



Energy Development in the Rockies

Tempering the Boom, Avoiding the Bust

By Brian Hall and Chris Jackson

THE 2007 COLORADO COLLEGE STATE OF THE ROCKIES REPORT CARD

The 2005 Energy Policy Act calls for dramatically enhanced domestic exploration and resource development of fossil fuels, including oil, coal, and natural gas. For the Rockies Region, with its concentration of these natural resources, this plan is particularly important. New demands are being placed on oil and gas production, coal extraction, oil shale exploration, and energy transmission via power lines, pipelines, railways, and roads.

Many of these demands occur in rural regions, where communities are small and the infrastructure is limited. The sudden influx of workers, support services, and new infrastructure stresses these communities. They become “boom” towns, witnessing extraordinary spikes in employment and income, a large influx of newcomers, and the benefits and costs that have historically been associated with new economic development. City, town, and county govern-



ments may find such booms bittersweet: growing tax revenues coincide with greater demands for infrastructure and government services, often by workers who will only remain in the community temporarily. Local labor shortages can also occur as workers in other industries move to the energy sector for higher wages.

In addition to impacts on communities and regions, rapid energy development can also stress land and water resources. Oil and gas drilling impact the land, native ecosystems, wildlife habitat, and water quality. The extent of this impact is determined by the type of drilling activity (e.g., natural gas versus coalbed methane production), the concentration of that activity (e.g., directional drilling with multiple wells per pad), and the environmental practices of the drilling company. In addition, the quality and quantity of surface and ground water can change, often to the detriment of

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ranchers, recreational users, and municipalities. A patchwork of private versus public ownership further complicates the process of monitoring and accommodating (if not minimizing) these impacts on land, water, and wildlife.

This section of the 2007 *State of the Rockies Report Card* evaluates the energy boom presently underway in the region. First, the primary forces of energy supply and demand are reviewed. Next is a discussion of the the federal energy leasing process, which strongly affects the location and pace of energy development in the Rockies. Finally, the socioeconomic costs and benefits of the energy boom are presented.

Energy Supply, Demand, and Infrastructure in the Rockies

To understand the costs and benefits of the current Rockies energy boom, it is important to first understand its origin. This section examines the current energy boom in terms of energy demand and supply, infrastructure statistics, the oil and gas leasing process, and the political climate.

Demand and Supply

Rising U.S. energy consumption has spurred oil and gas development in the West. In 2005, oil and gas accounted for 63% of total energy consumption in the U.S.¹ Figure 1 shows trends in oil and gas consumption over time and illustrates the rising demand for energy, a consequence of a growing population (note that total energy consumption per household actually fell from 138 million BTU in 1978 to 92 million BTU in 2001).² Domestic consumption of natural gas and oil has risen from 17 quadrillion BTUs in 1949 to 63 quadrillion BTUs in 2005.³ To meet the growing demand, the U.S. has developed domestic natural resources and imports oil and gas from other countries. In 2005, domestic production satisfied 33% of total U.S. oil consumption and 83% of natural gas consumption.⁴ With a growing population, U.S. energy demand will likely not diminish in the near future and will spur additional domestic production.

Domestic oil production has declined since peak production in 1970, associated with limited oil reserves, the economics of developing marginal wells, and development restrictions in environmentally sensitive areas (e.g., offshore areas and wildlife

Figure 1
Total U.S. Energy Consumption by Source,
1949 to 2005

Source: Energy Information Administration, Annual Energy Review, 2005

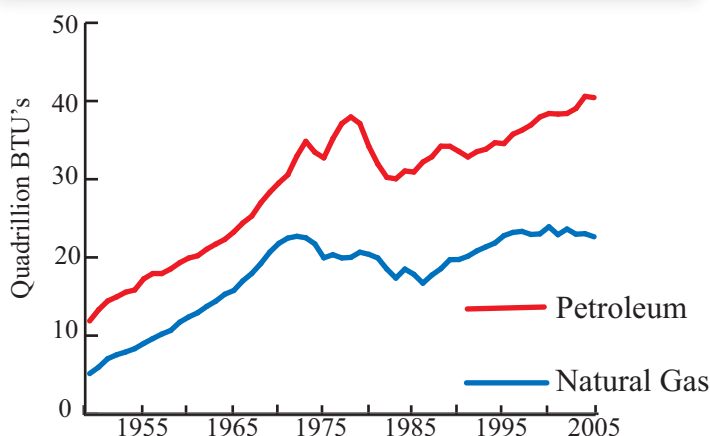


Figure 2

Oil Production by Census Region, 1981-2005

Source: Energy Information Administration

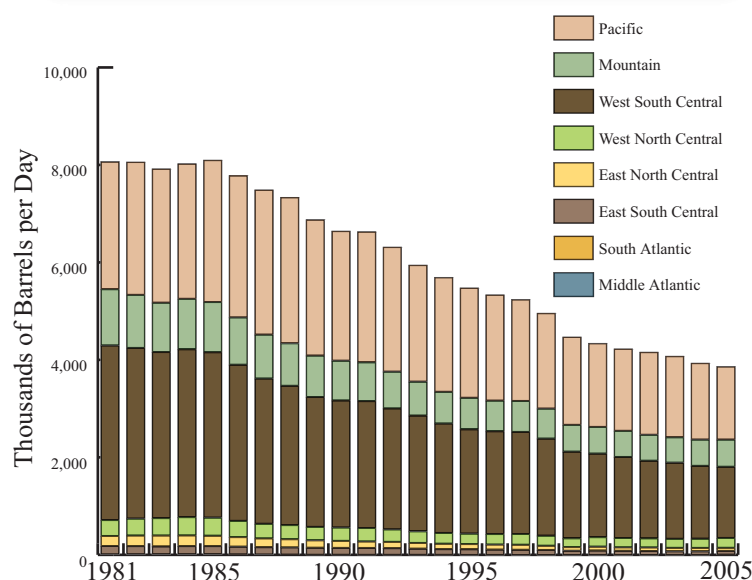
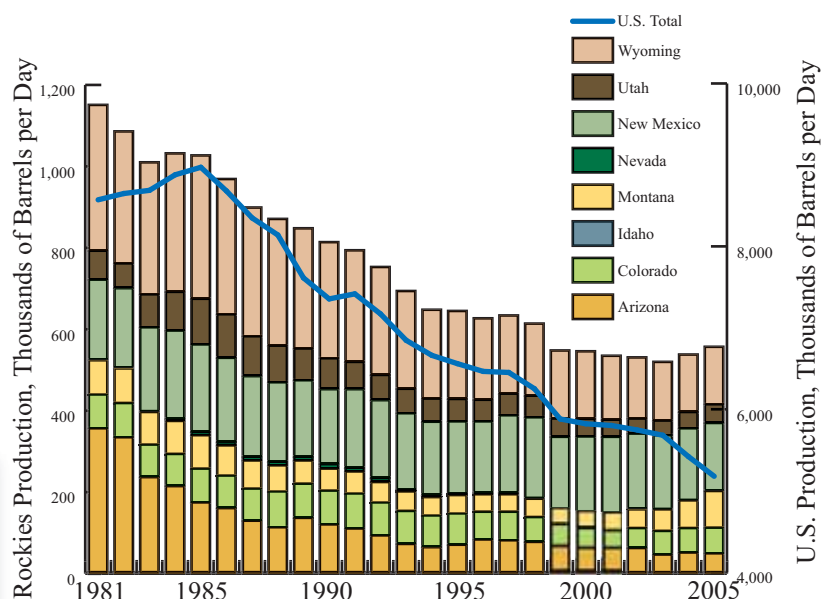


Figure 3

Rockies Oil Production by State, 1981-2005

Source: Energy Information Administration



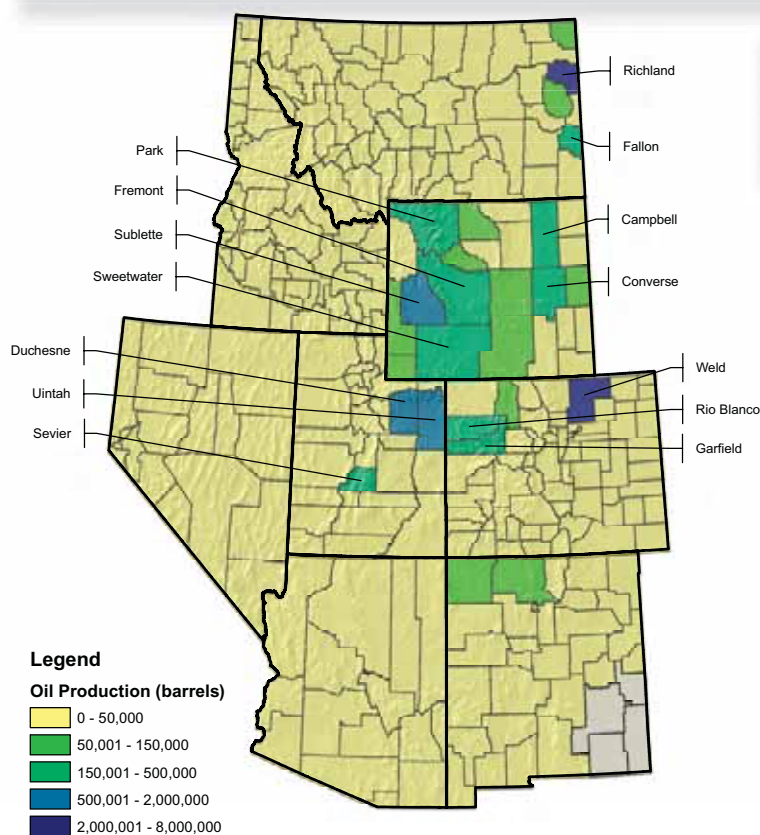
reserves). In 2005, the U.S. produced 5.1 million barrels of oil per day, down 47% since the 1970 peak.⁵ Oil production in the Rockies has also declined, though not at the national rate. In 2005, the Rockies produced 557,000 barrels of oil per day, roughly 11% of national production (Figure 2).⁶ Within the Rockies, New Mexico led in oil production in 2005, followed by Wyoming, Montana, Colorado, Arizona, Nevada, and Idaho (Figure 3).⁷ The top three oil producing counties in the Rockies are Richland County, Montana (Williston Basin), Weld County, Colorado (Denver Basin), and Duchesne County, Utah (Uintah Basin). Figure 4 and Table 1 show the top ten oil producing counties in Rockies Region. Note that because of data availability, these figures exclude counties in the highly productive Permian Basin in southeastern New Mexico.

U.S. Production, Thousands of Barrels per Day

ENERGY DEVELOPMENT

Figure 4**Top Oil Producing Counties in the Rockies, 2005**

Includes data supplied by Petroleum Information/Dwights LLC; Copyright 2006 Petroleum Information/Dwights LLC. Special thanks to Carol Hudson of IHS Energy



Note: the Permian Basin counties are not included in this assessment (Chaves, Eddy, Lea, and Roosevelt Counties)

Unlike oil production, domestic natural gas production is significantly increasing (Figure 5). In 2005, the Rockies states produced 5.6 trillion cubic feet (Tcf) of natural gas, accounting for 26% of total U.S. production.⁸ The Rockies' share of total U.S. production has been steadily growing over the last 15 years (Figure 6). Returning to Figure 5, Wyoming led in natural gas production among Rockies states in 2004, followed by New Mexico, Colorado, Utah, Montana, Nevada, and Idaho.⁹ The top three natural gas producing counties in the Rockies are Sublette County, Wyoming (Jonah Field in the Green River Basin), Garfield County, Colorado (Piceance Basin), and Uintah County, Utah (Uintah Basin). Figure 7 and Table 2 show the top 10 counties producing natural gas in the Rockies in 2005. These natural gas statistics clearly show the growing importance of Western states as a national energy supplier.

Energy Infrastructure in the Rockies

Examining the distribution of the oil and gas infrastructure illustrates the magnitude of the Rockies' energy boom and highlights the areas experiencing the most development activity. Figures 8 and 9 show the locations of oil and gas facilities and pipelines, and electric facilities and transmission lines, respectively. This web of energy conveyance is too often "out of sight – out of mind" to casual observers, but to the residents of an energy-rich region like the Rockies the impacts of energy development and transmission are significant.

Looking deeper into oil and natural gas facilities, well locations and production further reflect energy development in the West. Figure

Table 1**Top Ten Oil Producing Counties in the Rockies, 2005**

Includes data supplied by Petroleum Information/Dwights LLC; Copyright 2006 Petroleum Information/Dwights LLC. Special thanks to Carol Hudson of IHS Energy

County, State	Barrels, 2005 total
Richland, MT	7,103,079
Weld, CO	2,123,120
Duchesne, UT	1,325,697
Sublette, WY	1,044,792
Uintah, UT	907,118
Campbell, WY	447,144
Park, WY	445,416
Fallon, MT	423,027
Sevier, UT	343,529
Sweetwater, WY	314,565

10 shows the density of wells in the Rockies in 1995. Figure 11 depicts the historical oil and gas well locations in the West and the apparent peak in the energy development boom in the 1970s and early 1980s. Heightened energy activity is also demonstrated by the recent creation of new wells. Between 1999 and 2004, the number of producing natural gas wells in the Rockies grew 67%.¹⁰ In 2004, the number of natural gas wells in the Rockies represented 21% of wells nationwide, up from 17% in 1999 and 11% in 1989.¹¹

The Energy Information Administration (EIA) forecasts continued growth in the demand for oil and gas in the United States. According to the EIA's Annual Energy Outlook for 2007, consumption of oil and natural gas is slated to grow 15% by 2020 and almost 24% by 2030.¹² Increased domestic production will satisfy a large portion of growing domestic demand. The EIA predicts that natural gas production from the Rocky Mountain Region will grow faster than that in any other region of the contiguous U.S., growing by 2.7 trillion cubic feet annually by 2025 (Figure 12).¹³ According to the EIA, the Rockies will be responsible for 38% of all domestic natural gas production in the lower 48 states by 2025.

The data and figures presented above regarding volume and infrastructure illustrate the magnitude and location of energy development in the West. It is clear that the West is and will continue to be a vital source of energy. The following section examines why this region is a prime location for energy development in the United States.

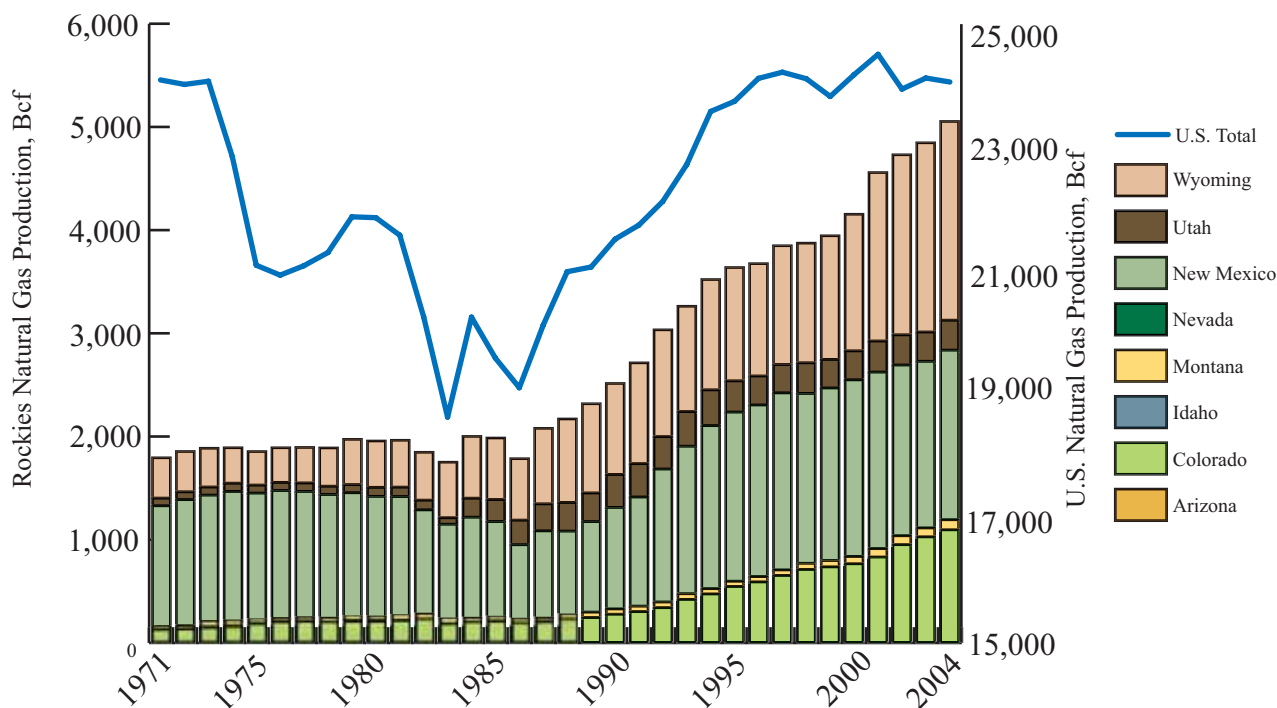
The Leasing Process and Federal Energy Policy

The federal government owns 58% of the eight-state Rockies Region.¹⁴ The Bureau of Land Management (BLM) manages federal lands and minerals, including federal mineral rights on private lands. They directly oversee 258 million surface acres and 700 million acres of subsurface mineral rights.¹⁵ Access to these federal lands for oil and gas production is obtained through energy

Figure 5

U.S. and Rockies States Natural Gas Production, 1971-2004, Billions of Cubic Feet

Source: Energy Information Administration



leases, allowing private companies to develop the mineral rights for decades. The leasing process begins with a resource management plan (RMP), which determines the areas available for oil and gas leasing. The lease sales are done on a quarterly basis, and the BLM must post a notice 45 days prior to the sale. During this time, a public comment period can affect the leasing of particular tracts. The sale is conducted by a closed-bid system, with some promising tracts going for several thousand dollars per acre. If there are protests regarding a parcel, the sale is postponed until the state director issues a ruling.¹⁶ The duration of a lease is 10 years, although the lease owner can appeal and ask that the lease be extended if they have been unable to develop the resource. If the well is producing, the lease lasts until production is complete.¹⁷

Current U.S. energy policy reflects a desire to increase domestic production, particularly in the West. High oil prices resulting from supply restrictions and price policies instituted by Middle Eastern oil-producing states and increasing global demand led to the 1970s oil crisis and associated boom in domestic production. Domestic exploration has continued to increase since the 1970s in response to concerns over dependence on foreign oil, political instability in oil-producing states, and increased energy demands from devel-

oping countries. Such concerns are reflected in the 2005 Energy Policy Act, which expedites the leasing process and eases regulations in Western states through the "western states pilot program."¹⁸ This program establishes field offices in five Rockies states (Colorado, Montana, New Mexico, Utah, and Wyoming) to streamline the leasing and permitting process to handle the growing volume of permit requests. In her statement before the House Appropriations Subcommittee on Energy and Water Development on March 8, 2006, then Secretary of the Interior Gale Norton stated:

The BLM is experiencing a steady increase in the demand for drilling permits . . . To address this demand, BLM has taken steps to ensure that drilling permit applications are processed promptly, while at the same time ensuring that environmental protections are fully addressed. These measures, along with increased funding, have allowed BLM to make significant progress in acting on permit applications. In 2005, BLM processed 7,736 applications, nearly 4,000 more than it was able to process in 2000.

Section 365 of the Energy Policy Act established a pilot program at seven BLM field offices that currently handle

Figure 6

Rockies Natural Gas Production as a Share of U.S. Production.

Source: Energy Information Administration

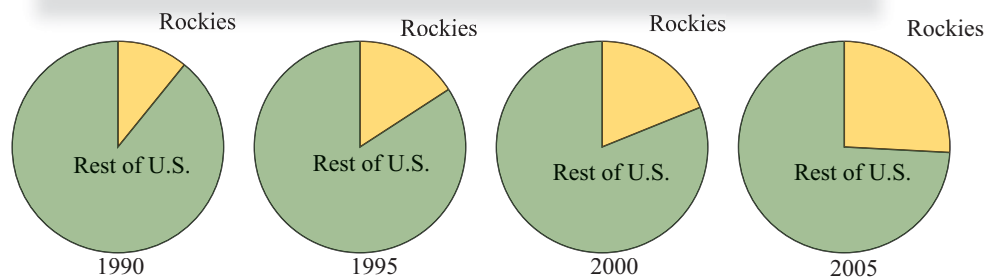
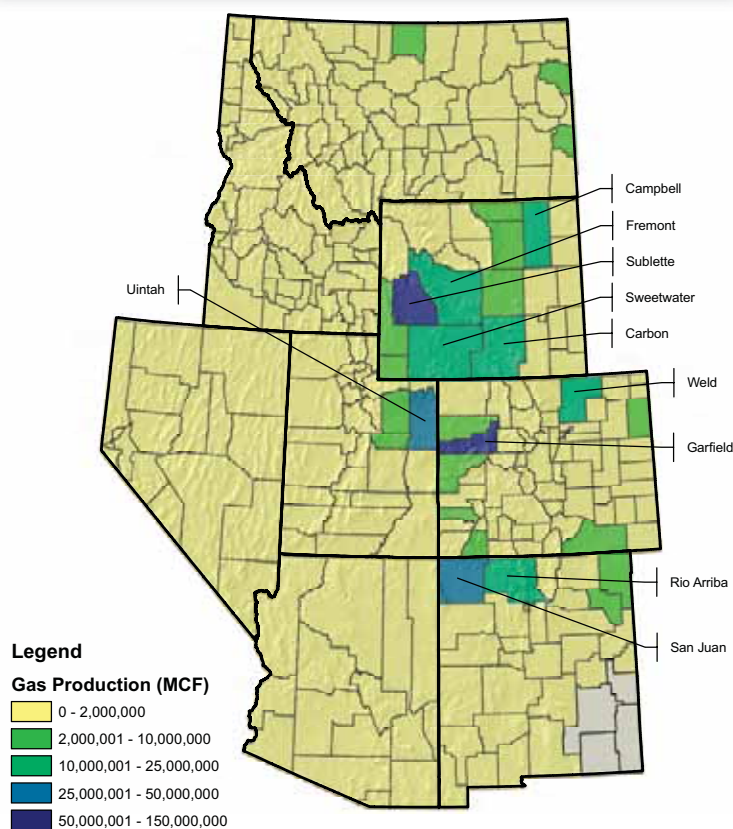


Figure 7

Rockies Gas Production by County, Thousands of Cubic Feet, 2005

Includes data supplied by Petroleum Information/Dwights LLC; Copyright 2006
Petroleum Information/Dwights LLC. Special thanks to Carol Hudson of IHS Energy



Note: the Permian Basin counties are not included in this assessment (Chaves, Eddy, Lea, and Roosevelt Counties)

70 percent of the drilling permit application workload. The pilot program is testing new management strategies designed to further improve the efficiency of processing permit applications. The Energy Policy Act provides enhanced funding for the pilot offices from oil and gas rental receipts. With more efficient processes and authorities and funding provided through Section 365, BLM currently anticipates processing 10,160 permits in 2006.¹⁹

The specific interest in the Rockies Region reflects both geology and politics. Currently, 11% of total proven oil reserves²⁰ and 31% of proven natural gas reserves are in the eight-state Rockies Region.²¹ In addition to these resources, the Rockies states are also politically appealing, as federal land ownership eases the leasing and extraction processes. For example, natural gas development in Wyoming is assisted by the 53.5% total federal land ownership in that state. As noted by Duane Zavadi, the vice president for government and regulatory affairs of the Bill Barrett Corporation (an oil and gas exploration and development company operating in the Rockies Region), political power and energy consumption vary geographically:

There are fundamental reasons for supporting production growth in the West. Reserves here are relatively untapped, and many more heavily populated (and therefore politically influential) states are exporting the challenges posed by energy production to the Rockies. Florida and California collectively consume 15 percent of the nation's

Table 2

Top 10 Natural Gas Producing Counties in the Rockies, Thousands of Cubic Feet, 2005

Includes data supplied by Petroleum Information/Dwights LLC; Copyright 2006
Petroleum Information/Dwights LLC. Special thanks to Carol Hudson of IHS Energy

County, State	Thousands of Cubic Feet
Sublette, WY	120,587,250
Garfield, CO	84,340,918
Uintah, UT	42,448,564
San Juan, NM	27,588,436
Campbell, WY	22,445,464
Sweetwater, WY	19,172,473
Weld, CO	17,832,472
Rio Arriba, NM	17,235,142
Fremont, WY	13,493,659
Carbon, WY	11,484,055

natural gas, yet they prohibit offshore exploration and severely limit other oil and gas activities.²²

This quote supports the idea that the West is an “inland colony” of the U.S., where natural resources are extracted with little political opposition and then sent to larger markets to the east and west. The recipient regions seek to limit development of their own natural resources and avoid the ensuing environmental impacts. Federal policies promoting energy development have a disproportionate impact on the Rockies, where natural resources are abundant and the federal government retains control.

Federal policy must balance energy independence and the consequences of domestic production. Similarly, local governments must also weigh the costs and benefits of oil and gas development, lest a boom quickly turn to a bust.

Benefits of Oil and Gas Production

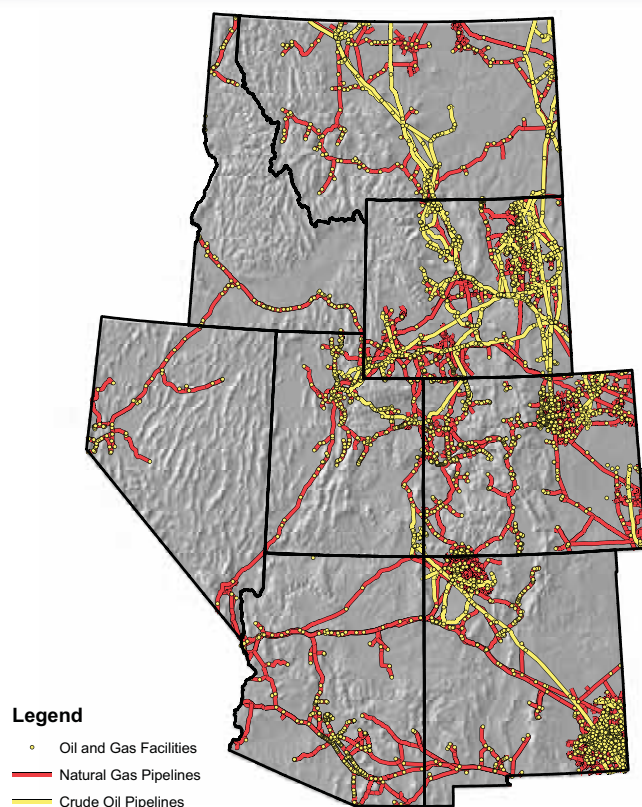
The benefits of energy production appear straightforward: increased tax revenues and economic vitality, including lower unem-



Figure 8

Rockies Oil and Gas Infrastructure, 2005

Source: Infrastructure data generously provided by PennWell Petroleum Group



ployment and rapid job growth. Development in the energy industry ripples through other economic sectors in what is known as the “local multiplier effect.” Workers require housing, roads, groceries, entertainment, and other goods and services. This demand creates new jobs and local businesses, and increases wages across many industries, in addition to raising sales tax revenues. Energy development provides an economic windfall that can boost economic vitality in rural communities throughout the West.

Acquisition and Allocation of Lease and Tax Revenues

Increased revenue from federal royalties and lease rents, as well as state taxes, are other visible benefits of energy development. The mineral royalties collected by the federal government were established by the 1920 Mineral Leasing Act and equal 12.5% of the income generated from resource extraction on federal lands. Royalties are distributed according to the following formula: the state where the resource was extracted receives 50%, the Bureau of Reclamation receives 40%, and the U.S. Treasury receives 10%. The collection and distribution of royalty revenues is performed by the Minerals Management Service (MMS).²³ From October 1, 2005 to September 30, 2006, federal revenue from energy royalties reached \$10.7 billion. Natural gas and oil royalties constituted 54% and 37% of total royalty revenues, respectively.²⁴

Rental fees are assessed for the use of federal land. As previously stated, mineral leases are distributed by auction. Rents are paid by the leaseholder until the lease is in production. In addition, the successful bidder for a mineral lease pays a “bonus” fee to the federal government. Half of the rental revenues are allocated to the state where the land is located, while the other half returns to a restrict-

Figure 9

Rockies Electric Power Infrastructure, 2005

Source: Infrastructure data generously provided by PennWell Petroleum Group

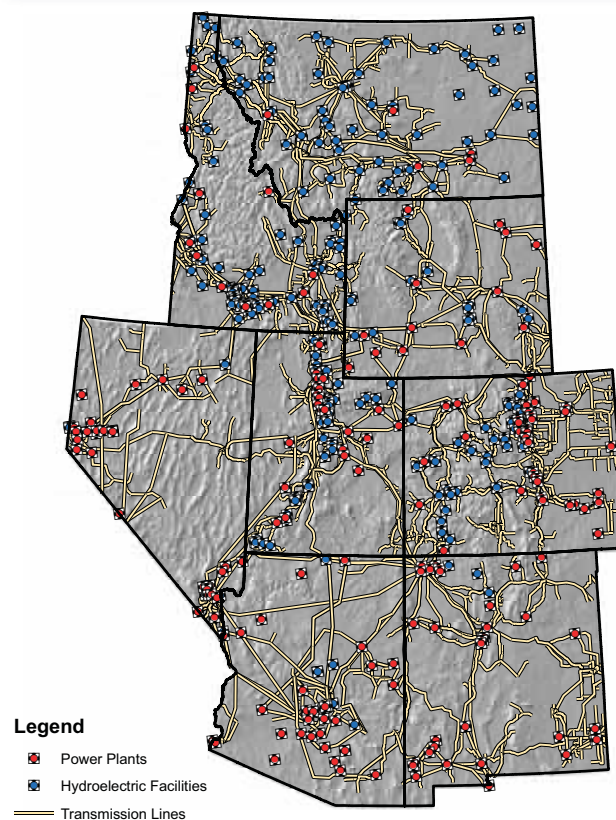


Figure 10

Rockies Oil and Gas Provinces, 1995 Well Density

Source: Infrastructure data generously provided by PennWell Petroleum Group

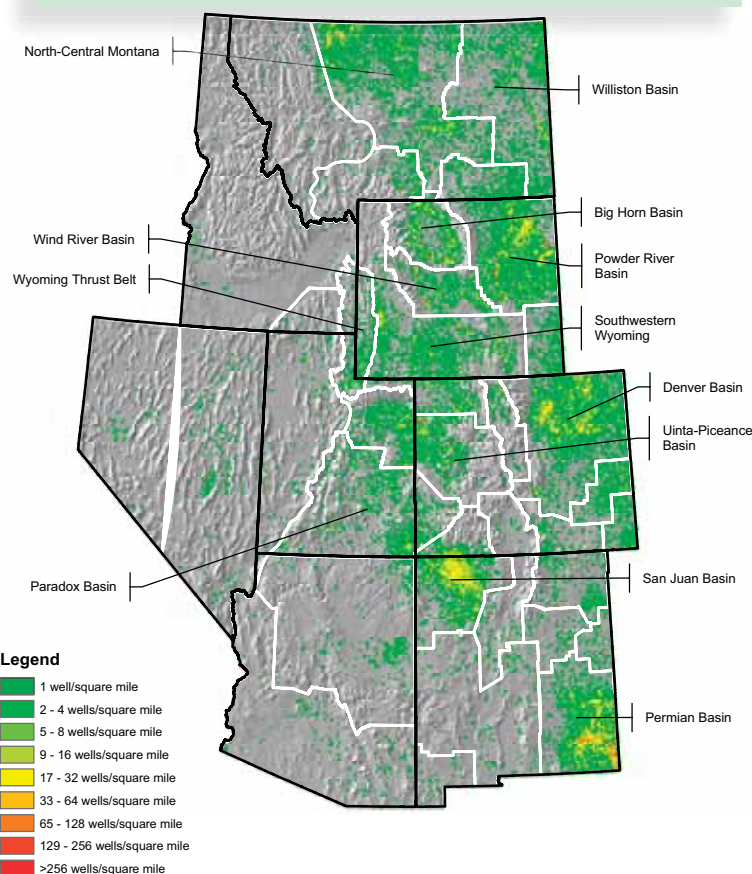
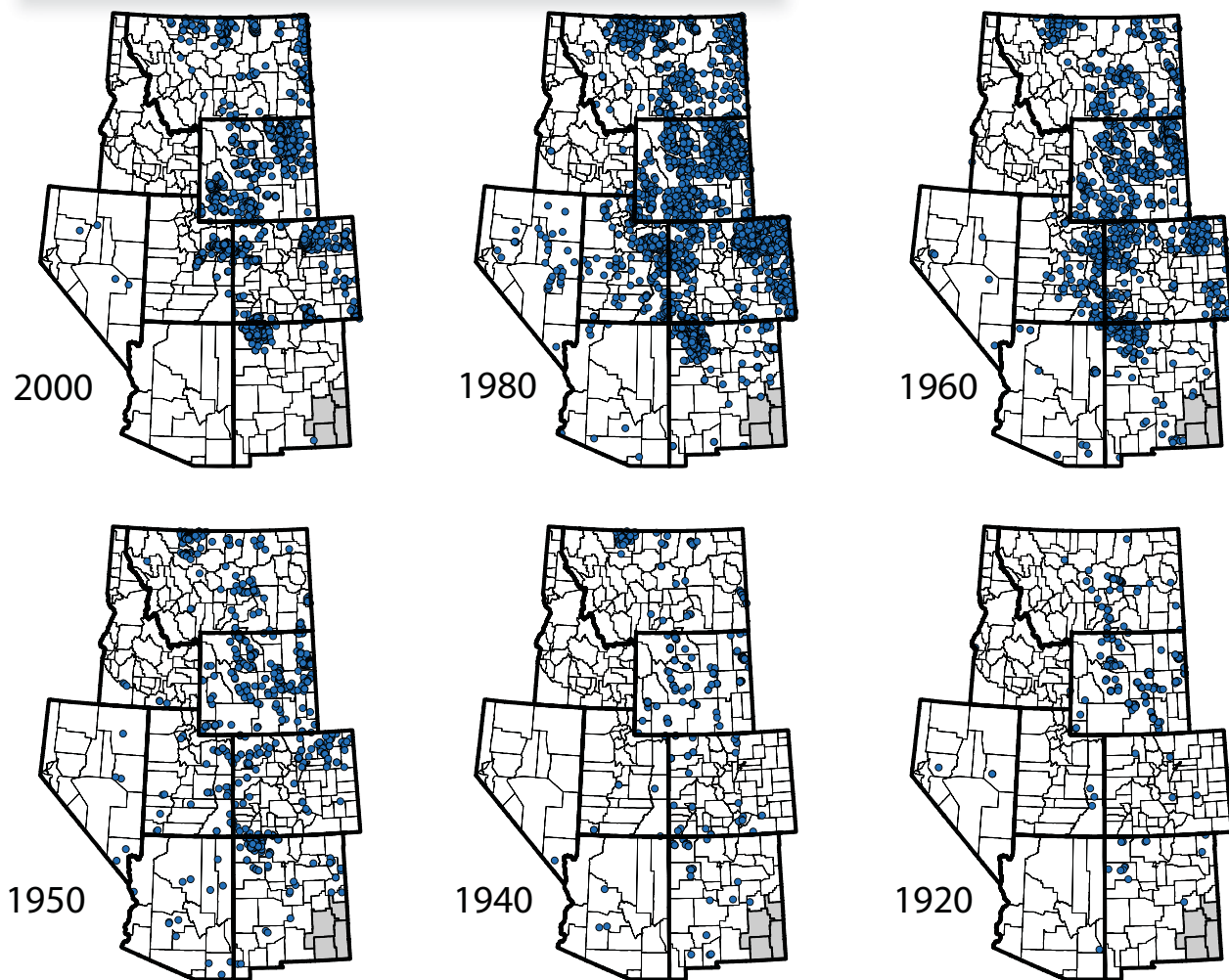


Figure 11

Historical Oil and Gas Locations in the Rockies

Source: Includes data supplied by Petroleum Information/Dwights LLC; Copyright 2006 Petroleum Information/Dwights LLC. Special thanks to Carol Hudson of IHS Energy

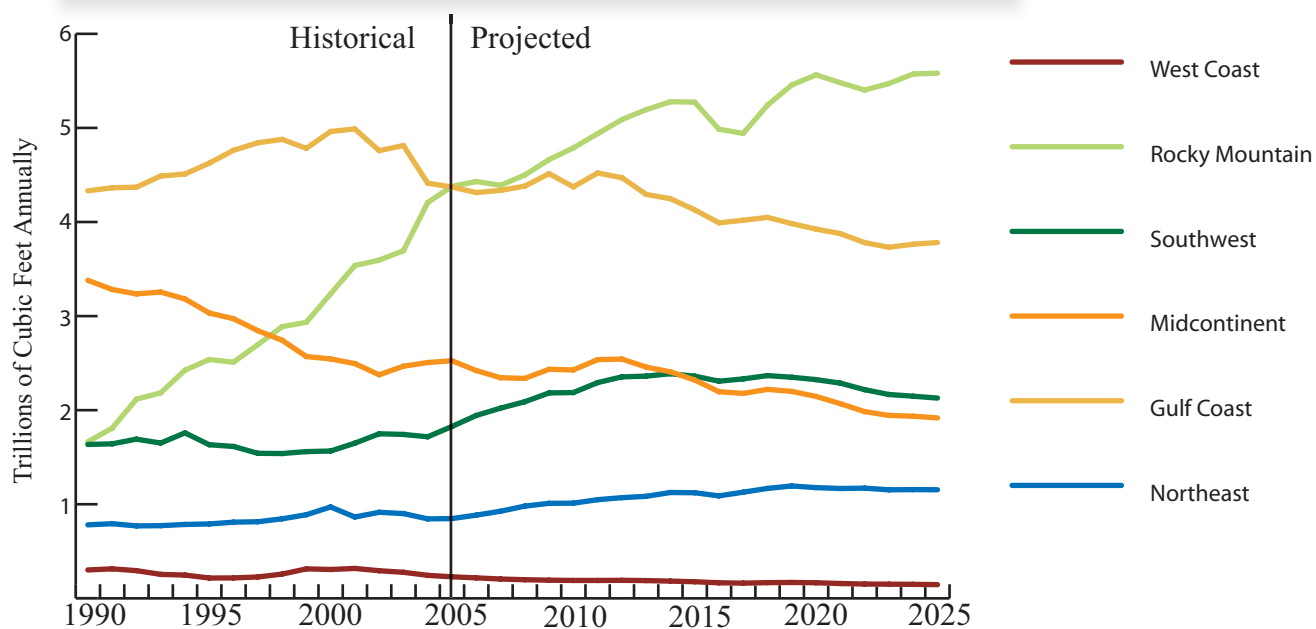


Note: the Permian Basin counties are not included in this assessment (Chaves, Eddy, Lea, and Roosevelt Counties)

Figure 12

Historical and Projected Natural Gas Production by Region, 1990-2025

Source: Energy Information Administration, 2003 Annual Energy Outlook



ed BLM fund. The director of the BLM can then choose to transfer the money in the fund, but only to other governmental agencies that are involved in the “coordination and processing of” oil and gas permits.²⁵ In 2005, revenues from rental fees, bonus fees, and other fees totaled over \$1.8 billion.²⁶

The MMS collected \$12.5 billion in combined royalty and rent revenues from October 1, 2005 to September 30, 2006.²⁷ Of this, the government paid \$2.2 billion to 34 states for their share of the federal revenues. Wyoming led the nation in royalty receipts with just over one billion dollars. Rockies states accounted for 91% of total receipts,²⁸ as expected from the large proportion of federal land and the active oil and gas development in the region.

States can also levy a severance tax separate from royalty and lease rental revenues. Severance taxes are assessments on corporate revenue generated from natural resource extraction, and these taxes can be applied to minerals whether the land is federally or privately owned. Revenues from a severance tax remain in the state.²⁹ States have the authority to allocate the funds wherever they see fit; most states allocate funds within the counties where the resource is produced. For example, Garfield County, Colorado, receives over 50% of its revenues from severance tax revenues.³⁰ State revenues from federal royalties and state severance taxes represent a large and tangible benefit to energy development for many remote, rural areas with limited tax revenues.

Costs of Oil and Gas Production

The costs of energy development are more difficult to identify and quantify. Boomtowns and the characteristic influx of people and money include a variety of socioeconomic disruptions, sometimes collectively referred to as the “boomtown syndrome” or “Gillette syndrome” (after the energy boomtown experience of Gillette, Wyoming). These include strains on the local infrastructure and workforce, increased in crime and drug use, health hazards, housing shortages, high housing costs, and economic vulnerability. Are these disruptions anecdotal or supported by socioeconomic data? Tables 3 and 4 show the top oil and gas producing counties and data on their violent crime, unemployment, median housing rent, and rent as a percentage of income. Although a few of these counties follow the predicted impacts of high crime and high housing costs, a significant correlation does not exist between energy development and these socioeconomic indicators. There-

Table 3

Violent Crime, Unemployment, Median Rent, and Rent as a Percent of Income in the Top 10 Oil Producing Counties in the Rockies in 2005

County, State	Reported Violent Crimes (2004)	Unemployment (2005)	Median Rent-monthly Cost of a 1 bedroom apt. (2005)	Rent as Percent of Income (2000)
Richland, MT	not reported	3.4%	\$398	20.1%
Fallon, MT	36	2.6%	\$398	20.5%
Weld, CO	98	5.1%	\$584	27.2%
Duchesne, UT	60	4.6%	\$502	24%
Sublette, WY	31	1.8%	\$477	22.5%
Uintah, UT	60	3.9%	\$422	21.6%
Campbell, WY	25	2.6%	\$474	18.4%
Park, WY	64	3.9%	\$428	22%
Sevier, UT	46	4.3%	\$494	24%
Sweetwater, WY	61	3%	\$434	19.2%
Rockies Region County Average	44	4.8%	\$505	23.6%

Table 4

Violent Crime, Unemployment, Median Rent, and Rent as a Percent of Income in the Top 10 Natural Gas Producing Counties in the Rockies in 2005

County, State	Reported Violent Crimes (2004)	Unemployment (2005)	Median Rent-monthly Cost of a 1 bedroom apt. (2005)	Rent as Percent of Income (2000)
Sublette, WY	31	1.8%	\$477	22.5%
Garfield, CO	19	3.7%	\$716	25.8%
Uintah, UT	60	3.9%	\$422	21.6%
San Juan, NM	111	5.5%	\$466	22.8%
Campbell, WY	25	2.6%	\$474	18.4%
Sweetwater, WY	61	3%	\$434	19.2%
Weld, CO	98	5.1%	\$584	27.2%
Rio Arriba, NM	not reported	6.1%	\$430	22%
Fremont, WY	51	4.7%	\$381	21.8%
Carbon, WY	19	4%	\$364	19.4%
Rockies Region County Average	44	4.8%	\$505	23.6%

fore, the positive economic benefits likely outweigh any negative impacts on the local infrastructure or social fabric: hardworking people are providing new economic and social vitality to Western towns, a far less intriguing story than rampant drug use or violent criminals.

However, one must also consider specific case studies to gain a clearer understanding of energy development in the West. The following is a more detailed examination of the socioeconomic impacts observed in Western energy boomtowns.

Demand on a Limited Infrastructure and Workforce

Small communities are often unprepared to accommodate the rapid population increase associated with an energy boom. Detention



facilities need more cells, health care facilities need more beds, schools need more classrooms and teachers, and roads need more lanes. For example, in Pinedale, Wyoming, the school has seen a 10–12 percent increase in enrollment over the last few years, which has been difficult for the small school district to absorb.³¹ Vehicle traffic is another easily identified impact of energy booms. Traffic causes long delays on outdated roads and highways built to service low volumes of ranch or farm traffic. In addition, large vehicles and constant traffic create noise, congestion, and pollution. Sublette County, Wyoming, has had a 60% increase in traffic on nearly all roads since 1995, with truck traffic showing large increases since 1995. On one road, the daily average of trucks rose from an average of 150 a day during 1995 to nearly 650 in 2005.³²

Low unemployment is typically viewed as a positive economic indicator. But in boomtowns, it is often a sign of a strained workforce. The unemployment rate in Sublette County, Wyoming, reached 1.8% in 2005. Garfield County, Colorado, also fell below the eight-state mean (4.8%) at 3.7% unemployment in 2005.³³ Oil and gas companies offer wages above traditional levels and thus draw workers away from jobs in the local school system, retail businesses, and law enforcement. As a result, the local school district in Pinedale has the highest base salary in the state (\$41,500)³⁴ and the sheriff's office has increased their base salary 20% in the last year.³⁵ In Sublette County, a police department of 52 people has had 38 people leave since January 2004, many drawn to better-paying jobs in the energy industry. Deputies regularly put in over 20 hours of overtime every week to compensate for worker shortages.³⁶

Housing

A large influx of workers can also overwhelm local housing supplies in rural areas. In Garfield County, Colorado, the rental unit vacancy

rate dropped from 1.5 percent in 2005 to 0% in 2006, resulting in waiting lists.³⁷ Energy companies, desperate to house workers, have built camps of portable trailer housing. RVs and campers pepper the landscape, parked wherever space can be found. It is not uncommon for campers to park in the equipment parking area (or staging area) in the small towns experiencing a boom. Such improvised housing is officially known as “non-traditional” housing. In these small communities, non-traditional housing simply means campers parked wherever a spot can be found, often creating strain between newcomers and long-time residents.

Potential Increases in Crime and Drug Presence

An increased population generally brings increased crime proportional to the change in population. As shown above, higher violent crime rates do not correlate with increased energy production in Rockies counties. Researchers studying past energy booms have predominantly shown that the impacts of an energy boom on crime are unclear.³⁸ Possible impacts include higher per capita crimes against property³⁹ or reduced per capita crimes against people.⁴⁰ The energy industry heavily relies on transient workers, and past research has shown these populations to be associated with higher crime rates.⁴¹ Regardless, the increased population results in higher absolute crime within a county, further straining limited local law enforcement.

Even more difficult to prove conclusively is the correlation between energy production and local drug use. Much speculation exists regarding rampant drug use, and some believe that drilling crews may rely on methamphetamines to work 12 hour shifts for seven to 14 days in a row. However, methamphetamine use is becoming more prevalent in rural regions as a whole, so it is difficult to say what specific impact the drilling industry has on drug use.⁴² While the industry does conduct drug tests, the results are not pub-



lic knowledge and a curtain of uncertainty remains over drug use by energy workers.

Economic Vulnerability and Overbuilding

A healthy economy is diverse and insulated from price fluctuations in any one sector. In contrast, the economic fate of an energy boomtown is linked to the performance of a single commodity in national and global markets. A drop in the price of oil or gas below its economic development point can rapidly drain money from a community. As drilling operations shut down, jobs and tax revenues evaporate. Often, financial problems experienced during a bust are exacerbated by overbuilding, which occurs when a community rushes to accommodate infrastructural needs such as roads, schools, and hotels. After a bust, personnel and money leave, but the buildings remain, saddling communities with maintenance costs and debt.⁴³ This scenario occurred throughout the West when the price of oil dropped below \$30 a barrel in May 1982, marking the end of the 1970s oil boom.⁴⁴

The Center for the American West in Boulder suggests that the current energy boom will not necessarily go bust like the previous one. Their report “What Every Westerner Should Know About Energy” suggests that communities are increasingly skeptical of energy hype and instead diversify their economies through increased energy revenues, adding retail and service industries as well as oil and gas wells.⁴⁵ Energy prices may fluctuate and resources may be exhausted, but through diversification rural communities are better insulated from the capital flight experienced after previous energy booms.

Environmental Impacts

Oil and gas development has both direct and indirect environmental impacts. Direct impacts are those associated with infrastructure such as access roads, drilling pads, pumping stations, storage facilities, and pipelines.⁴⁶ The placement of these facilities causes habitat fragmentation, destruction of vegetation, and soil degradation.⁴⁷

The most notable indirect impacts are air and water pollution. Noxious emissions from drill rigs, vehicles, and other energy facilities degrade air quality around drill sites.⁴⁸ As energy development encroaches on residential areas, air quality also becomes a greater human health concern. Of particular concern are the significant hydrogen sulfide emissions from natural gas wells.⁴⁹

In the drilling process, hydraulic fracturing threatens water quality. Hydraulic fracturing is the process by which fluids (gelling agents, foaming agents, and acids) are pumped down a bore hole to break up the gas-rich rock layers and expedite the flow of natural gas.⁵⁰ Of particular concern is drilling near watersheds, where seepage from the hydraulic fracturing process may contaminate rivers and municipal water sources. Responding to health and environmental concerns associated with the process, some oil and gas companies have offered to switch to “green fracing,”⁵¹ which utilizes non-toxic substances such as citrus oil in the slurry pumped underground.

Direct and indirect environmental impacts, such as infrastructure buildup, noxious emissions, and water contamination, can be difficult to measure and quantify and therefore difficult to weigh against the positive impacts of energy development in the West. Yet these impacts must still be considered when exploring the effects of oil



and gas development on Western communities.

Conclusion

The West is in the midst of an energy boom driven by high demand and prices, as well as federal policy that encourages development of Western resources. This is not a new story for the region; it is disturbingly reminiscent of the boom and bust during the 1970s and 1980s. Will history repeat itself in the Rockies?

The federal government plays a key role in determining the magnitude of the next energy boom and bust cycle. As the largest minerals owner in the West and the controller of oil and gas lease permits, the government is in the best position to regulate energy development and temper the pace of resource extraction. The 2005 Energy Policy Act focuses on expediting energy development in the West. Perhaps the West is considered a “sacrifice zone” to be exploited until oil dependence can be eased with the advent of renewable energy sources.

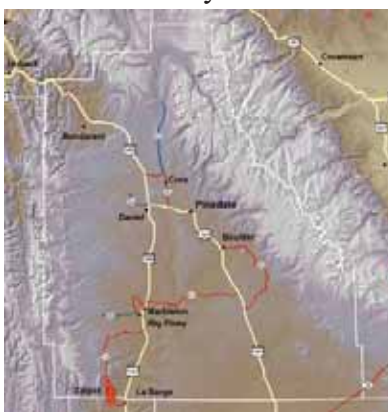
As long as land continues to be leased for resource extraction, local governments and corporations must mitigate the socioeconomic strains and alleviate the “boomtown syndrome.” At this level, citizens and corporations are already taking proactive measures. For example, energy companies have adjusted truck schedules and stringently enforced speed limits to accommodate community traffic. New technology allows for directional drilling, a technique that concentrates wells and limits their proximity to local homes. These two examples reflect many positive changes since the last energy boom and bust. Communities and corporations must continue to work together to manage the socioeconomic and environmental impacts of energy development as well as prepare for the bust that history has shown is inevitable.

Endnotes

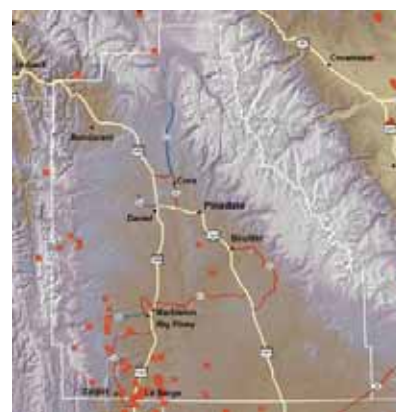
Sublette County Well Placement

Case Study: Sublette County, WY

A Detailed Profile of an Energy Boomtown



1940



1980

Region-wide analysis of the towns and counties impacted by the recent energy boom is hindered by the lack of uniform, all-inclusive, and up-to-date data sets. Occasionally, however, comprehensive data are available for individual counties. Such is the case for Sublette County, Wyoming.¹ Sublette County is in the unique position of having a countywide socioeconomic analyst, Jeffrey Jaquet, to study the impact of the energy boom. With Jaquet's help, we can examine detailed statistics in conjunction with personal interviews to provide a more accurate depiction of the economic windfalls and socioeconomic disruptions of the West's energy boom.

Energy operations in Sublette County draw from the Pinedale anticline and Jonah natural gas fields, which are the fourth and sixth largest producing fields in the nation, respectively.² The volume of energy development in the region has jumped significantly in the past five years, growing from 25 rigs in 2001 to a high of 55 rigs in 2006.³ Concurrently, the population of Sublette County grew by 17 percent from 2000 to 2005. In comparison, neighboring Sweetwater County grew by only 1.3 percent,⁴ and Wyoming as a whole has grown less than 1 percent since 2000.⁵

The largest town within the area of Sublette County drilling operations is Pinedale, with a population of 1,412.⁶ Energy development and the related population influx are an economic boon to the community but have also strained the infrastructure and social fabric of Pinedale. Examples of such pressures include workforce shortages in non-energy-related industries, a lack of affordable housing, increased crime and drug use, and high traffic volumes on inadequate roads.

Tax Revenue

Sublette County energy operations have generated a windfall in tax revenue for the county and its municipalities. In 2006 alone, over \$52 million in sales and use tax revenues were generated by Sublette County. Of that total, over \$16 million was returned to Sublette County and local municipalities. Of the \$47.5 million collected in sales tax, 51 percent was generated by the mining industry, as

was nearly half of the \$4.3 million in use tax revenue.⁷ Sublette County has the lowest sales and use tax rate allowed by Wyoming state law. With a tax rate of 4 percent, Sublette is one of three counties in the state using the lowest possible rate.⁸ Even with such a low tax rate and small population, Sublette County ranked sixth among Wyoming counties in terms of tax revenue generation.⁹

Labor and Wages

In November 2006, the unemployment rate in Sublette County hit an all-time low of 1.5 percent.¹⁰ The energy boom in the area has simultaneously increased the need for public service jobs to accommodate the growing population, as well as drawn people away from those positions. Local schools, law enforcement, and other public service sectors struggle to attract new employees when energy companies offer much higher wages.

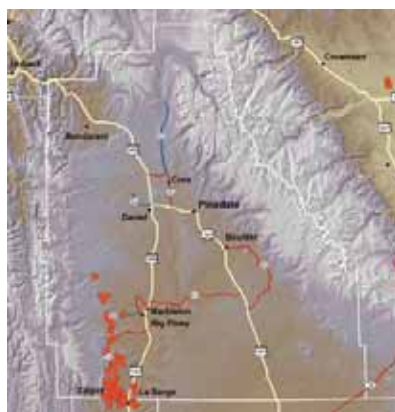
In the gas field, new workers with no prior experience or education generally start as roustabouts, earning an average of \$36,585/yr plus overtime, which generally brings the average up to \$53,000/yr. However, because of the high turnover rates and shortage of workers in the gas field there are generally plenty of opportunities for an unskilled and uneducated worker to be promoted. With just a few years of experience, a worker can rise from roustabout to driller (\$60,000/yr plus

Table 5
Sublette County Sales Tax Revenue, 2001-2006

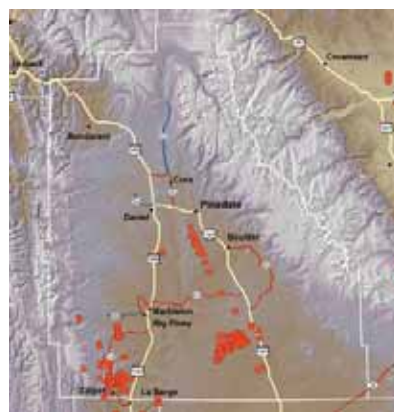
Source: Wyoming Department of Revenue

Prepared by: Jeffrey Jaquet, Sublette County Socioeconomic Analyst

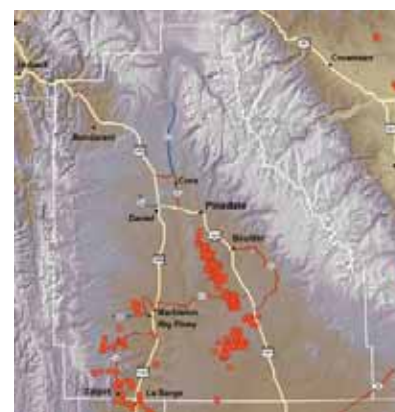
Fiscal Year	Gross Tax Revenue	Total Amount of Sales	Revenue Returned			
			Sales	Use	Lodging	Total
2001	\$15,520,968	\$388,024,200	\$3,961,059	\$331,950	\$8,858	\$4,301,867
2002	\$21,059,374	\$526,484,350	\$5,520,576	\$280,411	\$103,064	\$5,904,051
2003	\$21,082,473	\$527,061,825	\$5,675,004	\$436,263	\$122,471	\$6,233,738
2004	\$28,291,190	\$707,279,750	\$7,649,411	\$561,690	\$140,500	\$8,351,601
2005	\$37,580,227	\$939,505,675	\$10,632,904	\$838,716	\$164,990	\$11,636,610
2006	\$52,568,766	\$1,314,219,150	\$14,711,510	\$1,333,922	\$233,125	\$16,278,557



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2005

overtime) and then to tool pusher, earning \$91,000/yr plus overtime pay in Sublette County.¹¹

To compete with high wages offered by energy companies, other businesses must raise wages to retain a sufficient staff. As a result, the local school district in Pinedale has the highest base salary in the state (\$41,500),¹² and the Sheriff's office increased their base salary by 20 percent in 2006.¹³ The average minimum wage for non-skilled, non-labor-intensive jobs was \$9/hr in July 2006.¹⁴ Statewide, the starting wage for the same sector of jobs ranged from \$5.88/hr to \$6.50/hr.¹⁵ Wage increases are particularly dif-

ficult for residents with fixed incomes, whose wages do not rise with the rising cost of living. With an estimated workforce shortage of 1,500–2,000 workers in the natural gas industry, wages are bound to keep increasing and competition for the short supply of workers will only become more intense.¹⁶

Rising housing prices further contribute to the labor shortage. The Sublette County Assessor's office estimates that the average sales price of a single-family home has risen from \$126,000 in 2000 to \$249,000 in 2005.¹⁷ When surveyed,



local Realtors reported a lack of homes under \$150,000.¹⁸ Sublette County Sheriff Wayne “Bardy” Bardin elaborated that “we lose people or have very few people apply for jobs because of housing prices. Both parents have to work in order to live here so we have a definite lack of child care. Since January 2004, 38 people from my 52-person staff have left my department.”¹⁹ Not only does the housing crunch make it difficult to attract teachers and police officers, it also deters workers in the gas fields from relocating to Pinedale. Depending on the affordability of housing, one study of the tastes and preferences of gas field workers estimates between 300 and 1500 would prefer to become permanent residents of Sublette County.²⁰

Brett Kingsbury, chairman of the local school board, also expressed difficulties in recruiting staff: “As we grow, it gets difficult to attract young kids to come teach. Housing is expensive, the temperatures can hit 40 below, and there are 10 men for every 1 woman.”²¹ The October 2006 student count showed a 9.6 percent (74 students) increase in the local school district.²² Funding is available to expand school facilities, but teachers remain in short supply.

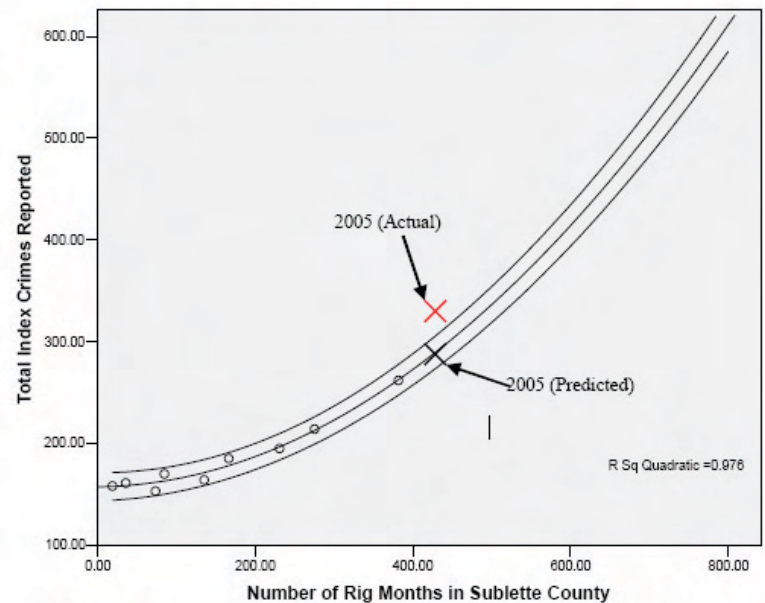
Crime and Drug Use

Assessing crime and its relationship to energy development is difficult. Arrest data are an imperfect indicator of actual crime rates, and it is hard to correlate fluctuations in arrests to energy-specific growth as opposed to growth in general. Despite these obstacles, it is useful to explore the statistics and research associated with crime and drug use, specifically in Sublette County where more in-depth studies have been conducted.

Pinedale and the Sublette County region have seen a rise in non-violent crime but not in violent crimes. This is illustrated by figure 13, created by Mr. Jacquet. The figure shows several

Figure 13
Rig-Based Trend of Reported Index Crimes 1996-2004

Sources: Wyoming Unified Crime Reporting, 1996-2004; Drilling Records Inc., 1996-2004
Prepared by: Jeffrey Jacquet, Sublette County Socioeconomic Analyst



years and the increase of crime correlated to rig-operation months. The number of drilling rigs present is the best way to estimate how many workers there are in the county.²³ The number of drilling rig months per year is the aggregate number of months spent by drilling rigs in Sublette County. The graph illustrates the predicted amount of crime for the amount of rig months in 2005 and shows that the actual increase in crime was much steeper than initially expected.²⁴ From 2002 to 2004, the number of arrests increased by 75 percent while the resident population of the county

increased by only 7 percent. In 2004 there was one arrest for every 15 people, and Jacquet’s regression model predicts that by 2008 one arrest will be made for every eight residents.²⁶ According to Jacquet, “part of this severe increase may be accounted for by a disproportionate increase in residents in their mid-twenties or younger, as younger populations typically commit a great amount of crime.” He also suggests that the



increase may reflect the increased non-resident population which includes workers who live in campers and worker camps.²⁷

Crime and drug use are recognized as undesirable factors associated with development, but actually quantifying the magnitude of each factor is difficult. Most drug use data are confidential or hard to piece together, and the actual increase is not necessarily represented by the number of reported arrests made.²⁸ Nevertheless,

Table 6

Median Housing Prices, Sublette County

Source: Teton Board of Realtors Multilisting Service

Provided by: Jeffrey Jacquet, Sublette County Socioeconomic Analyst

Year, Month	sales	median price
2004	11	\$150,000
February	1	\$139,500
March	7	\$169,000
April	12	\$180,000
May	10	\$180,000
June	12	\$195,000
July	14	\$182,450
August	11	\$293,000
September	11	\$220,000
October	19	\$165,000
November	15	\$200,000
December	9	\$165,000
2005	8	\$195,000
February	9	\$240,000
March	11	\$172,000
April	12	\$265,000
May	12	\$195,000
June	15	\$170,000
July	12	\$185,000
August	15	\$175,000
September	19	\$215,000
October	7	\$158,000
November	15	\$205,000
December	21	\$226,500
2006	5	\$288,000
February	9	\$190,000
March	14	\$285,100
April	11	\$330,000
May	20	\$260,000
June	17	\$325,000
July	26	\$256,000
August	14	\$231,000
September	14	\$258,000
October	14	\$232,500
November	9	\$238,000

in 1995 110 arrests were made, and by 2004 that number had increased by 270 percent to 439 arrests. Since 1995, the number of arrests per officer also more than doubled.²⁹ As stated by Jeffrey Jacquet, “while caution must be exercised when analyzing percentage changes of the small numbers associated with rural areas, the changes still appear to be substantial.”³⁰ Jacquet also stated that tracking arrest data does not track overall crime. That is, if a crime is committed but no one is arrested for it then no arrest will be reported. Also, arrest data only record the most serious crime for which a person is being arrested. If a person has committed a murder and also possessed illegal drugs, the murder but not the drug possession are recorded.³¹ Arrests per officer in Sublette County rose from 7.93 in 1995 to 19.09 in 2004. This number also accounts for an increase of staff from 15 officers in 1995 to 23 officers in 2004. The number of arrests per officer in 2004 is likely underestimated, as the Sheriff’s office has had some officers serving abroad as national reservists.³² In contrast, arrests per officer for the State of Wyoming have decreased 6.37 percent over the same time period.³³

Traffic

With growth in energy development comes growth in the traffic volume. Roads built to carry small levels of ranching or tourist traffic are now being used heavily by the natural gas industry. Sublette County has seen a 60 percent increase in traffic on nearly all roads since 1995, with truck and semi-tractor trailer traffic showing large increases. On one road, the daily average of trucks and semis rose from roughly 150 a day during 1995 to nearly 650 in 2005.³⁴ Both of these numbers outpace the population increase of the county over the same period of time. Increased traffic on small rural roads is not just an inconvenience, it is a safety hazard. Many roads were not built to handle two-way travel of large trucks, and roads to energy facilities can cut through residential areas. Most often, the expensive burden of expanding the road infrastructure falls on the county or local municipality.

Conclusion

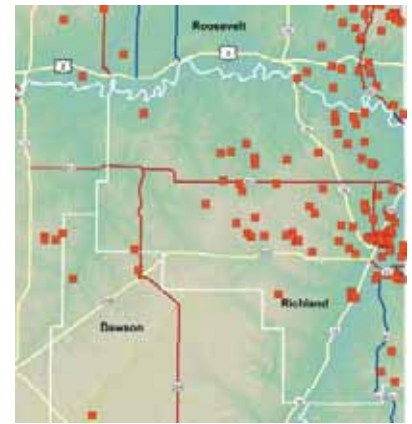
The region as a whole is seeking to learn from other areas in the Rockies that are experiencing similar problems. Sublette County has found a “sister county” in Colorado’s Garfield County, and some experts in the community also plan to visit Farmington, New Mexico, to examine their mitigation of energy project impacts. Local citizens are beginning to “think regionally,” an important first step in cooperating with others to find solutions to common problems.³⁵ The assistant to the Mayor of Pinedale, Laurie Latta, said the region needs to work together and focus: “we have not focused on planning; we have been reactive.” Jacquet notes that “there needs to be more consensus and planning in the communities, but Pinedale could come out of this boom running.”

Richland County Well Placement

Case Study: Richland County, MT

Oil Wealth to Mitigate Oil
Impacts

1940



1980

In six years, Richland County, Montana has gone from being a relatively insignificant supplier of oil to the largest oil-producing county in the Rockies Region. In 1999, Richland County produced 52,000 barrels, a number that surged to 7.1 million barrels in 2005.¹ The major oil companies had previously explored the area but had not drilled into the same lucrative layers chosen by the future “wildcat” producer. After a test well was drilled in May 2000, the producer and nearby competitors quickly realized that large amounts of oil still remained in the area.²

Recent energy development has brought economic prosperity to the area. The schools are well-funded, business is booming, and the unemployment rate is low. The local paper publishes a twice-yearly section on oil while the town of Sidney and Richland County hold an “Oil Appreciation Day” at the local fairgrounds.³

However, not all the recent change is positive. As in other energy boomtowns in the Rockies, affordable housing is limited. As noted by Richland County Commissioner Mark Rehbein, “there are currently no homes on the market in the \$150,000 to \$200,000 range”; high traffic volume is also harming the area’s “gravel roads designed for farm equipment, not heavy oil trucks”; and there is a severe labor shortage with “every local business [having] a ‘help wanted’ sign in the window.”⁴

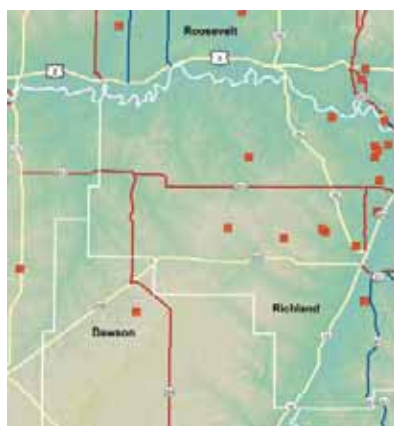
The local emergency medical service has been hit particularly hard by the labor shortage. Recruiting new emergency medical technicians (EMTs) has been difficult because it is an all-volunteer force. With the increased pace of life that the boom has created few people have the time or the desire to even join the force. According to Josh King, Director of Richland County Emergency Medical Services, “our call load has increased. For example, a couple years ago we averaged one call every other day, and yesterday alone we had six calls.” The oil boom has given the local economy an immense boost but at the same time has challenged locals in many ways.

Energy development not only affects the infrastructure and workforce, but also the social fabric of the community. The

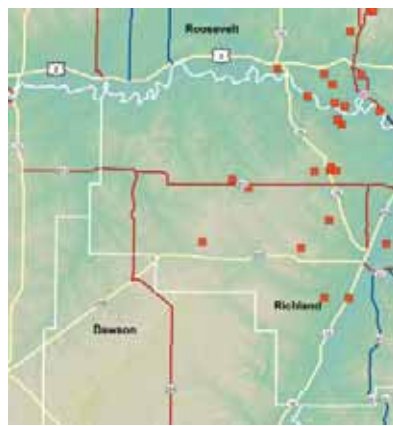
Richland County Coalition Against Domestic Violence provides care and assistance to victims of domestic violence and their families. According to Director Helen Schmitt, out of 187 total cases in the past year, 20 involved people who were in Richland County specifically because of the oil industry.⁵ While oil impact funds are readily dispersed to local governments, as a private nonprofit, the CADV cannot easily acquire such funding. However, thanks to donations by some church congregations and other community members, the center has remained able to care for victims of domestic violence.⁶

Often, citizens of boomtowns accuse local officials of being reactive in their policies, rather than anticipating the externalities of energy development. County Commissioner Mark Rehbein explains the difficulty of being proactive at the outset of the current energy boom: “the way the revenue system is structured, we didn’t receive any funds until two years after the boom really started.” Since the funds started pouring in, however, the county has worked hard to stay ahead of the energy development. As Rehbein notes, “we’re now spending money to improve roads where we predict the energy development is going in the future, not just catching up to where the development is now.”⁷

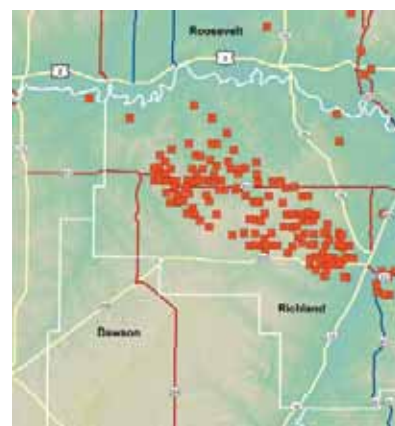
The town of Sidney and Richland County as a whole have received “oil impact funding.” The recently passed House Bill 758 established the oil impact fund to redistribute state income from the energy boom to the counties and municipalities hit hardest by the boom. Two-thirds of the funding goes straight to the towns, and the remaining third goes to county coffers.⁸ In one fiscal quarter alone, Richland County and Sidney received over \$79,000 and \$137,000, respectively, in oil impact funds. These funds add to the over \$7.5 million that the county claims annually in severance tax receipts.⁹ The county spent most of their oil impact funds on improving roads in three unincorporated towns, as well as on new law enforcement facilities (the court system has been overwhelmed in the past several years), and new fair grounds.¹⁰ Sidney has also spent their impact funds on law enforcement and road repair, but additionally built a water slide and improved the local school. The school expansion alone cost between \$3 and \$4 million and included a new science wing. The school improvements would not have been possible without the added funding from the energy boom.



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School funding in Montana is based on school enrollment, which has been declining in Sidney. The community had repeatedly tried to raise money through bonds and mill levy requests, but had not been able to raise sufficient funds.¹¹ It was not until the oil money came in that they were able to make the upgrades. Commissioner Rehbein reiterates that “all these community improvements have been possible through the energy boom, and never at the expense of increased taxes on local residents.”¹²

Local officials and residents are also confident that they are proceeding with caution and have learned from the previous bust. The

Richland County economy is more diversified than during the boom in the early 1980s (for example, Anheuser-Busch recently installed a large facility in the area).¹³ Many community members, including local EMT director Josh King, agree that their local government is spending the new funds wisely.¹⁴ The pace at which the energy boom came to Richland County initially made it difficult for local officials to mitigate its impacts. It appears, however, that with enough money and thoughtful planning, many of the negative side effects of the energy boom can be tempered.



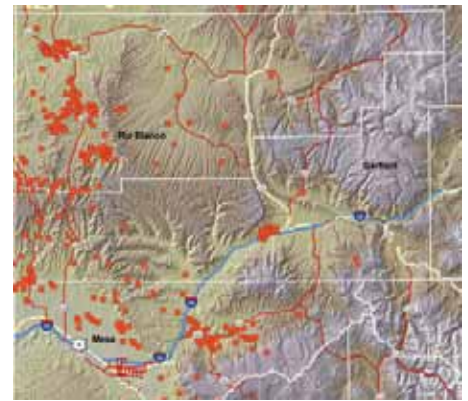
Garfield County Well Placement

Case Study: The Grand Valley, CO

Corporate and Community Cooperation



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Rapid energy development is a familiar story to the citizens of the Grand Valley in western Colorado. In the late 1970s and early 1980s the region enjoyed the economic impacts of heavy energy investment, led most notably by Exxon's oil shale projects. Eventually, the oil shale development proved unprofitable, and Exxon closed its doors on "Black Monday"—May 3, 1982. Hundreds lost their jobs, and local municipalities were left in economic disarray.¹

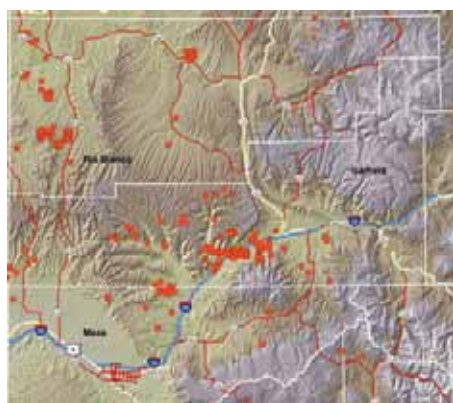
Now, energy development, spurred by high natural gas prices and a renewed interest in oil shale, has returned to Garfield and Mesa counties. Residents who recall the previous energy bust are skeptical of the current boom and fear another economic collapse. Further marring the relationship between energy companies and local citizens are complications with the "split estate." The split estate refers to the separation of surface rights and subsurface mineral rights. It is common for a surface owner to not know who owns the minerals be-

neath their land, and it can be a shock to learn of plans to extract those minerals. Residents who do not own the mineral rights beneath their land may find natural gas facilities and access roads encroaching on their homes. Current laws attempt to mitigate potential disagreements between surface rights and mineral rights owners. Sub-surface owners must make a "good faith effort" to come to an agreement with the surface owner regarding details of a potential development. However, if no agreement is reached, the mineral rights owner can still proceed by posting a bond with the Bureau of Land Management that is theoretically large enough to cover the costs of plugging the well and reclaiming and restoring the impacted lands.² The process of "bonding on" ensures that the mineral rights owner has the upper hand in a dispute.³

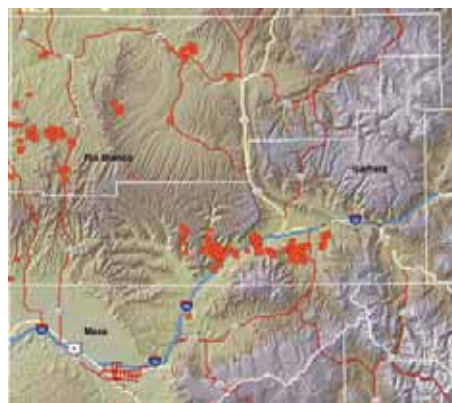
Despite the contentious relationship between energy companies and residents of the Grand Valley, there are examples of cooperation. EnCana Oil and Gas (USA) has drilling rights to more than 1.2 million acres in Colorado; the company has roughly 2,500 wells in the area⁴ and plans to drill 250 more in 2007.⁵ EnCana has

a mixed history of community relations. In 2004, they were fined for a faulty well that allowed natural gas to seep into a nearby creek.⁶ Since then, due in large part to the community uproar over the leak, EnCana has sought to improve community relations and make some concessions to local community members. Examples include painting oil and gas collection tanks colors that match the landscape, burying pipelines underground, and readjusting trucking schedules to avoid school bus pickup and drop-off times.⁷ To dampen noise from rigs working near residences, EnCana sometimes builds temporary walls around the rigs and focuses lights on the rig downward to lessen light pollution.⁸ The company has also helped Garfield County School District 16 retrofit their buildings with energy efficient upgrades and has donated money to Colorado Mountain Col-

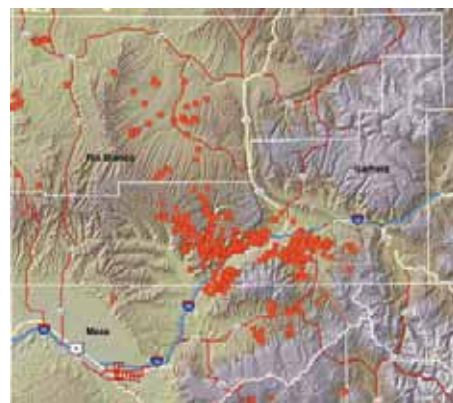




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lege to help build a technology and training center in Rifle, Colorado.⁹ EnCana has reclaimed 129 acres of sage grouse habitat by replanting mountain shrubs and also halted drilling during mating season. A new method of drilling, called micro-drilling or coiled tube drilling, could offer a way to diminish some of the impacts. The coiled tube rigs are smaller, with the largest taking about 12 semi-trailers to move as opposed to 20 or 30 semi-trailer loads for the conventional drilling rig. Coiled tube rigs are also quieter, reduce the amount of time needed to drill a well, and have cut costs by 38 percent according to tests run by the National Energy Technology Laboratory.¹⁰

Even though EnCana has made some changes and appears poised to make more, many residents are still frustrated by the traffic, noise, and odors. The Colorado Oil and Gas Conservation Commission, which is in charge of inspecting the wells and ensuring that regulations are being met, currently has only nine inspectors for the 30,000 wells it oversees.^{11,12} With over 3,300 wells for each inspector, it is easy to understand why some local residents are concerned that regulations may not be enforced.

The Grand Valley Citizens Alliance (GVCA) was formed in 1997 with the goal of representing local residents and pushing energy companies to adopt best industry practices. Recently, the GVCA helped draft a planning document to encourage responsible energy development.

One of the local drilling companies, Antero Resources Corporation, has taken a leadership role in the region and was involved in writing the plan. GVCA member Peggy Utesch stated, "I'm not aware of any other communities that have done this."¹³

The Grand Valley of western Colorado has had a long history with the energy industry, with no end in sight. According to Andrew McGregor, the Director of Community Development for Glenwood Springs, "the boom-bust cycle will keep repeating itself as long as there is something in the ground worth taking."¹⁴ For the citizens of the Grand Valley, the best practice efforts of local energy companies and the work of citizens groups like the Grand Valley Citizens Alliance provide hope for more thoughtful booms and fewer unexpected busts.



¹EIA Annual Review of Energy, Table 1.3 Energy Consumption by Source <http://www.eia.doe.gov/emeu/aer/txt/stb0103.xls>.

²Taken from the 2006 EIA Annual Review of Energy, Table 2.1b <http://www.eia.doe.gov/emeu/aer/consump.html>.

³Calculated from 2006 EIA Annual Review of Energy, Tables 6.1 and 5.1 Energy Consumption by Source <http://www.eia.doe.gov/emeu/aer/txt/stb0103.xls>.

⁴Calculated from 2006 EIA Annual Review of Energy, Tables 6.1 and 5.1 Energy Consumption by Source <http://www.eia.doe.gov/emeu/aer/txt/stb0103.xls>.

⁵Calculated from 2006 EIA Annual Review of Energy, d 5.1 Energy Consumption by Source <http://www.eia.doe.gov/emeu/aer/txt/stb0103.xls>.

⁶Energy Information Administration, "Crude Oil Production," http://tonto.eia.doe.gov/dnav/pet/pet_crd_crdn_adc_mbb1_a.htm.

⁷*Ibid.*

⁸Energy Information Administration, "Natural Gas Total Gross Withdrawals," http://tonto.eia.doe.gov/dnav/ng/ng_prod_sum_dcu_NUS_m.htm.

⁹*Ibid.*

¹⁰Energy Information Administration, "Number of Producing Gas Wells," http://tonto.eia.doe.gov/dnav/ng/ng_prod_wells_s1_a.htm.

¹¹*Ibid.*

¹²Energy Information Administration, "Annual Energy Outlook: 2007," <http://www.eia.doe.gov/oi/afo/index.html>.

^{13a}Rocky Mountain States Natural Gas Production: Resource Potential and Prerequisites to Expanded Production." Department of Energy, Office of Fossil Energy. September 2003. p. 7.

^{13b}U.S. General Services Administration Table: Comparison of Federally Owned Land with Total Acreage by State as of September 30, 1999," <http://www.blm.gov/natac/pls00/pdf/part1-3.pdf?search=%22general%20services%20administration%20percent%20federall%20land%22>, 5 September 2006.

¹⁴BLM Facts," <http://www.blm.gov/nhp/facts/index.htm>, 3 September 2006.

¹⁵Bob Randall, Attorney with Western Resource Advocates, interview by author, 6 July 2006.

¹⁶Ernie Gillingham, BLM Canon City, interview by author, 28 June 2006.

¹⁷Senate Committee on Energy and Natural Resources, "Impacts of the 2005 Energy Policy Act," www.craig.senate.gov/energybrochure.pdf.

¹⁸Statement of Gale A. Norton. March 8, 2006, <http://www.doi.gov/iepa/index.html>.

¹⁹Energy Information Administration, "Proved Oil Reserves," http://tonto.eia.doe.gov/dnav/pet/pet_crd_pres_a_EPCO_R01_mmb1_a.htm.

²⁰Energy Information Administration, "Proved Natural Gas Reserves," http://tonto.eia.doe.gov/dnav/ng/ng_enr_sum_a_EPG0_R11_BCF_a.htm.

²¹Duane Zavdil, "Meeting America's Natural Gas Demands," 16 October 2005, Denver Post, Opinions.

²²*Ibid.*

²³Minerals Management Service, "All Reported Royalties," http://www.mrm.mms.gov/MRMWebStats/Disbursements_Royalties.aspx?report=AllReportedRoyaltyRevenues&year=FY&year=2005, 9 September 2006.

²⁴The agencies which funds can be transferred to are the U.S. Fish and Wildlife Service, Bureau of Indian Affairs, Forest Service, Environmental Protection Agency, Corps of Engineers, and the states of Wyoming, Colorado, Montana, Utah, and New Mexico. Energy Policy Act of 2005, Public Law 109-58, 109th Congress, Sec. 344.

²⁵Minerals Management Service, "All Reported Royalties," http://www.mrm.mms.gov/MRMWebStats/Disbursements_Royalties.aspx?report=AllReportedRoyaltyRevenues&year=FY&year=2005, 9 September 2006.

²⁶Minerals Management Service, "All Reported Royalties," http://www.mrm.mms.gov/MRMWebStats/Disbursements_Royalties.aspx?report=AllReportedRoyaltyRevenues&year=FY&year=2006&datatype=AY, 9 September 2006.

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²⁸"Natural Gas Boom Affects Rural Wyoming Town," http://www.pbs.org/newshour/bb/business/july-dec06/gas_08-22.html, aired 22 August 2006.

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