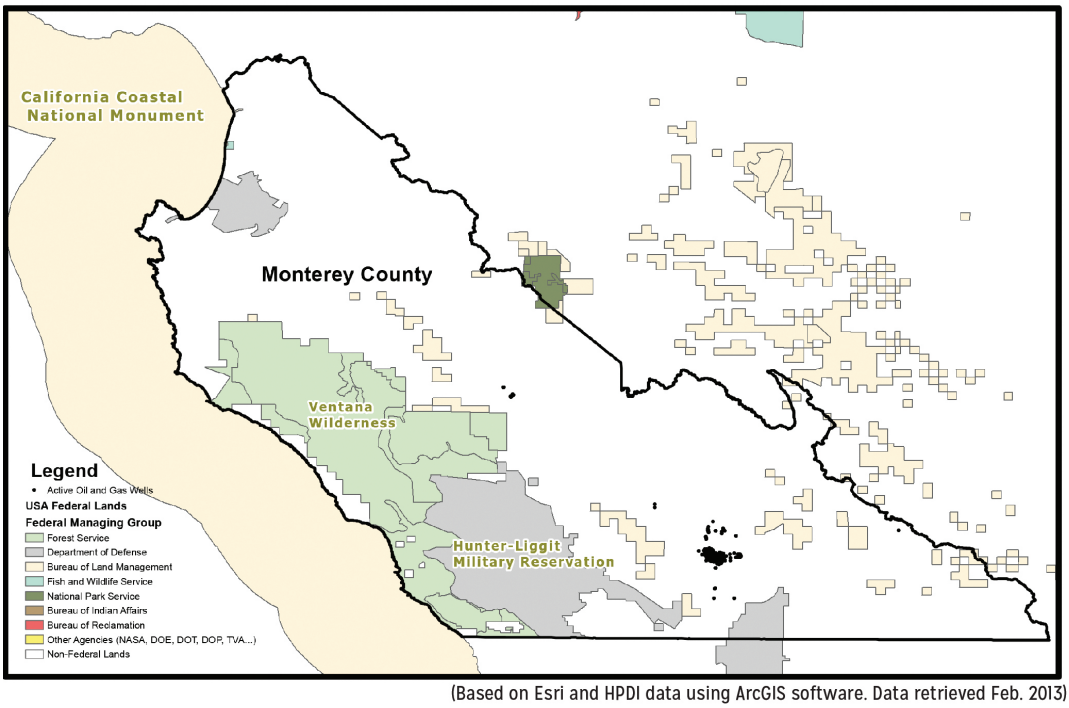
foundational sector of the economy. The amenity sector in Kern County is also strong, and further opportunity exists for marketing and developing the county's natural amenities, which can enrich the region's growing economy. For continued economic diversification, Kern County can seek more economic opportunities that complement energy development in the county economy.

Monterey County, California

Centrally located along California's coast, Monterey County has beautiful landscapes and a rich variety of resources. Monterey County's beauty and landscapes were celebrated in the novels of John Steinbeck, particularly in "The Pastures of Heaven" and "Cannery Row" and "In Dubious Battle." As of 2007 Monterey County had over 1.3 million farmland acres, accounting for just over 63.2% of its total land area (United States Department of Agriculture, 2007; U.S. Census Bureau, 2012).[36] Ideal agricultural conditions are not the only thing Monterey County has to offer; it also has a large tourism industry. According to the most recent statistics, in 2006 Monterey County hosted 7.9 million visitors (Monterey County Convention and Visitors Bureau, 2012). In addition to the active agriculture and tourism industries, underneath part of Monterey County is a portion of the Monterey Shale Play, which is "the primary source rock for the conventional oil reservoirs found in the Santa Maria and San Joaquin Basins in California" (U.S. Energy Information Administration, 2011, p. 4). As the oil and gas available in these reservoirs is further explored, Monterey County will have to balance its growing energy extraction opportunities with its traditional agricultural and amenity base.

[36] This percentage is calculated using the USDA data for total farmland acres and dividing it by the total land area of the county, which is 2,413,440 acres.

Exhibit 7.17 Active Oil and Gas Wells in Monterey County, CA



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

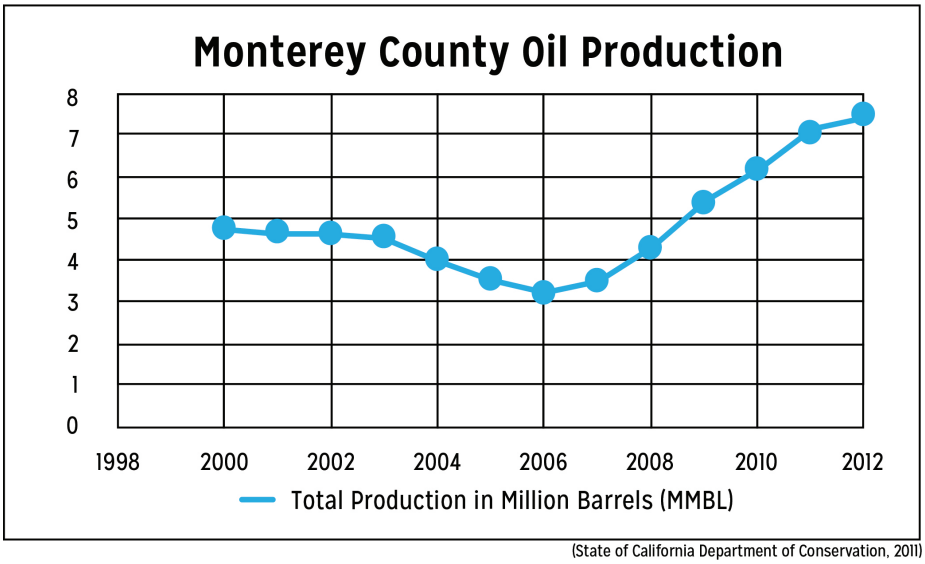
Exhibit 7.17 (for larger exhibit see Appendix) shows current energy extraction activity in Monterey County. The map also shows federal lands. Areas in light green are USFS lands, including the Ventana Wilderness area; beige areas are managed by the BLM; and grey areas by the U.S. Department of Defense (DOD). Two areas are of particular interest for their amenity value, the Ventana Wilderness and the California Coastal National Monument. Oil and gas wells, indicated by black dots, fall entirely outside any of these federally managed areas and well away from the two areas formally protected for their amenity value.

Energy Development

The primary area of oil and gas production in Monterey County is the San Ardo Oil Field. In 2011 San Ardo produced 6.8 million barrels of oil, accounting for more than 95% of the county's oil production (Department of Conservation, 2012, p. 1). The field also produced 1.3 BCF of gas in 2011 (Department of Conservation, 2012, p. 8). Exhibit 7.17 shows the concentration of oil and gas activity in the southern portion of the county, where the San Ardo Oil Field is located. In December 2012 the BLM auctioned off about 6,000 acres of federal mineral estate parcels in Monterey County

(DOI BLM, 2012, September 13, p. 9). Two land service companies each purchased two of the four Monterey County parcels, paying as much as $10 per acre (DOI BLM, December 12, 2012). The interest in these parcels illustrates the future growth potential of energy development in Monterey County (CBS San Francisco, 2012).

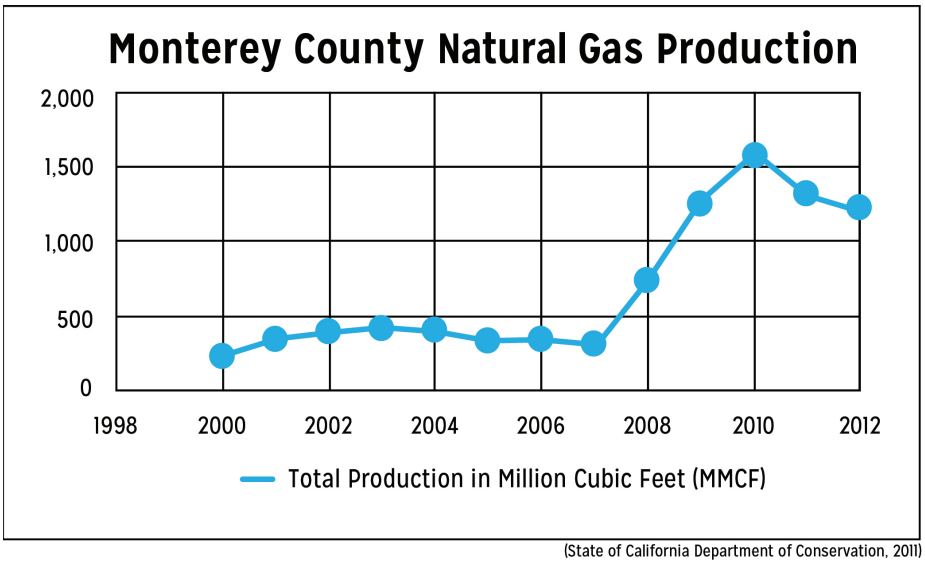
Exhibit 7.18



(State of California Department of Conservation, 2011)

In 2000, Monterey County produced almost 5 million barrels of oil. That production gradually declined until 2006, to just above 3.2 million barrels. Production increased rapidly after 2006 and by 2009 had surpassed the production level seen in 2000. By 2012 production had increased even further, to 7.4 million barrels, an increase of 2.7 million barrels over 2000 levels. Despite the increase, the county's 2012 production only accounted for about 4% of total crude oil production in California that year (U.S. Energy Information Administration, 2013).

Exhibit 7.19



(State of California Department of Conservation, 2011)

Gas production in Monterey County has seen similar growth over the past decade. From 2000 to 2007 production remained relatively static. Production spiked after 2007, and by 2010 production had peaked at over 1.5 BCF. In 2011 and 2012, there were slight decreases from 2010s peak but production remained well above 2000–2007 levels. Like the oil production numbers, gas production has dramatically increased from 2000 production levels, illustrating the production possibilities in the county. Despite these increases, production levels are small relative to state production. In 2011, Monterey's gas production of 1.3 BCF represented only 0.5% of California's total gas production (U.S. Energy Information Administration, 2013). While petroleum production does not represent a large portion of state totals and is not a large part of the county's economy, the growth in oil and gas development signifies the potential of energy extraction to be a large contributor to Monterey County's economy (Monterey County Office of Housing and Redevelopment, 2011).

As energy production continues to increase in Monterey County officials will have to work through land rights issues that have recently presented challenges to residents and petroleum companies. For example, almost all of the 6,000 acres leased by the BLM in December 2012 are "split estate lands" where federal minerals are overlain with private surfaces (DOI BLM, September 13, 2012, p. 1). This can cause conflicts when the intentions of those who hold the mineral rights differ from those of the surface owner.

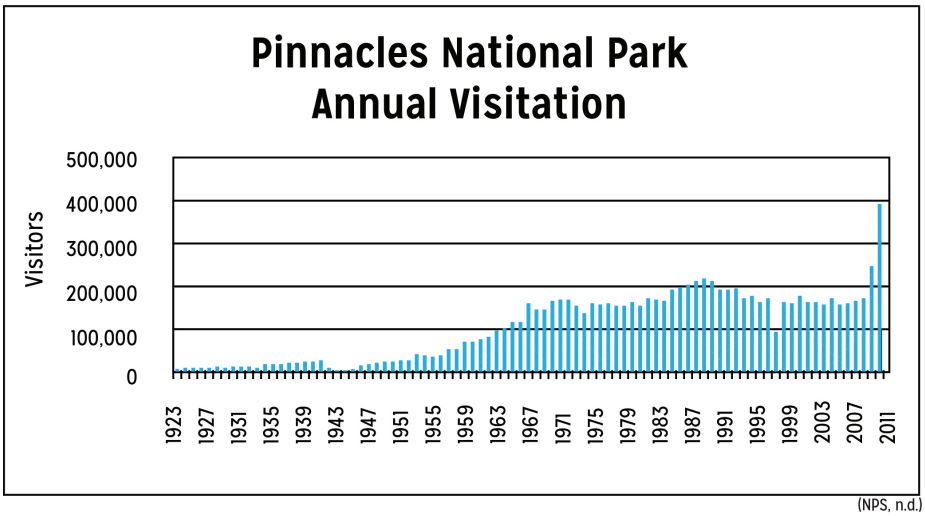
Amenity Development

The Salinas Valley has always served as an economic foundation for Monterey County, and as a leader in agricultural activity in Central California it has acquired the nickname "America's Salad Bowl" (Anderson, 2000). Today, the Salinas Valley is the number-one vegetable-producing region in the nation, producing the most broccoli and cauliflower of any region in the United States and serving as one of the world's largest lettuce exporters (Delsol, 2011). Recently, agriculture in the valley has begun attracting tourists to enjoy farm visits, museums, and wine tours. These attractions range from large-scale farms such as Earthbound Farm (the world's largest organic producer) to customized, guided tours organized by independent consultants (Delsol, 2011).

Monterey County's coastline also attracts tourists and provides numerous outdoor amenity opportunities. Many of these activities occur in one of Monterey County's 10 state parks or 7 state beaches. "When you look at the diversity of state parks within the Monterey District area, you begin to realize that there is something for everyone—recreational activities, scenic beauty, natural and cultural history sites, and educational programs," explained Dave Schaechtele, Public Information Officer for the State Parks Monterey District (California Department of Parks and Recreation, n.d.). According to the California Protected Areas Database, more than 450,000 acres of Monterey County are classified as protected areas, ranging from small, urban parks to national wilderness areas (California Protected Areas Database, 2012). Monterey County has two natural reserves and nine marine protected areas. It includes parts of the Los Padres National Forest, Salinas River National Wildlife Refuge, Ventana Wilderness, and Pinnacles National Park.

Exhibit 7.20 shows annual visitation to Pinnacles National Park, an ancient volcano field, over several years. Visitation increased dramatically in recent years, reaching an all-time high in 2011. Because of the extreme climate in Pinnacles National Park, this area sees higher visitation in fall, winter, and early spring (NPS, 2013). The monument hosts more than 30 miles of hiking, hundreds of rock climbing routes that have led the area to become one of the premiere rock climbing destinations in the U.S., two caves to explore, and guided ranger hikes (NPS, 2013).

Exhibit 7.20



(NPS, n.d.)

Monterey County is also home to some iconic places, like Pebble Beach, Highway One, and the Monterey Bay Aquarium. Pebble Beach is home to several resorts and golf courses, some of which are considered among the most beautiful in the world. Pebble Beach Golf Links is especially famous, having hosted 11 U.S. Golf Association Championships and holding a National Pro-Am tournament each year (National Geographic, 2013(a)). Visitors interested in Monterey County's stunning scenery can drive the winding Highway One, running along the California coastline and ranked among the world's most beautiful drives (National Geographic 2013(b)). Monterey County also has the Monterey Bay Aquarium. Since the aquarium's opening in 1984, the total number of visitors through the year 2011 was 49 million (Wilder, 2012, p. 4). The aquarium is home to more than 35,000 plants and animals that together represent more than 550 different species, displayed in over 200 galleries and exhibits within the aquarium (Wilder, 2012, p. 4).

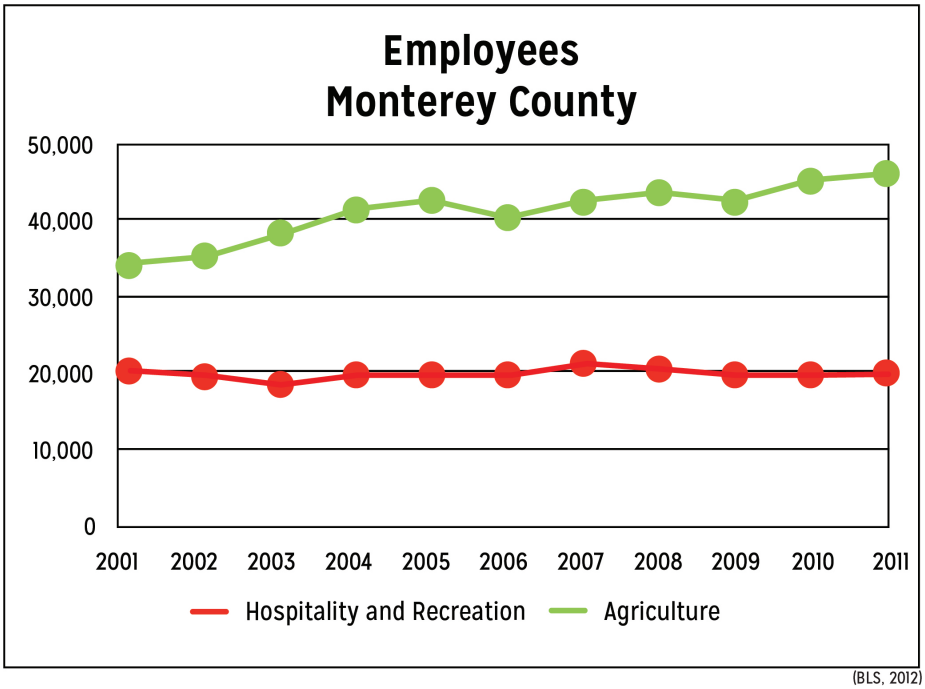
Economic Indicators

Monterey County's economy is heavily dependent on agriculture—it is the third largest agricultural county in California (Economic Development Department, Monterey County, 2011(a)). Agriculture contributes $8.2 billion per year to the local economy, directly through output and indirectly through expenditures by agricultural companies and employees (Langholz and DePaolis, 2011). The wine industry alone in Monterey County produces at least $238 million dollars (County

of Monterey, 2011(b)). Monterey County's economy is also reliant on the retail and housing and construction sectors, both of which were hit hard by the economic crisis, making Monterey County's recovery slower than that of other California counties (Beacon Economics, 2011, p. 21).

The percent of civilian residents aged 16 years and older in Monterey County employed by sector can be seen in Exhibit 7.3. Agriculture, forestry, fishing and hunting, and mining, of which oil and gas is a subset, employed 15.01% of this population in 2007, nearly seven times the state average. This result is not surprising given the county's active agriculture sector, which is included in this percentage. Monterey County also has higher than the state average employment in the arts, entertainment, recreation, accommodation, and food services sector, with 10.72% of the civilian labor force over 16 years old employed here.

Exhibit 7.21

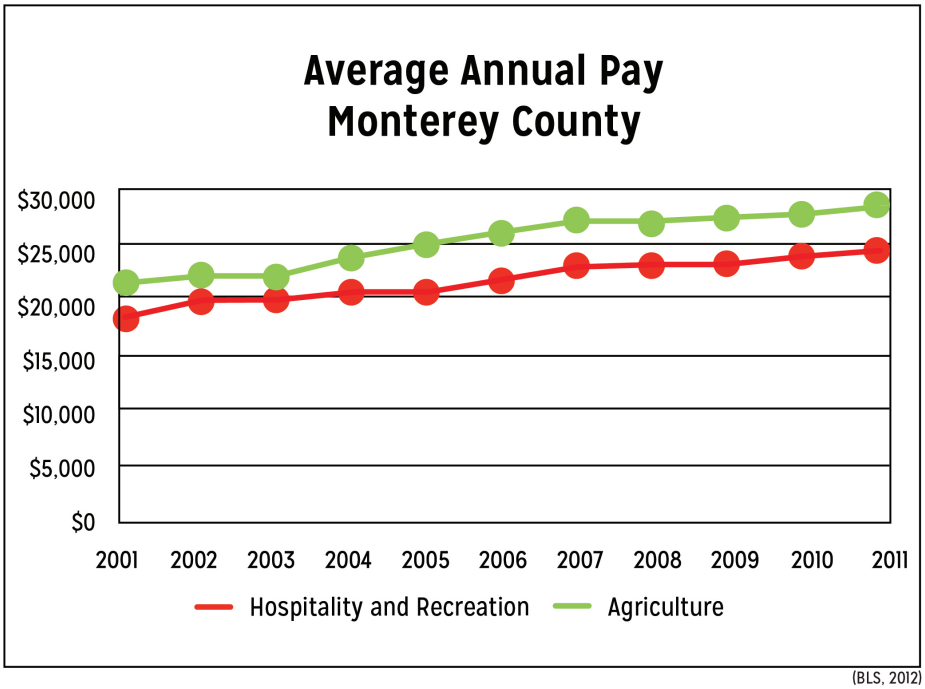


(BLS, 2012)

Exhibit 7.21 shows employment data in Monterey County. Employment in the hospitality and recreation industry has been fairly constant over time, while jobs in agriculture have grown considerably over the past decade (data for upstream oil and gas are unavailable for Monterey County). Exhibit 7.22 shows a steady increase in average annual pay in both industries over the past decade, though this data is

not adjusted for inflation. Both the employment numbers and the wages in these industries held fairly steady during the financial crisis of 2007–2008. The average annual pay for jobs in the agricultural sector has remained higher than those in hospitality and recreation from 2001 to 2011.

Exhibit 7.22



(BLS, 2012)

Monterey County realizes economic benefits from these sectors. The Pebble Beach Company, which owns several resorts and golf courses (including Pebble Beach Golf Links), was the number two property taxpayer in Monterey County in 2012 with a taxable assessed value of $567 million (County of Monterey, 2012). Another 3 of Monterey County's top 16 property taxpayers were agriculture companies, including Dole Fresh Vegetables (which had a taxable assessed value of $66.9 million dollars), and another was a petroleum company (County of Monterey, 2012). These tax figures help show how important these industries are to Monterey County.

Development Strategies

Currently, agriculture and tourism are major drivers of Monterey County's economy. With an abundance of farmland and natural beauty, these traditional sectors will continue to play important roles in the county well into the future. With increases in energy production and growing interest in energy exploration in the county, residents, industry personnel, and officials will need to determine to what extent they want to balance the county's abundant resources.

The growing potential for increased energy production has created some concerns in the county. Land rights issues, mentioned previously, are a source of potential conflict, though the recently leased split-estate parcels are unlikely to be developed quickly—the BLM estimates that only one new exploration well will result from the December 2012 lease sale (United States Department of the Interior, 2012, p. 93). Paula Getzelman, who co-owns TreGatti Vineyards in Southern Monterey County, and who served as President of Monterey County Vintners and Growers Association, is worried about the possible effects of oil exploration near her land, especially if those activities include hydraulic fracturing. Some residents are concerned about water quality and use as related to hydraulic fracturing. Getzelman stated, "Most of the people in our area are not adamantly opposed to [hydraulic fracturing] as much as we are opposed to [hydraulic fracturing] without any additional information" (Reddall, 2012).

To address these concerns, both county officials and petroleum companies are trying to expand communication and respect resident views. In an effort to obtain more information about energy development, the county began a new, more rigorous permit application process that requests information on drilling techniques for new permit applications (Rubin, 2010).

With a strong amenity-based economy and a growing energy presence, Monterey County highlights some of the trade-offs involved in preserving the integrity of amenity opportunities while developing energy resources. One obstacle faced by energy development in Monterey County is the perception by residents that energy development and environmental integrity are mutually exclusive. Education about the safety of techniques such as hydraulic fracturing and visible efforts by the

industry to demonstrate their commitment to safety and environmental protection will help bridge that gap. However, it is up to Monterey County residents and policy makers to determine the extent to which the county's energy potential will be realized.

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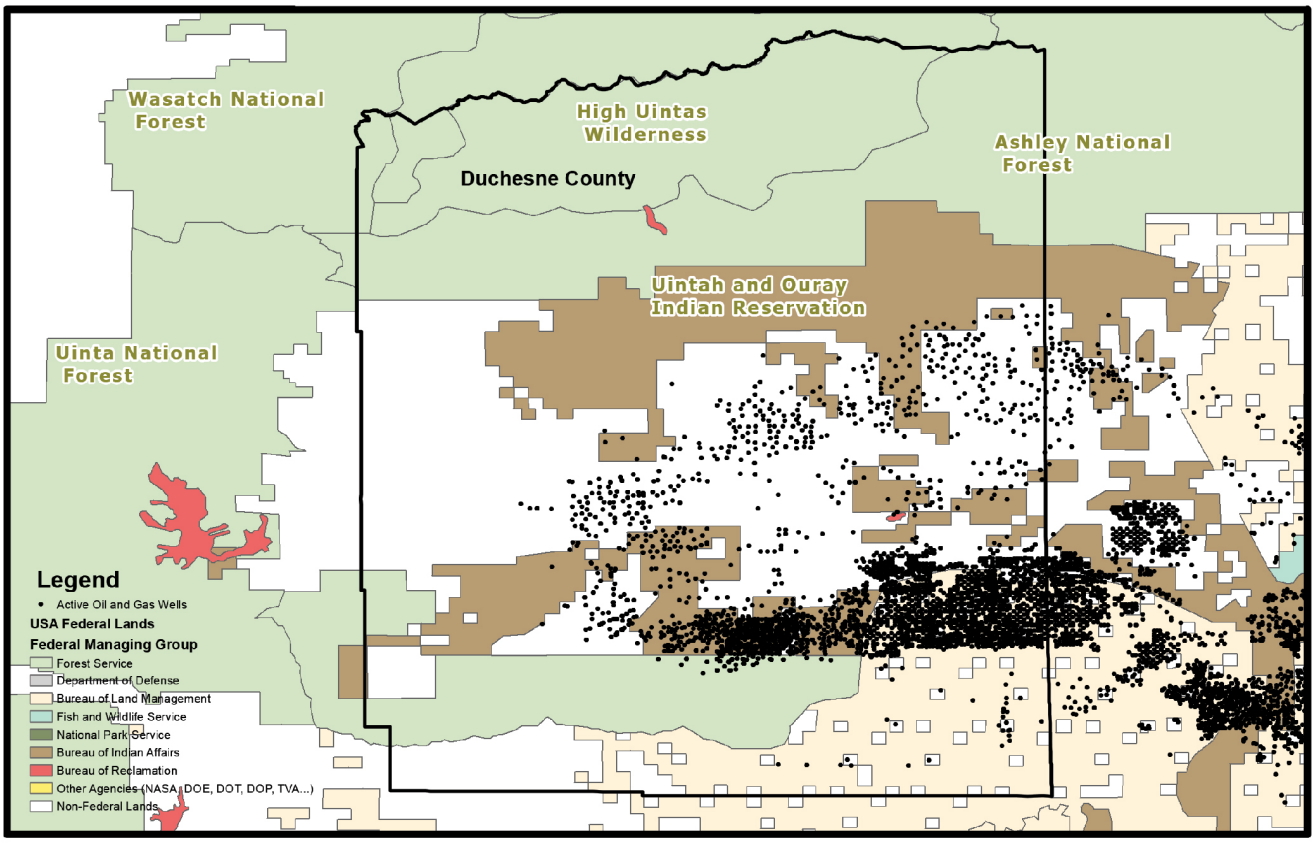
Appendix

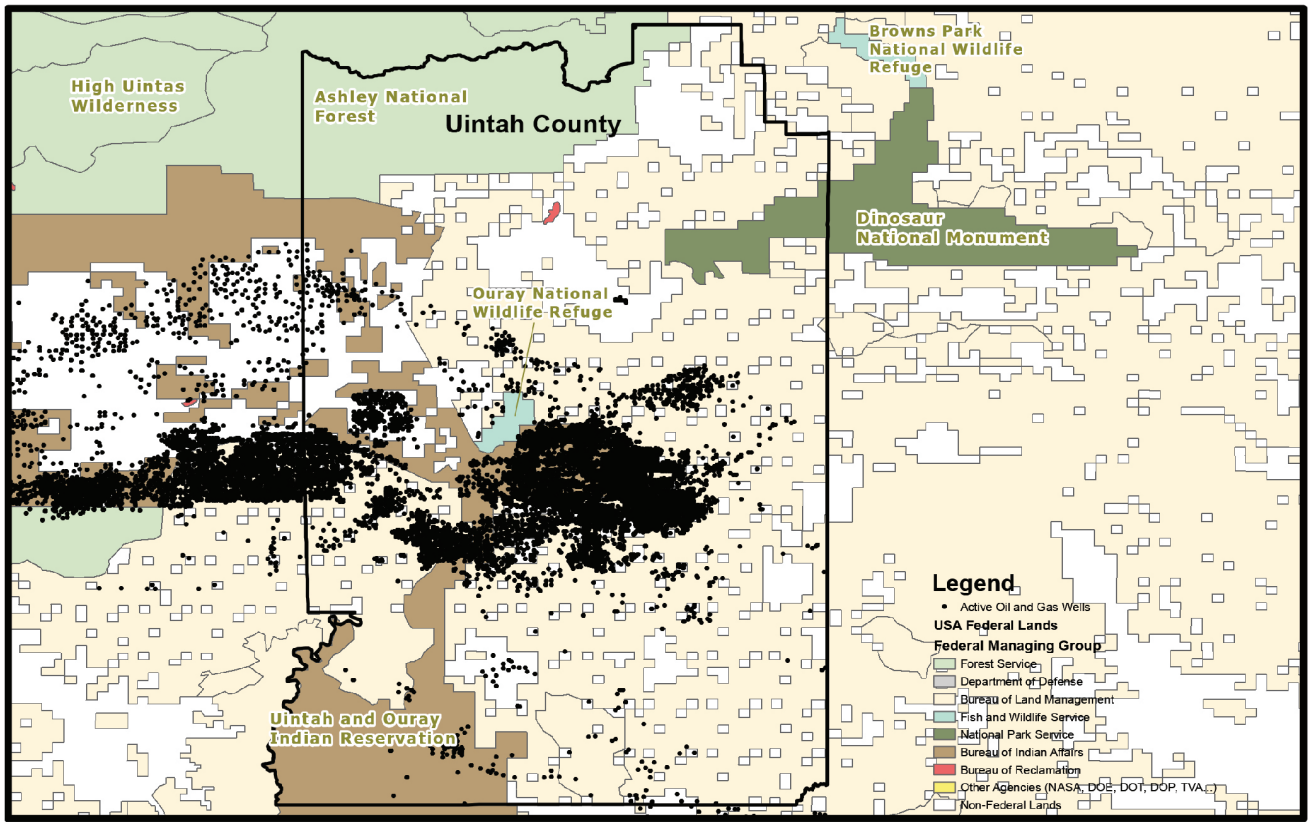
Active Oil and Gas Wells

Exhibit 2.5 Active Oil and Gas Wells in Duchesne County, UT



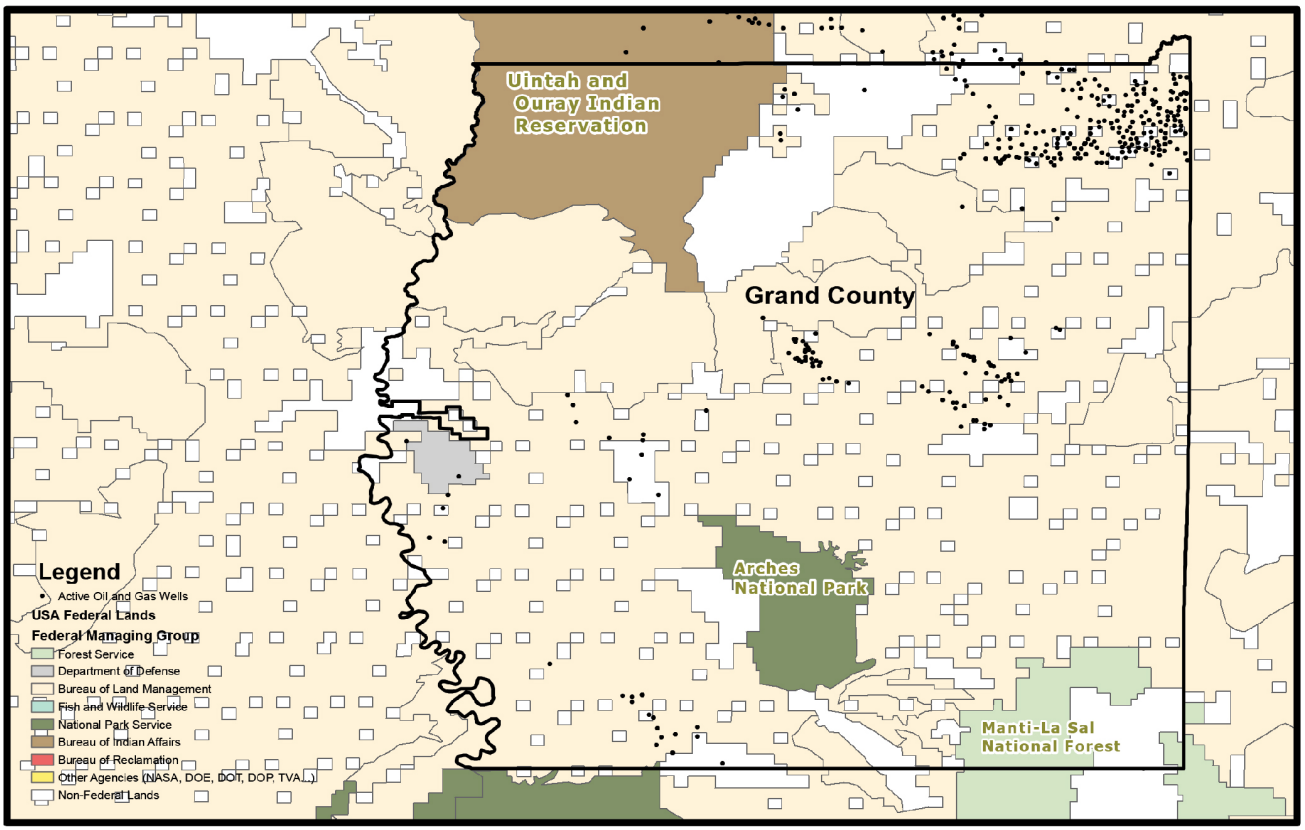
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 2.11 Active Oil and Gas Wells in Uintah County, UT



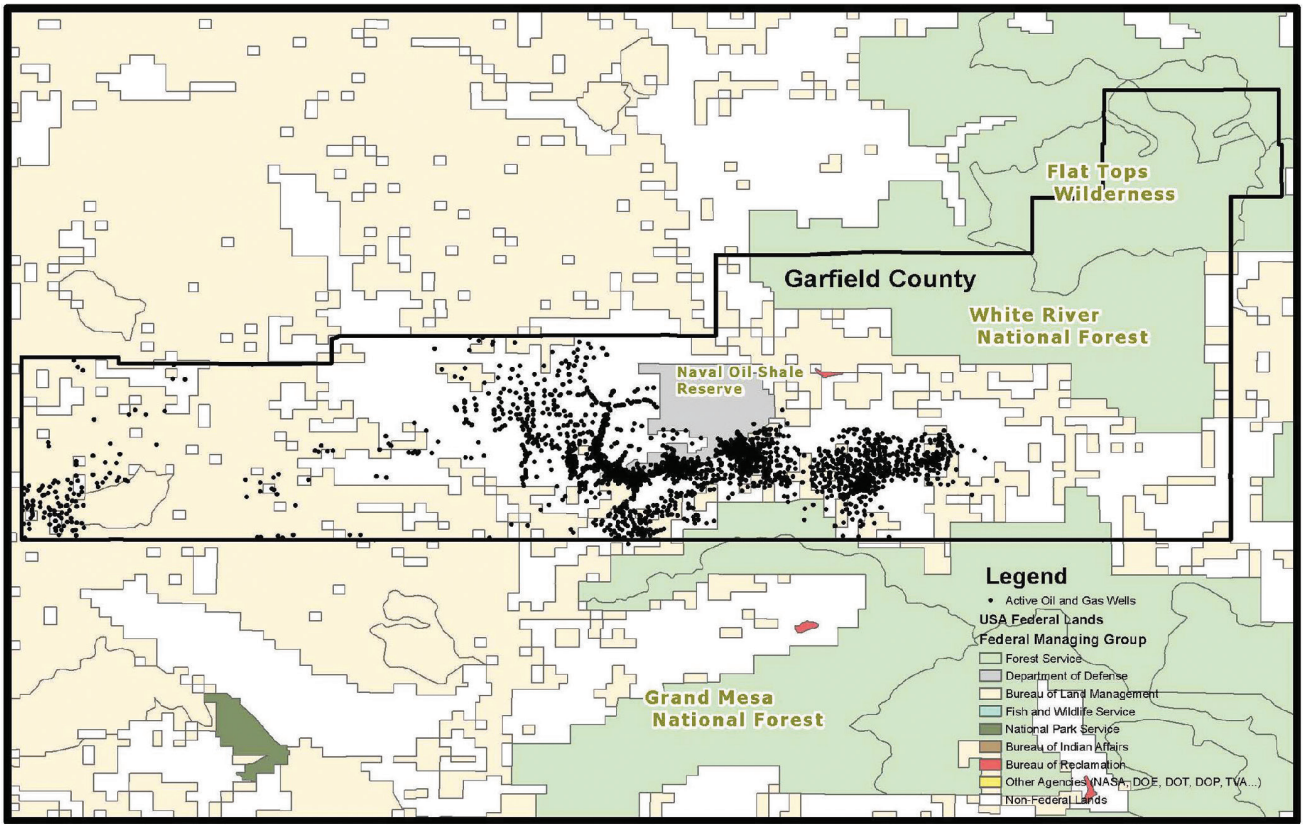
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 2.18 Active Oil and Gas Wells in Grand County, UT



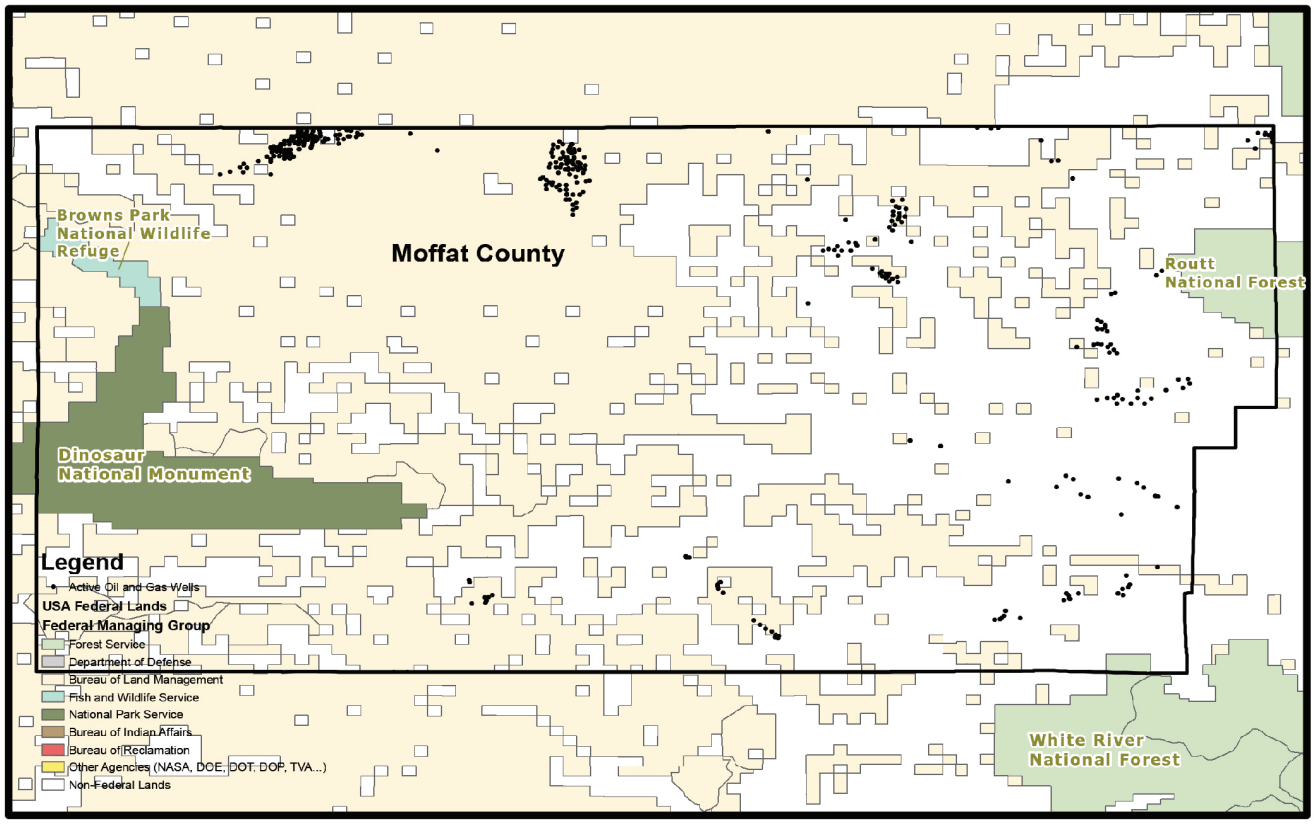
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 3.5 Active Oil and Gas Wells in Garfield County, CO



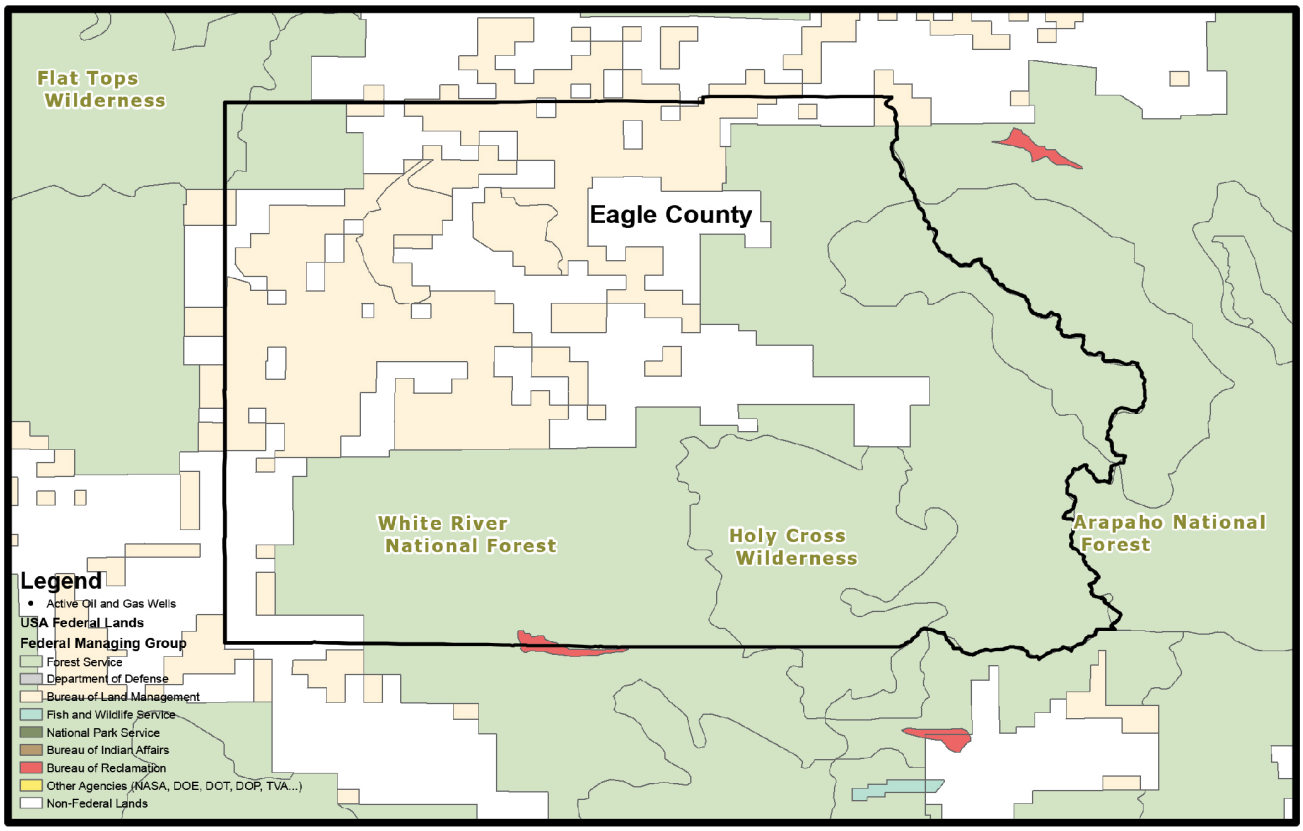
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 3.12 Active Oil and Gas Wells in Moffat County, CO



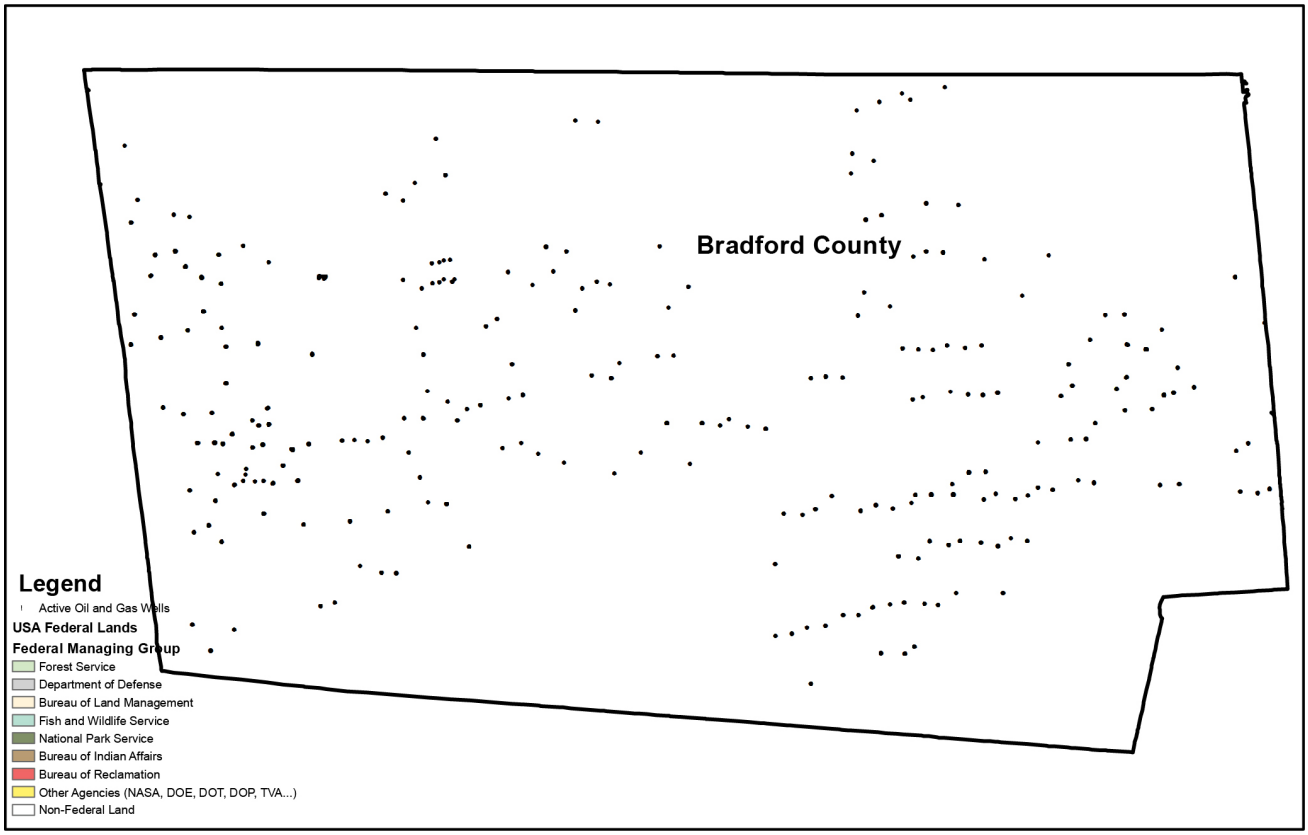
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 3.19 Active Oil and Gas Wells in Eagle County, CO



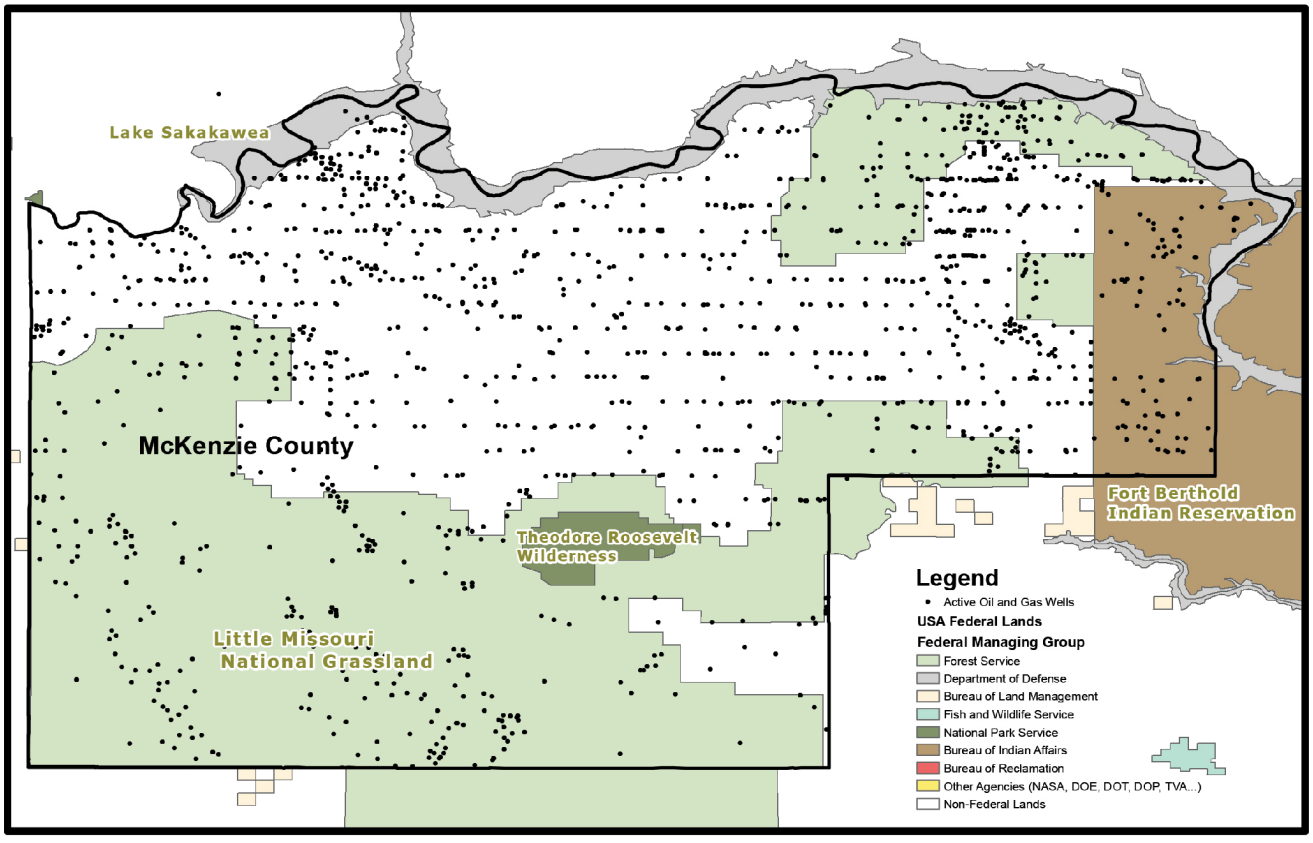
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 4.3 Active Oil and Gas Wells in Bradford County, PA



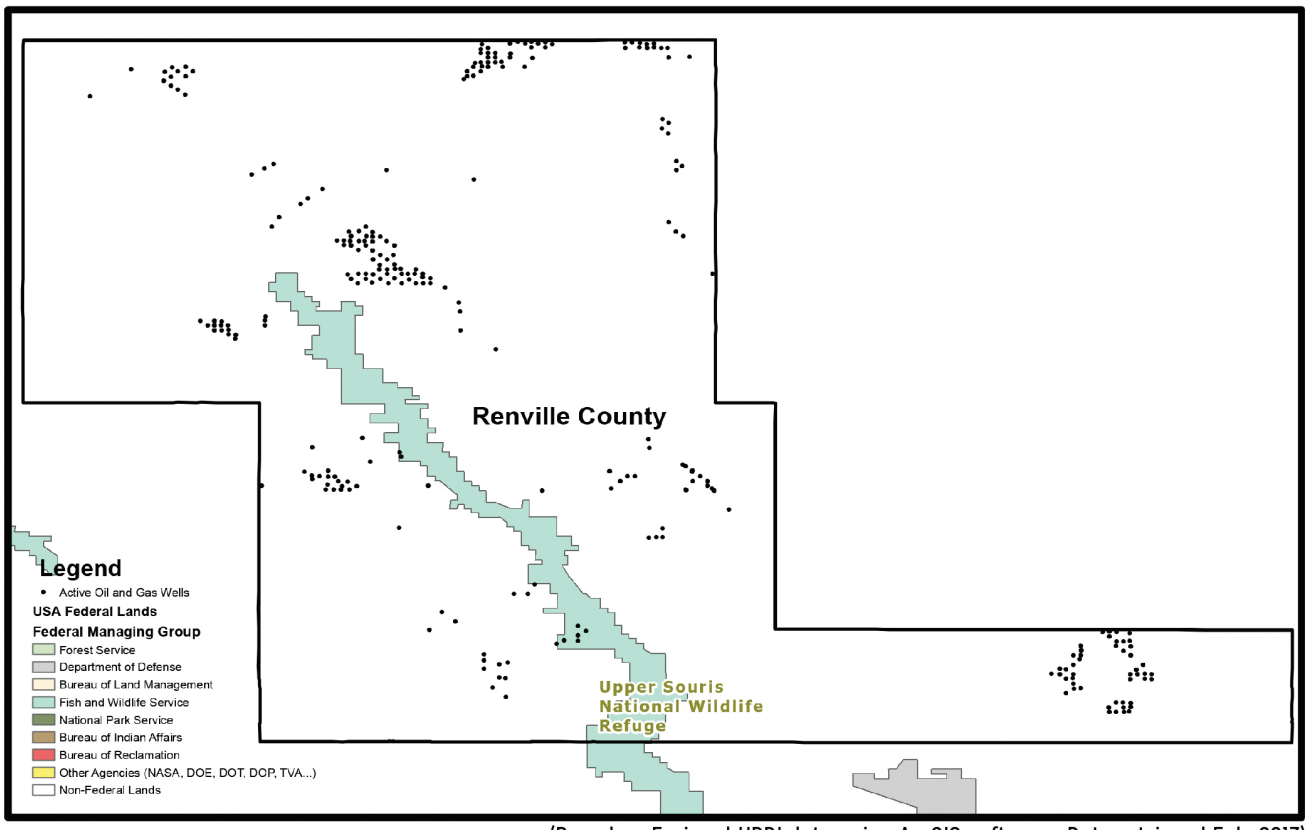
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 5.5 Active Oil and Gas Wells in McKenzie County, ND



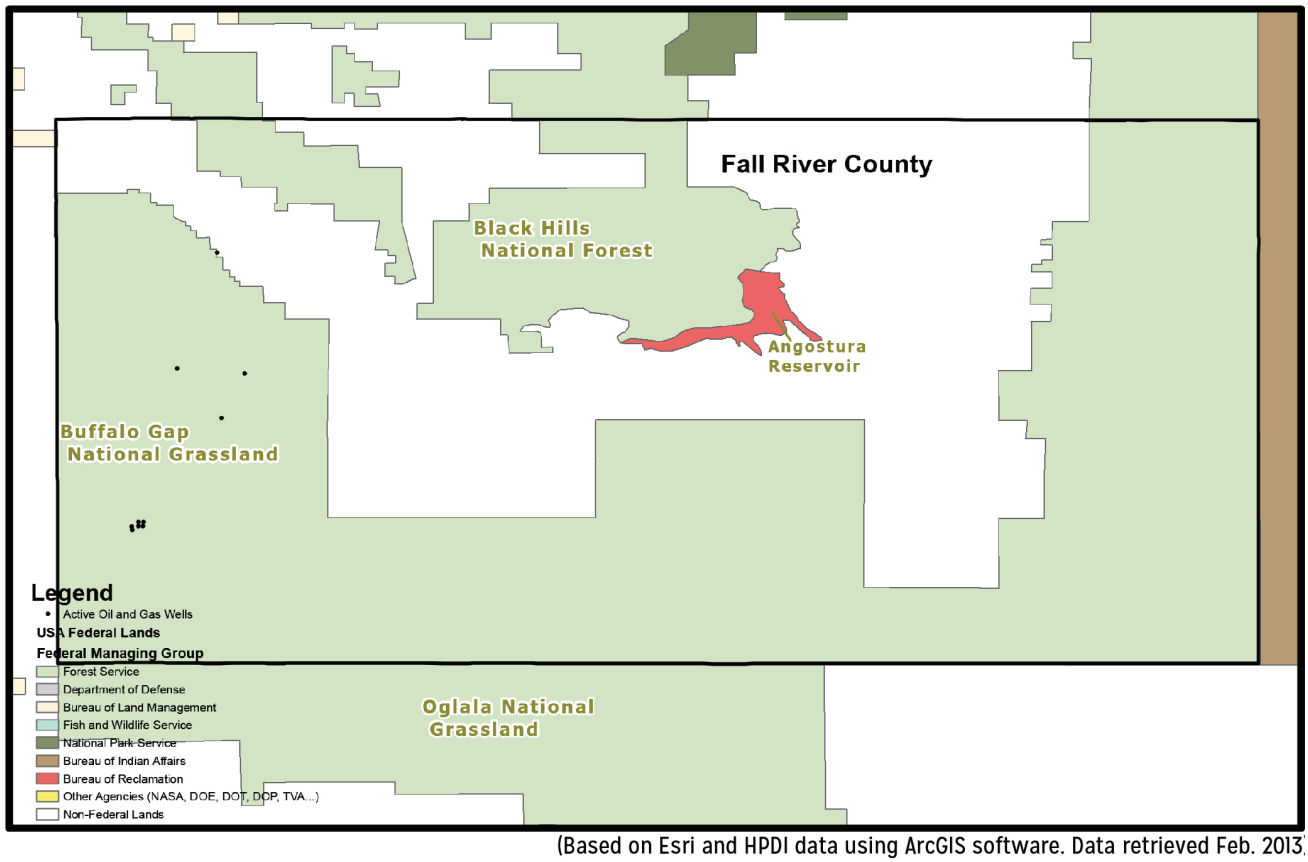
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 5.11 Active Oil and Gas Wells in Renville County, ND



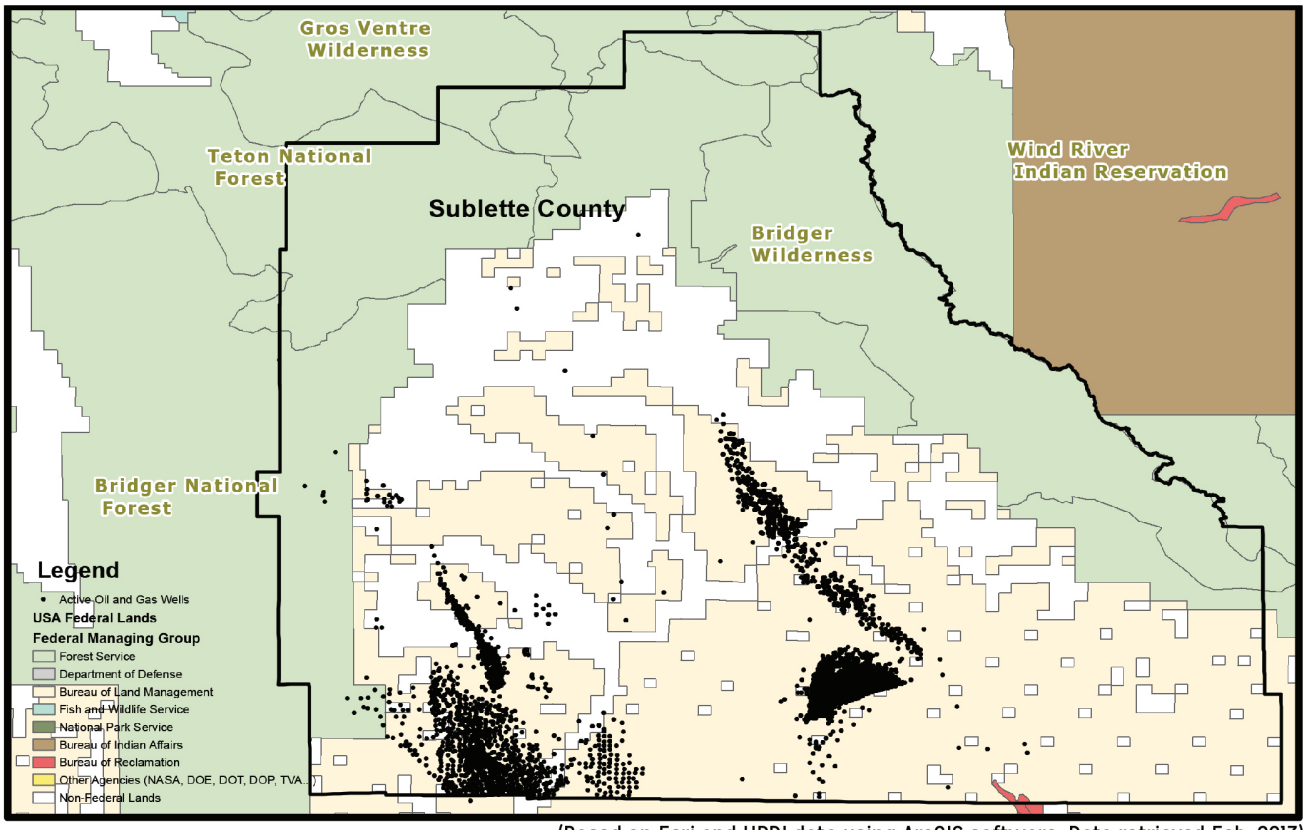
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 5.16 Active Oil and Gas Wells in Fall River County, SD



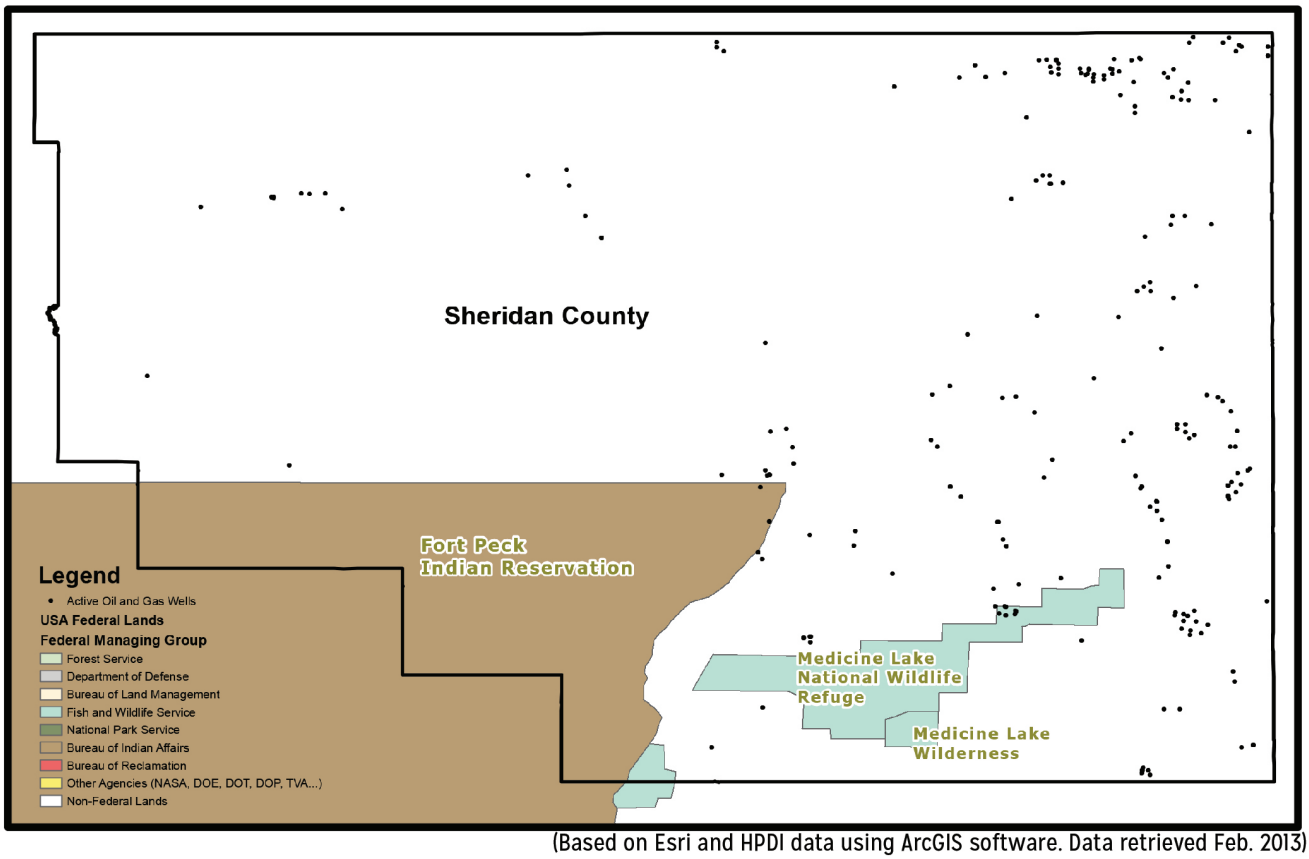
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 6.5 Active Oil and Gas Wells in Sublette County, WY



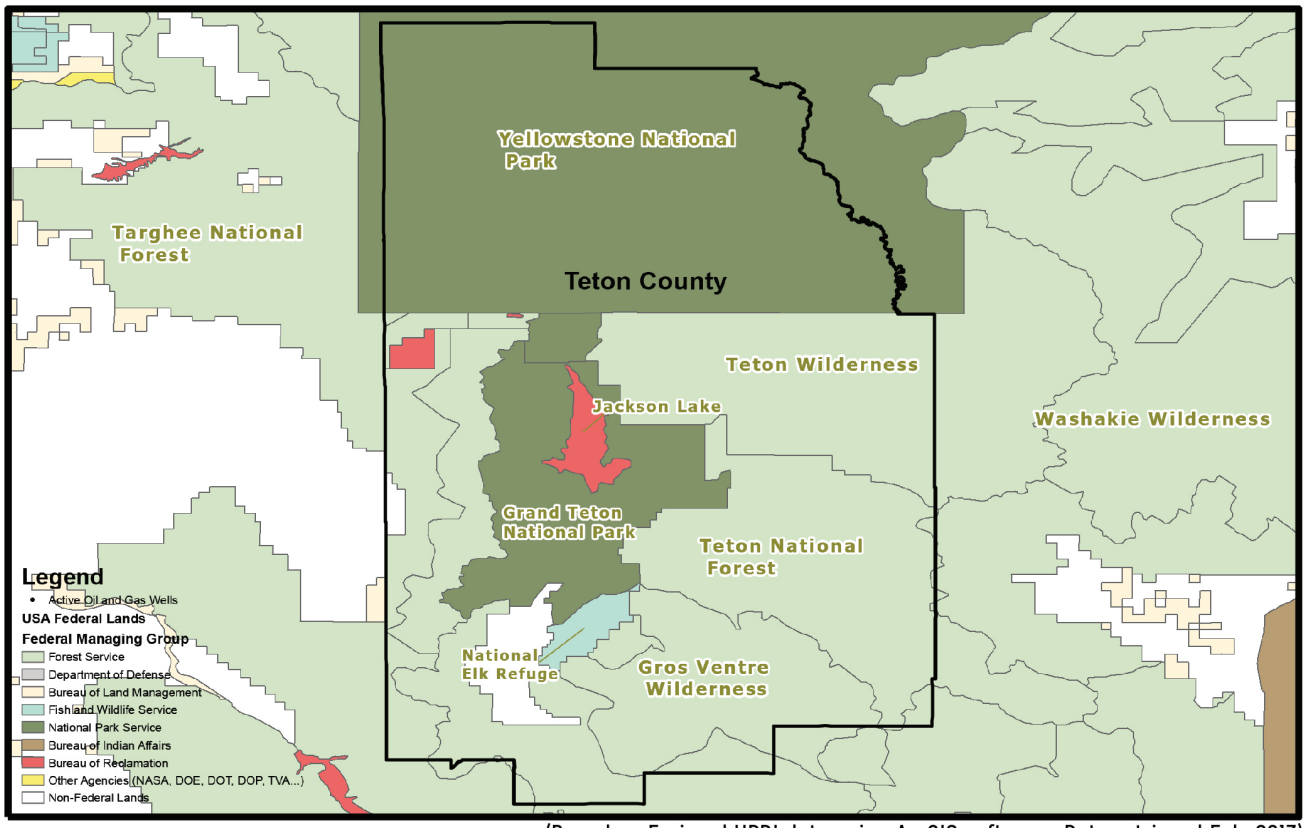
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 6.10 Active Oil and Gas Wells in Sheridan County, MT



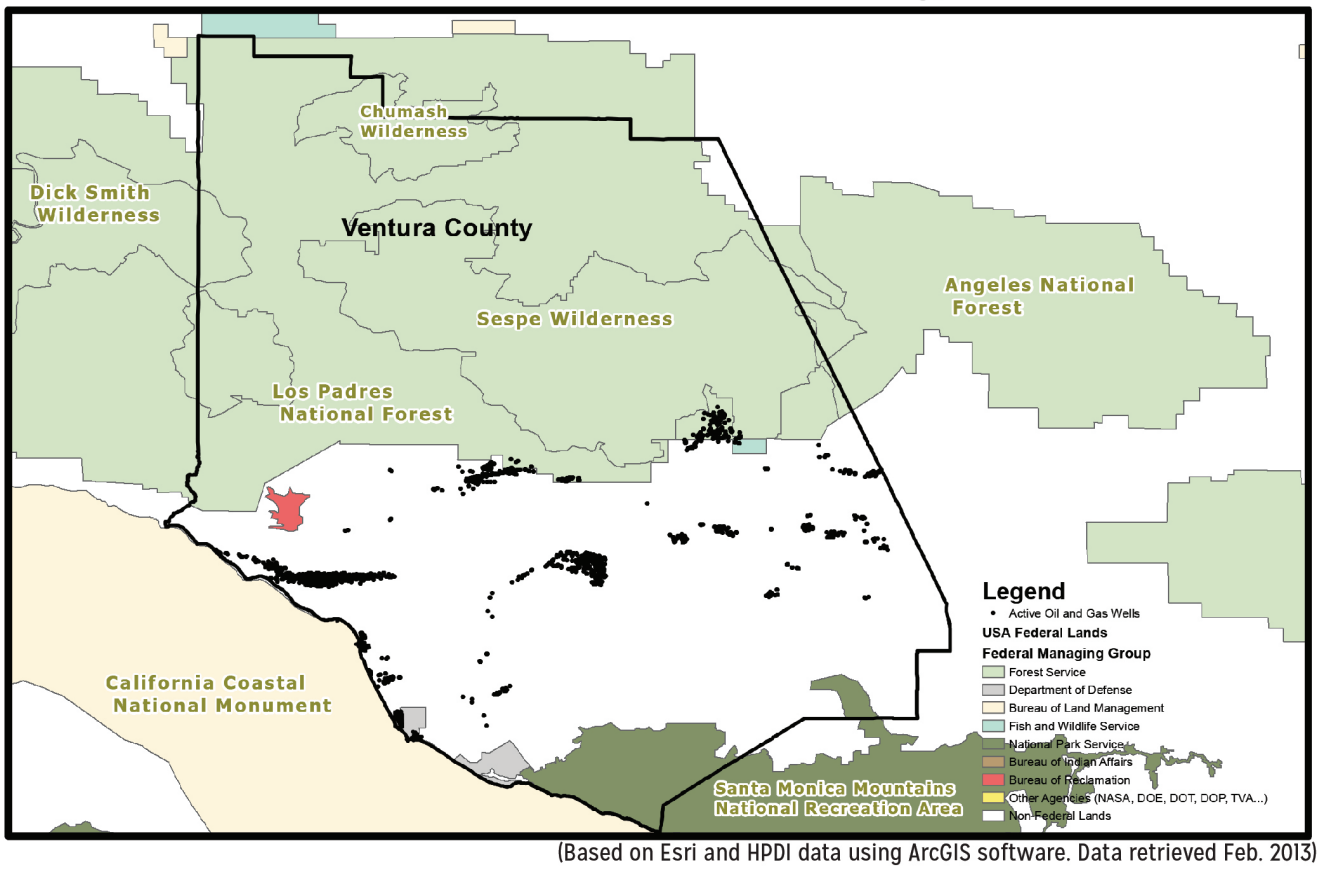
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 6.14 Active Oil and Gas Wells in Teton County, WY



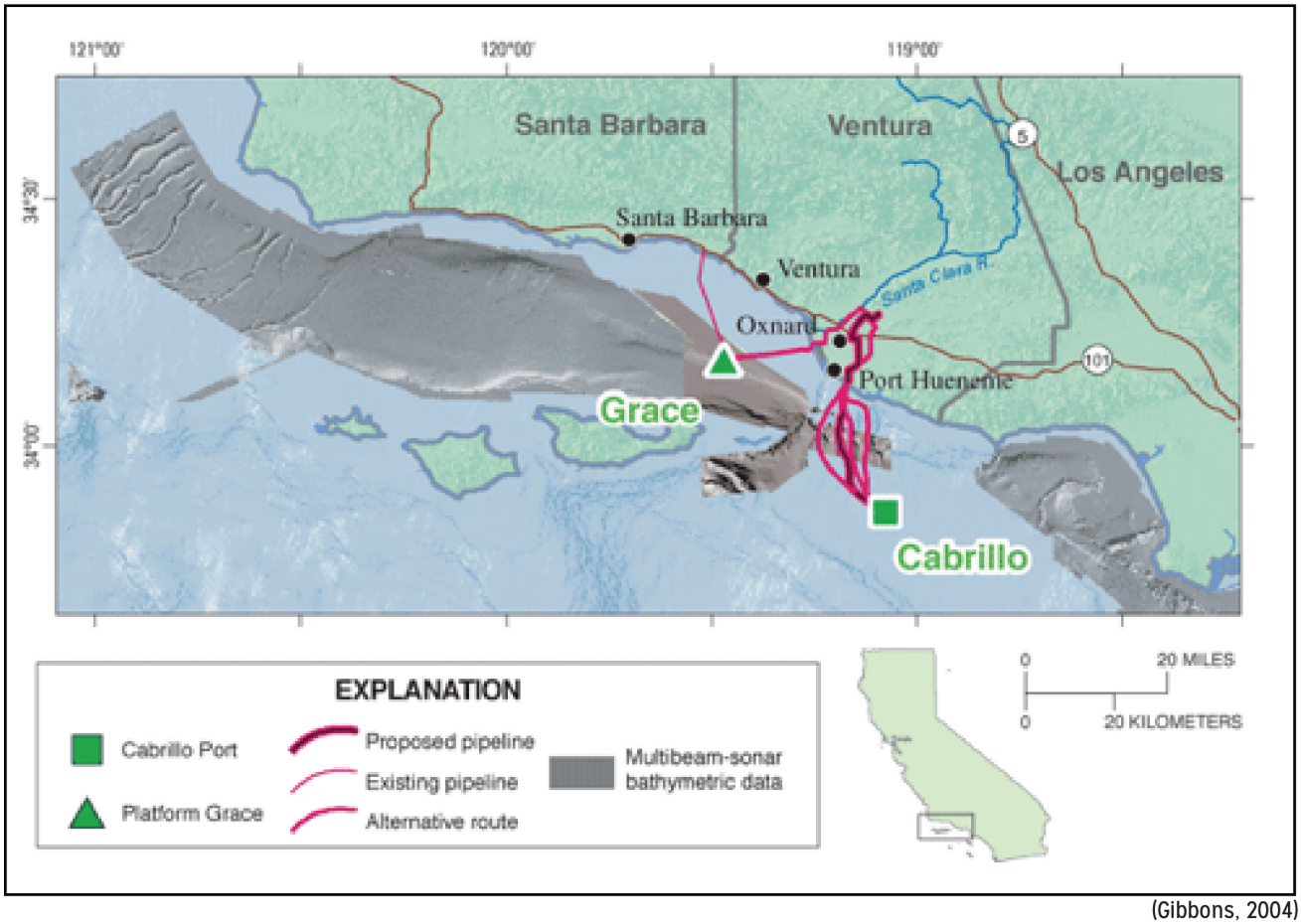
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 7.5 Active Oil and Gas Wells in Ventura County, CA



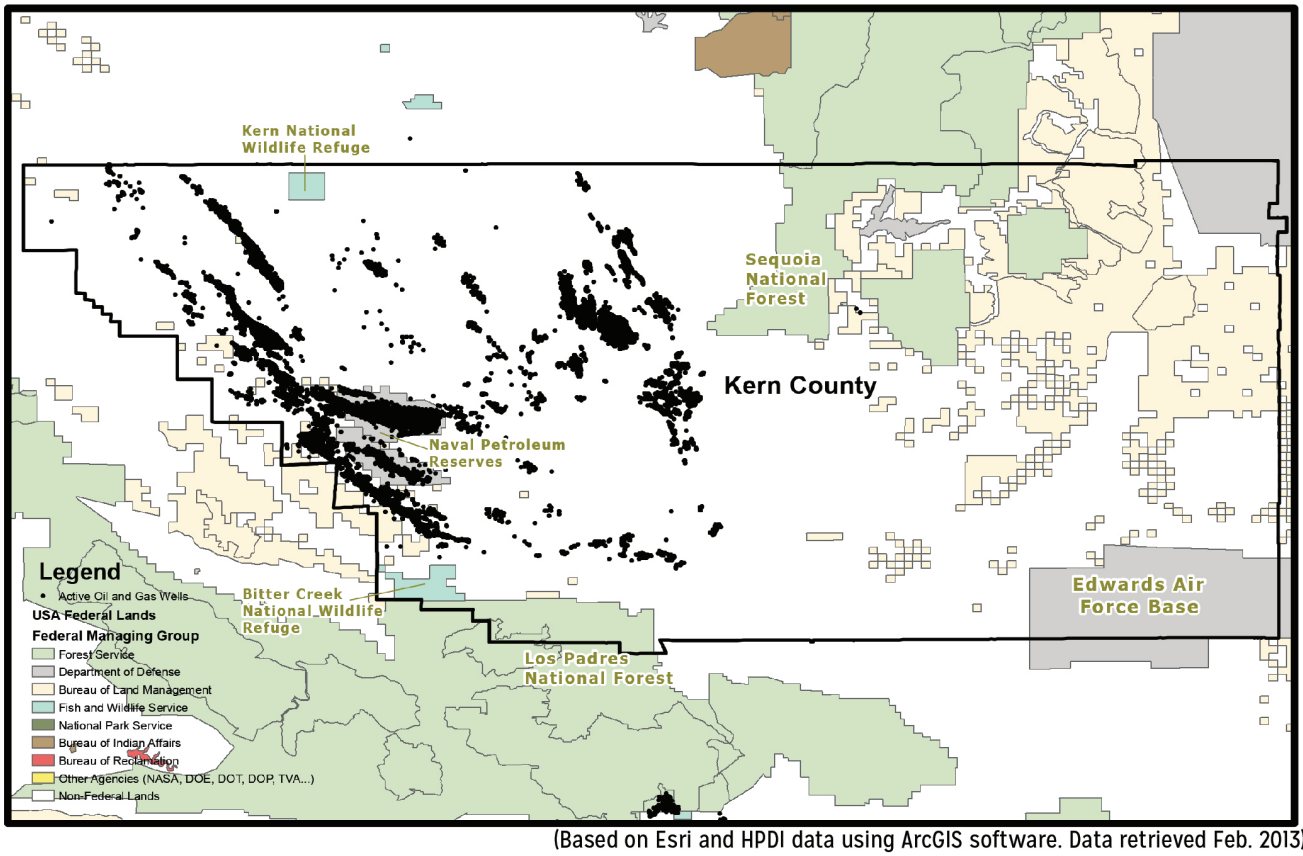
(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 7.6 Oil Platforms off Ventura County's Coast



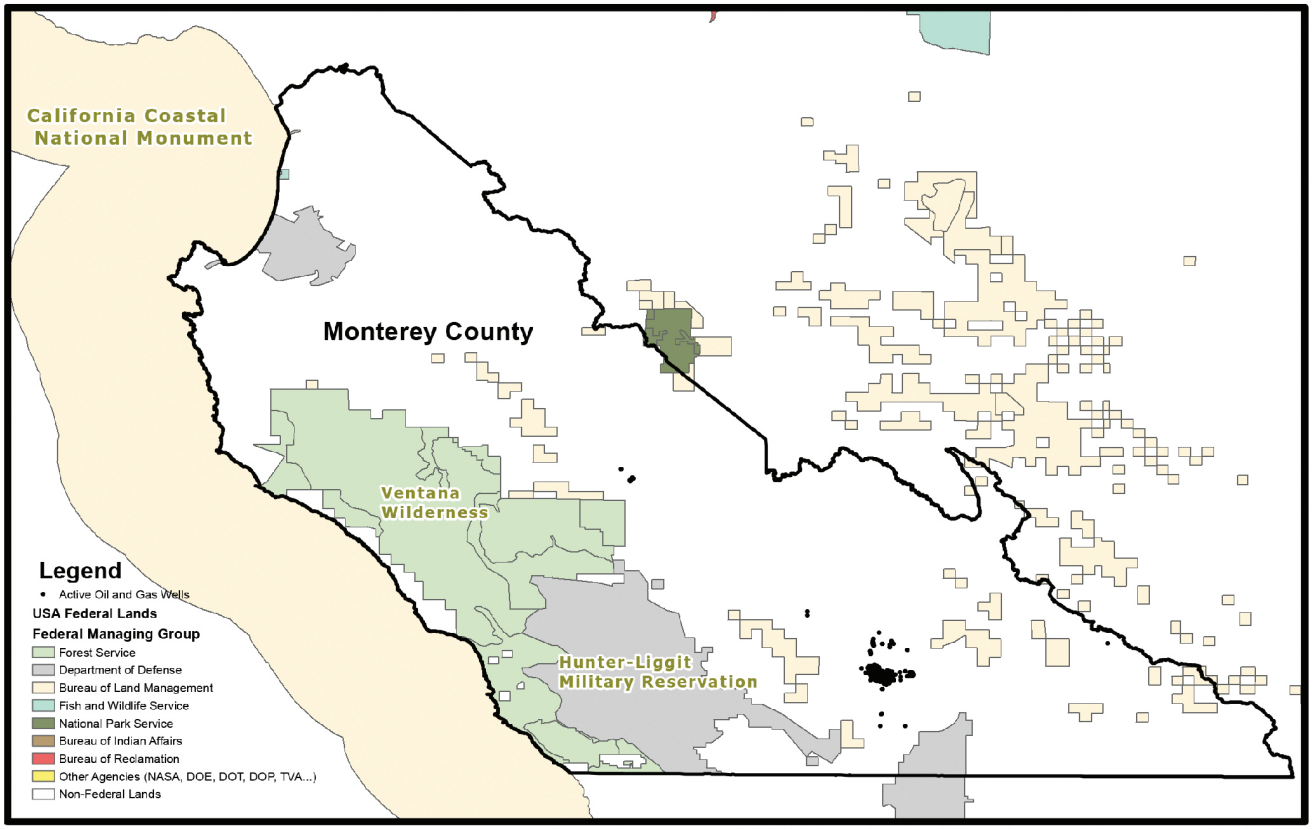
(Gibbons, 2004)

Exhibit 7.12 Active Oil and Gas Wells in Kern County, CA



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)

Exhibit 7.17 Active Oil and Gas Wells in Monterey County, CA



(Based on Esri and HPDI data using ArcGIS software. Data retrieved Feb. 2013)