

UTAH COAL

A REPORT AND SCENARIO PLAN BY THE RURAL PLANNING GROUP | SEPTEMBER 2014



A study performed by the Rural Planning Group
in partnership with Southern Utah University's
Center for Rural Life.

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BY WAY OF INTRODUCTION

What's around the corner for Utah's coal industry? Which way do we as local leaders turn when we come to a fork in the road? The following study aims to answer these questions and provide guidance.

Coal has enjoyed a long and prosperous reign as king of Utah's energy sector. While coal has been the backbone of many rural economies, change is coming. Presently, there are many threats to the coal industry, and current indicators suggest that a rocky road lies ahead.

It has been a pleasure for the Rural Planning Group to perform this coal study. This report presents known facts as well as the key uncertainties or variables that can and will impact the coal industry. Based on what is known and what could change, this report and its companion website (ruralplanning.org/coalstudy) provide likely scenarios and options.

In the end, we hope to have provided you with tools and resources you can use. The only real certainty is uncertainty, and that things are changing. This work should serve as a call to action to help you prepare for what may come in the energy, and more specifically, the coal sector.

I want to thank Nick Baker, who led this project; Mike Hansen, our senior planner; and Kyle Slaughter, the world's best intern. Also, thank you to Wes Curtis for giving us this opportunity, and to Gordon Walker and the Community Impact Board for supporting and funding the Rural Planning Group.



Keith Heaton
Rural Planning & Community Development Director

the **IMPETUS**

The coal industry has entered into a period of intense scrutiny, speculation, and uncertainty. The following developments represent a selection of considerations that served as the impetus for this study.

Utah

- × The Los Angeles Division of Water and Power (LADWP)—the primary customer of the Intermountain Power Project (IPP)—will not be renewing its power purchase agreement, set to expire in 2027, with IPP. Instead, the LADWP intends to build a new natural gas plant adjacent to IPP’s existing facilities and begin purchasing natural gas-fired electricity from IPP by 2025.
- × The Carbon Plant, operated by Rocky Mountain Power, is set to close its doors in 2015 due to the prohibitive costs of operating under existing federal regulations.
- × The Bonanza Plant was recently fined for excess for pollution and faces uncertainty due to an increasingly stringent regulatory environment.
- × Rocky Mountain Power (RMP) is not planning to build additional coal-fired generating capacity in Utah. Furthermore, RMP intends to reduce its reliance on coal by 15 percent over the next 10 years.
- × Natural gas production in Utah, occurring primarily in the Uintah Basin, exceeded coal production for the first time in 2010, with that trend continuing over the past four years.
- × Earlier this year, the Ute Indian Tribe announced plans for a 1,000-megawatt natural gas power plant, demonstrating increasing competition for Utah’s coal-fired power plants.

United States

- × Over half (8,433) of all coal miners in Eastern Kentucky have been laid off since the first quarter of 2009.
- × The United States is experiencing a shift away from coal-fired power. The state of Nevada, for instance, reduced its coal-fired power production from 70 percent of its total power generation in 1992 to 12 percent in 2012.
- × Since 2010, over 150 of the nation’s coal-fired power plants have closed or been scheduled for retirement.
- × The Energy Information Administration reports 11 planned coal-fired generating unit additions (4 percent of planned capacity) in the United States in comparison with 281 natural gas-fired generating unit additions (45 percent of planned capacity).
- × The Environmental Protection Agency (EPA) estimates that 46 to 50 gigawatts of coal-fired generating capacity—over four times PacifiCorp’s total generating portfolio—will go offline as a result of its proposed CO² regulation. Consequently, the EPA projects that thermal coal production in the United States will decline by roughly 26 percent.

World

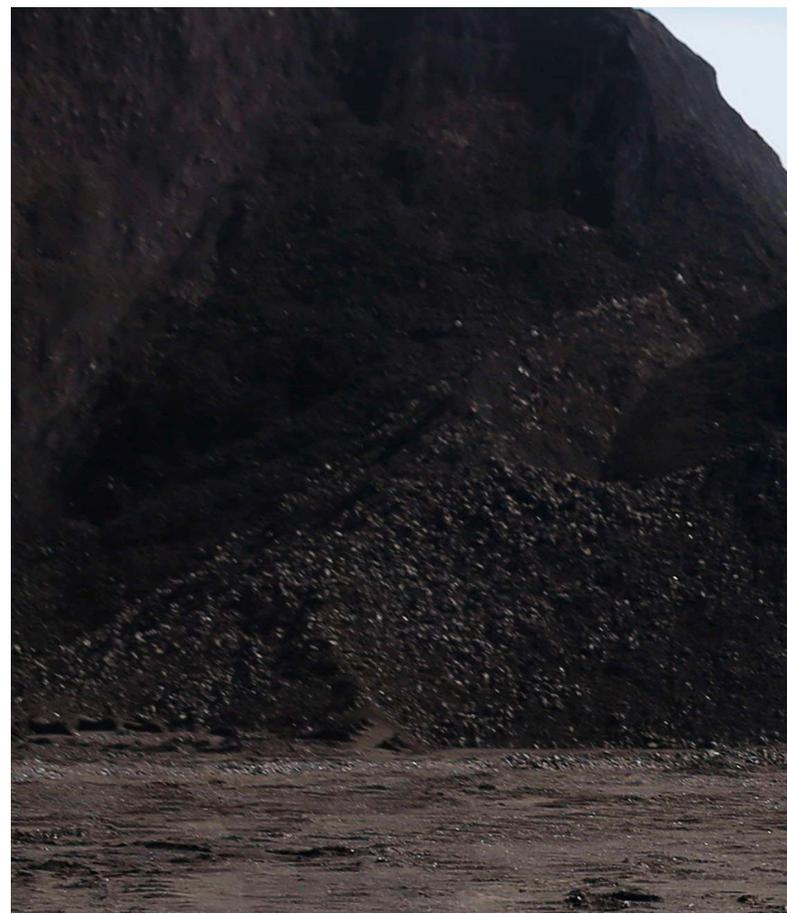
- × The world produced an oversupply of coal amounting to roughly 840 million short tons between 2008 and 2012.

ABOUT THIS STUDY

This study examines Utah's coal industry using the framework of scenario planning, a practice that helps decision makers explore a range of possible futures, consider how those futures might emerge, and develop strategies that are both focused and flexible.

Several previous studies analyzing the future of Utah coal projected a sustained increase in Utah's coal production. The reality that has unfolded, however, is quite different.

The gap between these projections and actual coal production is not the result of poor modeling, a misreading of market conditions, or faulty data. Instead, the disparity speaks to the complexity and



attendant uncertainty of the coal industry as well as the inability of any model to adequately account for the full range of possible outcomes.

Rather than make another attempt to predict the future of Utah's coal industry—an exercise that would likely produce a somewhat gloomy outlook given current regulatory and market conditions—this study offers an assessment of the set of circumstances (or certainties) currently affecting the industry, identifies key uncertainties upon which the future of the industry hinges, and presents scenarios that describe how these uncertainties could shape the future of the industry and the communities that depend on it.



“There are no perfect measures. Conditions change. Events happen. Judgment is vital.”

— ANTONY BURGMANS / BP Board Member —

BACKGROUND

a brief

HISTORY

Utah's use of coal dates back to 1850, when Mormon settlers made the state's first reported coal discovery in what would later become Cedar City. Further coal discoveries spurred mining activity in Sanpete, Summit, Carbon, and Emery counties, but early extraction methods—typically involving the use of explosives to loosen coal from visible surface seams and hauling it away by the wagonload—kept production low through the 1870s.

With most of Utah's surface-level coal seams having been exhausted by the latter stages of

the 19th century, mining enterprises grew more sophisticated. During this period, a typical coal mine consisted of a series of underground tunnels, each featuring iron rail tracks. The miners of this era blasted coal away from open faces and manually loaded it into wooden rail cars that were then pulled out of the mine by horses or mules.

The completion of the Rio Grande Western Railroad in 1882 was a major boon for the coal operations dotting the Carbon and Emery county coalfields and helped the region become one of the top coal producers in the West. In 1900, the state's

annual coal production surpassed one million tons for the first time, with most of that coal hauled out of Carbon and Emery county mines.

While the year 1900 represented a significant milestone for the industry in terms of production, it also marked Utah's most tragic coal mining disaster. In May of that year, a major explosion at Scofield Mine in Carbon County took the lives of 200 miners, leaving 107 widows and 268 fatherless children. The cause of the catastrophe was an excessive accumulation of coal dust, demonstrating the poor labor and safety conditions of that era.

Utah's coal industry experienced significant expansion between 1900 and 1920. An economy increasingly reliant on steam coal and the flurry of activity associated with World War I propelled demand for coal during this period. Major technological advancements—which saw drilling machines, cutting machines, and locomotives replace traditional picks, shovels, and carts—enabled mines to produce more coal with fewer workers. By 1915, the amount of coal mined by

machine overtook the amount of coal mined by hand for the first time in the state's history, and by 1920, coal production had more than quadrupled since the dawn of the 20th century.

The steady growth of the industry over the previous two decades stalled after World War I and plummeted with the onset of the Great Depression in 1930. Utah's coal production in 1934 dropped to 2.4 million tons, less than half of the amount produced at the 1920 peak.

Coal production again increased during World War II, when newly-constructed steel plants in Carbon County and Orem generated additional demand for coking coal. At the conclusion of the war in 1945, coal production was more than double what it had been in 1939 when the war began, and the industry reached new heights in 1947, when just under 7.5 million tons of coal were removed from Utah mines.

Demand for coal stagnated in the 1950s and 1960s as the residential coal furnace and steam



locomotive markets disappeared. During these two decades, coking coal accounted for around half of all coal produced in the state. Though idle demand kept Utah's coal output from growing, the amount of coal produced per miner work day increased dramatically with the introduction of conveyor belts and shuttle cars. Productivity grew from 7 tons of coal per worker day in 1947 to more than 15 tons of coal per worker day in 1965. Coincidentally, mining employment in 1965 (1,495 jobs) fell to approximately one third of what it had been in 1947 (4,202 jobs).

The 1970s—when coal became the preferred fuel source for electric power generation—ushered in the most significant boom in the history of the Utah coal industry. Four coal-fired power plants (Hunter, Huntington, Bonanza, and the Intermountain Power Project) came online during the 1970s and 1980s, with the demand created by these projects prompting mining companies to ramp up their operations at a feverish pace. These conditions allowed the number of coal miners employed in the state to climb to 4,296 in 1982—

more than at any other time since 1950—though the introduction of highly productive long-wall mining machinery in the following years would simultaneously reduce mine employment and expand coal production.

At just over 27 million tons, coal production in the state of Utah reached an all-time high in 1996, a year that would also mark the tail end of an extraordinary two-and-a-half-decade boom cycle for the industry. In spite of a brief spell of increased domestic and international exports, the state's coal production would plateau between 1996 and 2001.

Utah's coal industry has since entered a period of tremendous uncertainty. Increasingly formidable market and regulatory conditions, among other factors, have curtailed coal production in Utah, which fell to just under 17 million tons in 2013, the state's lowest output since 1987. Consequently, many coal mining companies have scaled back their operations, causing coal mining employment to drop to 1,445 in 2013, Utah's lowest figure since 1971.





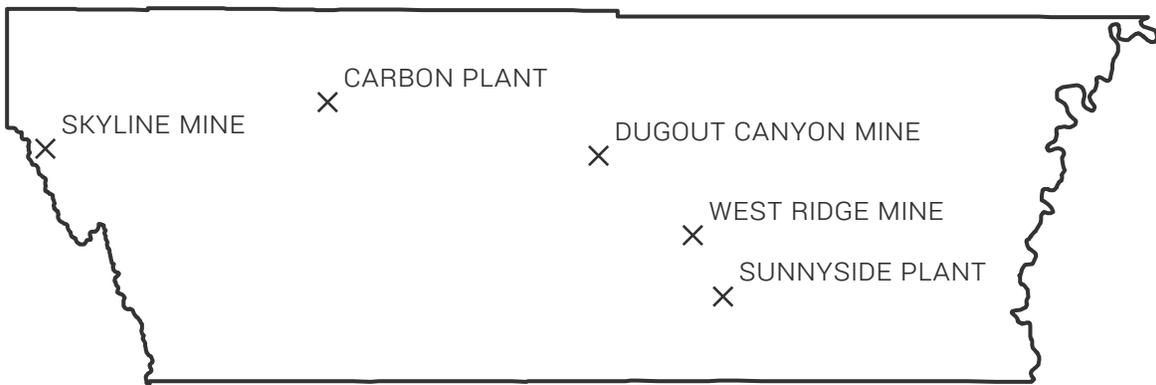
THE
OF
ROLE
COAL

With his helmet donned and pickax in tow, a dark, 20-foot-tall coal miner greets all who travel Main Street in Helper, Utah. Big John, as the statue is called, commemorates the region's longstanding ties to the coal industry.

Coal is deeply embedded in the history, economy, and culture of many of Castle Country's communities. The industry continues to provide the livelihood of many of the region's individuals and families, with some families able to trace involvement in coal mining and related activities back through multiple generations. As one miner put it, "It's like they always say: The coal dust gets in your blood." As such, the effects of the industry's booms and busts are far-reaching and personal.

Shifts in the coal industry can have transformational impacts on the communities in central Utah that have sizable contingents of coal miners, power plant workers, truck drivers, and individuals employed in other support activities. Consequently, understanding and mitigating the negative effects of the boom-bust cycle—while also embracing new opportunities—is key to regional success as "King Coal" faces ever increasing challenges.

The following pages contain brief profiles of the six counties that commissioned this study. For more information on county population, migration, and employment, please visit ruralplanning.org/coalstudy.

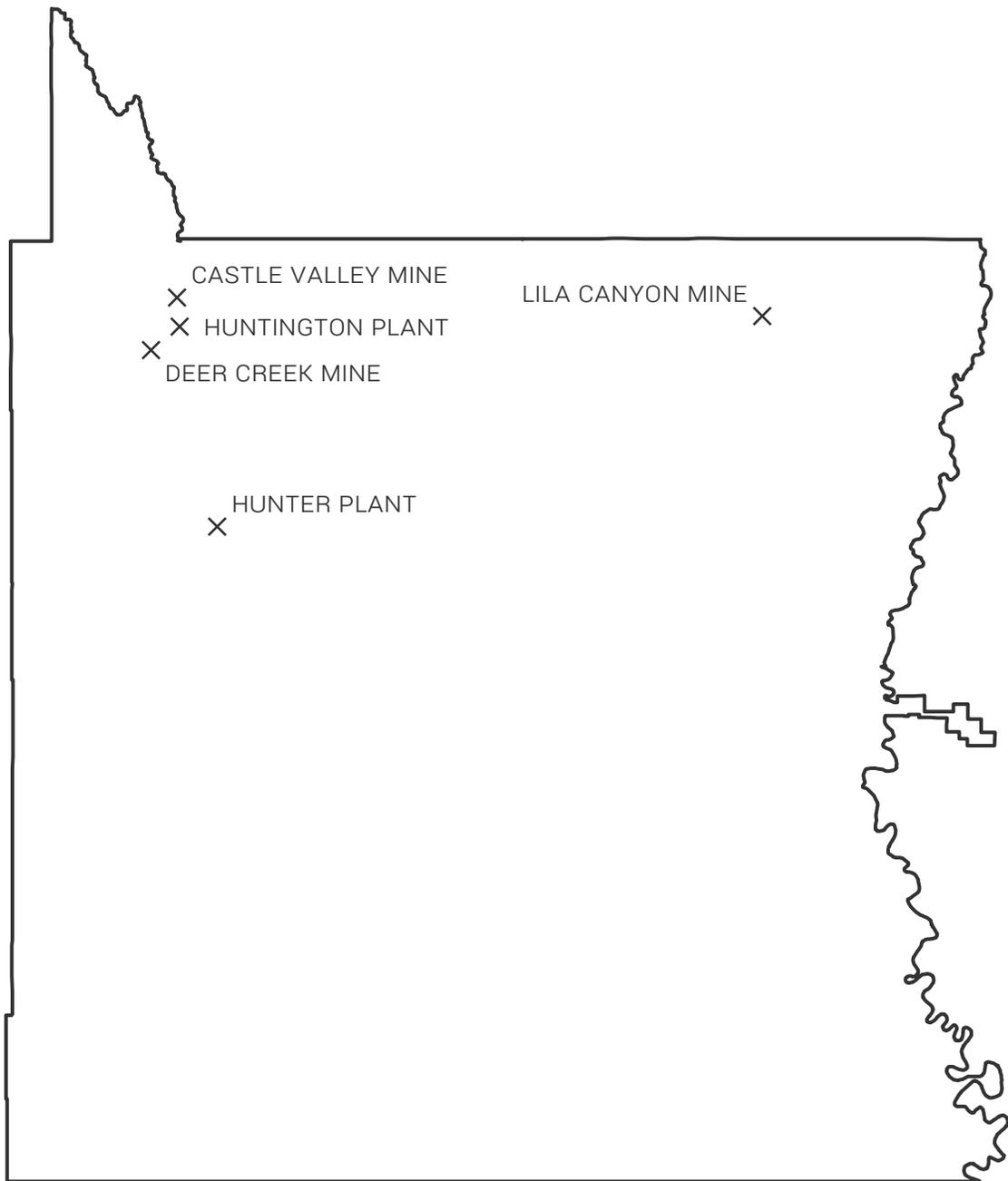


CARBON

county

True to its name, Carbon County has long been the heart of Utah's coal industry. Mining and power generation remain an important staple of Carbon County's economy, with coal industry (and support industry) employment currently accounting for an estimated 22 percent of the county's total employment.

Carbon County has experienced slow migration activity—almost all of which has been negative (people moving out) since the early 1980s—which has contributed to the sharp rise in the population's average age. Furthermore, the county has seen the loss of a large share of the mining and support industry jobs it had just a decade ago.



EMERY

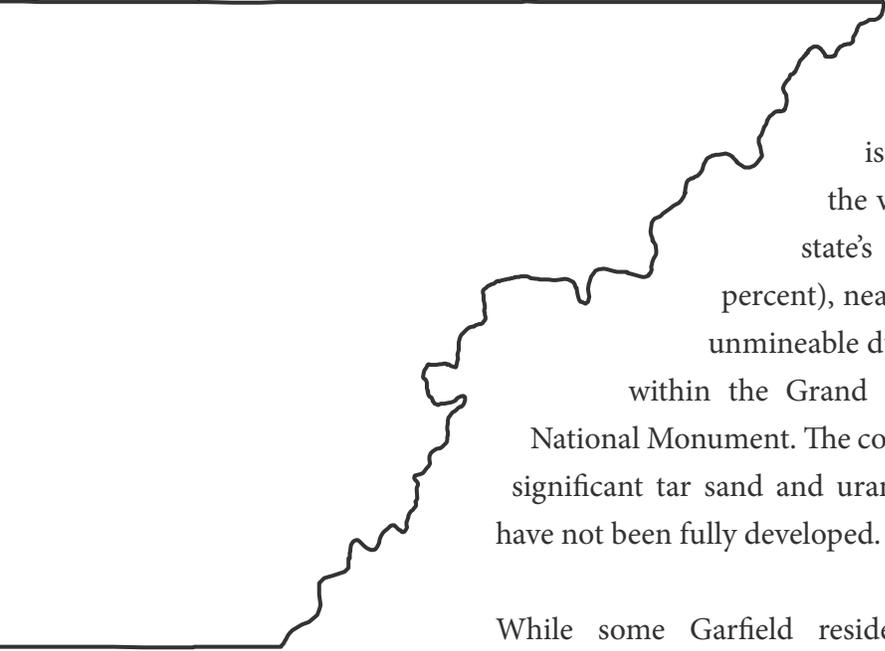
county

Coal mining, power generation, and support industries are absolutely critical to Emery County's economy. Not only does Emery County have more coal-related jobs than any other county in the state, it also has a relatively small workforce, meaning the coal industry makes up a greater share of its jobs.

Emery County's most significant period of growth occurred in the 1970s when the Hunter and Huntington Plants were established. Since then, however, migration into and out of the county has been slow and the county's average age has increased rather dramatically.

GARFIELD

county



The difficult irony facing Garfield County is that it is home to the vast majority of the state's coal reserves (61 percent), nearly all of which are unmineable due to their location within the Grand Staircase-Escalante National Monument. The county also possesses significant tar sand and uranium deposits that have not been fully developed.

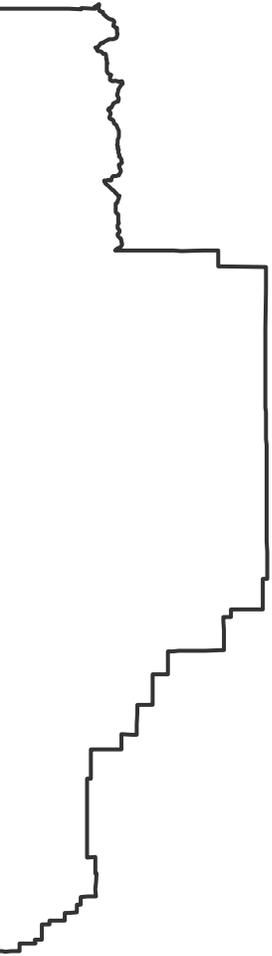
While some Garfield residents commute to coal-related jobs in neighboring counties, these individuals are not represented in available data sets since coal mining and power plant employment are measured by employer location.

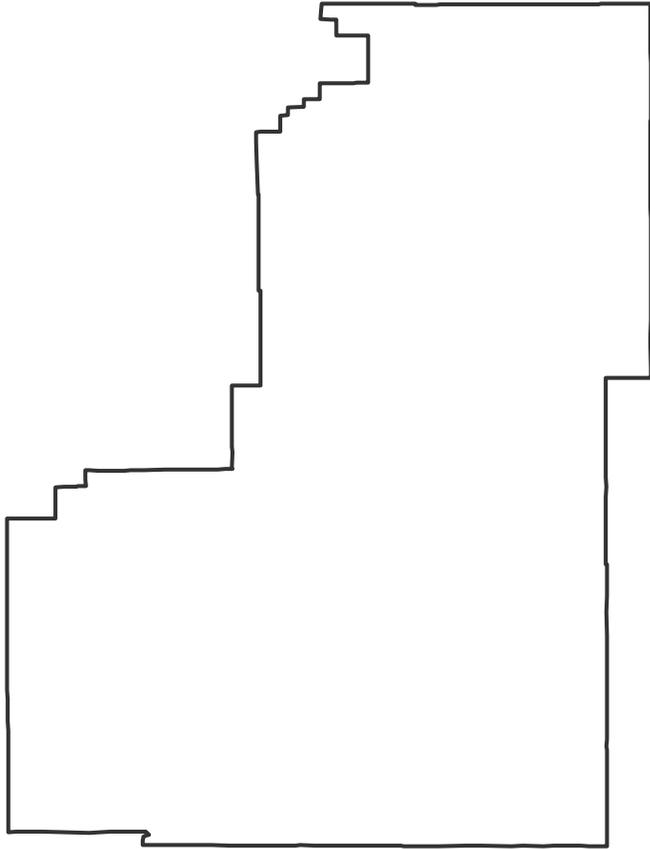
INTERMOUNTAIN POWER PROJECT X

MILLARD

county

While Millard County has no coal mining activity, the coal-fired Intermountain Power Project (IPP) is a major cornerstone of the county's economy. At present, IPP accounts for roughly 8 percent of the county's direct employment, not to mention the numerous support industry jobs associated with the plant. Additionally, Millard County contains major energy-related infrastructure that helps position it to become an energy hub.



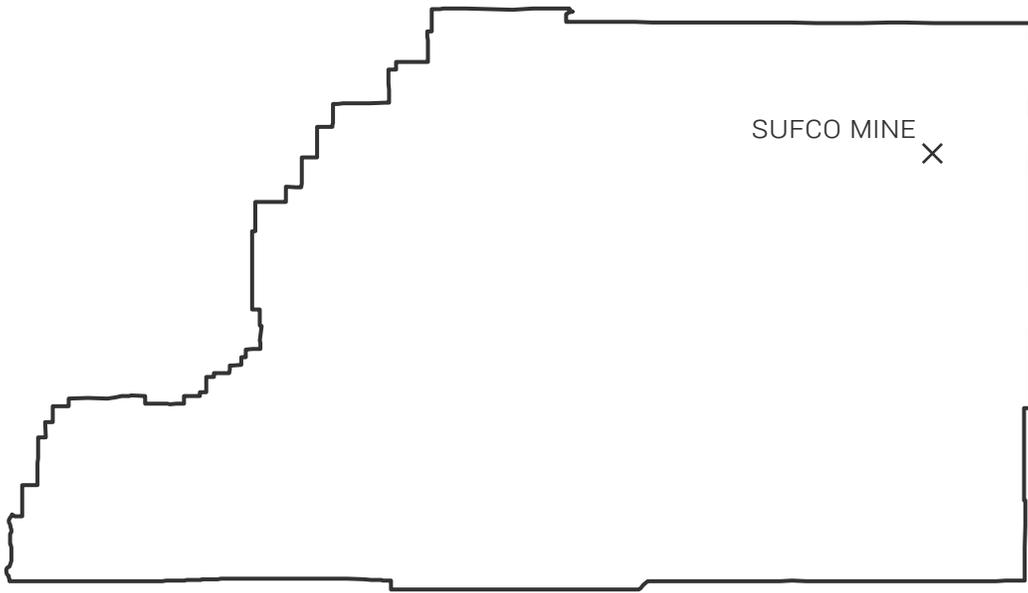


SANPETE

county

Sanpete County's strong population growth (nearly doubling since 1990) and relatively low median age are unrelated to the coal industry and can be attributed to other economic sectors (e.g. higher education).

While some Sanpete residents commute to coal-related jobs in neighboring counties, these individuals are not represented in available data sets since coal mining and power plant employment are measured by employer location.



SEVIER

county

Sevier County has the potential for a robust natural resources sector. At present, 4 percent of the county's workforce is employed at SUFCO Mine, with another 11 percent of the county's employment tied to the coal industry. In addition to its coal resources, Sevier County also possesses oil reserves and major geothermal resources that could be tapped for energy production.

CERTAINTIES



black rock ABUNDANCE

Coal—a fuel source that has been utilized by mankind for centuries, if not millennia—is both abundant and finite, a paradox that makes the expected longevity of the combustible black rock a rather contentious topic.

Due to the variability of market conditions, the actual amount of feasibly recoverable coal is fluid and uncertain. Consequently, the resource totals and longevity projections presented hereafter are based on estimates of potentially recoverable coal reserves and do not necessarily account for all of the numerous constraints (e.g. land use, access,

cost, demand, etc.) that could prevent the coal from reaching the market.

Global Coal Reserves

The US Energy Information Administration (EIA) estimates that there is approximately 971 billion tons of potentially recoverable coal on the planet. To put that amount in perspective, a standard BNSF Railway coal car has a 117-ton capacity, meaning it would take nearly 8.3 billion BNSF Railway coal cars to carry all of the world's coal. With each coal car measuring just over 53 feet when coupled with

other railcars, a train consisting of that many coal cars would span about 83.5 million miles, which is equivalent to 3,352 times the circumference of the earth or approximately 90 percent of the distance between the earth and the sun.

In 2012, the world's population consumed just under 8.5 billion tons of coal. If consumption were to continue at 2012 rates, the world's remaining recoverable coal reserves would last until the year 2130.

United States Coal Reserves

The amount of coal resting under American soil is estimated at an astounding 3.9 trillion tons, about 257.6 billion tons of which qualifies as recoverable. The United States ranks first in the world in terms of recoverable coal reserves, accounting for 27 percent of the world's total. Given the country's prominent position, it comes as no surprise that one mine manager claimed that "the United States is the Saudi Arabia of coal."

Whereas the world's coal resource would last another 116 years at 2012 consumption rates, the United States' reserves would last much longer, at approximately 253 years, if mined at 2012 production rates.

Utah Coal Reserves

The Utah Geological Survey (UGS) lists Utah's supply of potentially recoverable coal at 14.9

billion tons—a quantity that would last about 594 years based on 2012 production levels—though the amount of feasibly recoverable coal in Utah is substantially less.

According to 2002 estimates from the UGS and the Bureau of Land Management Price Field Office, the amount of feasibly recoverable coal at then producing coalfields (Wasatch Plateau, Book Cliffs, and Emery) totaled almost 1.2 billion tons. An update of this estimate suggests that just over 966 million tons of coal is feasibly recoverable, a total that would keep Utah's coal industry up and running for the next 57 years.

The vast difference between the state's potentially and feasibly recoverable coal reserves demonstrates the impact of outside constraints on Utah's coal industry. Though Utah possesses billions of tons of potentially recoverable coal, the majority (61 percent) of the state's coal lies in the Kaiparowits Plateau coalfield and is off limits due to its location within the Grand Staircase-Escalante National Monument. Meanwhile, other reserves (approximately 33 percent) are not feasibly recoverable due to land use, leasing, coal quality, access, and environmental issues.

In spite of these limitations, Utah possesses a considerable supply of feasibly recoverable coal, and an estimated 57 years of remaining production suggests that the biggest issue facing the state's coal industry is not necessarily the scarcity of the fossil fuel, but the demand for an abundant resource.







comparatively speaking

Clean coal helps power plants meet increasingly stringent regulatory requirements. The introduction of emissions standards—which are becoming common throughout the world—makes clean coal attractive to power plants that may be able to avoid costly investment in emissions mitigating technologies.

Utah's coal compares favorably to the resources mined elsewhere in the country. In addition to possessing moderately high heat content, Utah's coal contains relatively low amounts of ash and sulfur, qualities that make it appealing for power plants both with and without emissions reducing technologies such as scrubbers and baghouses. In spite of these virtues, the fixed costs of transporting Utah's coal to other states may, in many cases, outweigh the resource's benefits due to the prevalence of cleaning technologies at coal-fired plants across the country.

Utah's coal-fired power plants benefit from the clean qualities of Utah's coal. As a result of effective management, forward-thinking investment, and the use of high quality coal, Utah's large coal-fired power plants boast some of the most efficient and cleanest operations in the western United States.



low cost, high yield

Governor Gary Herbert identified energy development as one of his four cornerstones for Utah's continued economic success. His approach to energy—supporting the development of all of Utah's energy resources—has helped keep Utah's electricity rates below the national average. The state is consistently recognized for its robust economy, with many people pointing to the low cost of power as one reason for this success.

Due to its consistent and inexpensive pricing, coal keeps Utah's electricity rates low. Utah currently generates 78 percent of its electricity from coal, making it one of only seven states in the nation that relies on coal for more than three-quarters of its power. In 2012, Utah ranked 11th in the United States in terms of lowest electricity prices, at just 9.93 cents per kilowatt hour.

Utah's natural gas boom has increased the practicality and profitability of gas-fired power plants. Natural gas, which accounted for less than 1 percent of Utah's electrical generation in 1989, now represents 17 percent of Utah's electrical

generation, contributing to the decrease in coal's share (from 97 percent to 78 percent) over the same time period. This shift has increased and will continue to increase pressure on Utah's coal industry. However, the historic variability of natural gas pricing suggests that today's low prices may not be an indication of low rates in the future.

Due to its consistent and inexpensive pricing, coal keeps Utah's electricity rates low.

Changes to Utah's energy portfolio create a degree of uncertainty about the future of Utah's electricity rates. Average electricity prices have already risen as coal has decreased as a percentage of Utah's power production, a trend that could continue with further reduction in coal-fired power generation and increased reliance on natural gas for base load generation.



IMAGE | *Nick Baker*

POWER HUNGRY

Utah is one of the fastest growing states in the nation. With the state's population expected to practically double by 2050, another 2.5 million residents will join an already power-hungry populace. These added residents will increase the demand for electricity on multiple fronts, a reality that will keep energy production and electricity generation at the forefront in any discussion of the state's future.

If population figures alone are not enough to suggest a busy future for Utah's power plants, a look at the state's per customer electricity usage will surely solidify that case. Modest

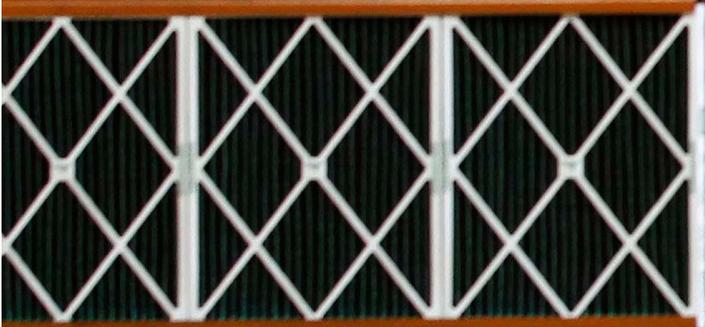
reductions from energy-saving measures and products are being readily outpaced by demand for power from an increasingly energy-intensive society. In Utah, per customer electricity demand from each of the four customer sectors—residential, commercial, industrial, and transportation—has increased steadily over time.

For the casual observer, the trend of increasing electricity use is perhaps most apparent at the household level, where unused electrical wall outlets have become precious commodities. The typical US household now owns around 25 electronic devices, a number

that has ballooned from the 3 electronic devices per household reported in the mid-1980s. In Utah, household electricity use jumped from 6 megawatt hours per year in 1972 to 10 megawatt hours per year in 2012, a clear indication that Utahns are using more power than ever before.

Changes in demand have the potential to affect the prices Utahns—as well as the state's commercial and industrial enterprises—pay for electricity. Consequently, public- and private-sector leaders at every level should carefully consider how changes in the energy landscape will impact the state's economic outlook.

AL GE ELECTRIC



GE
ELECTRIC







keeping it **LOCAL**

Utah's vast natural resources and relatively low population have helped position the state as a net energy exporter. Though coal is one of the state's top exported energy products—with a portion of the state's yearly output reaching domestic and international buyers—the majority of the 17 million tons of coal mined annually in Utah is used to meet local electricity needs.

Advantages arising from their proximity to one another encourage Utah's coal producers and coal consumers to do business with their in-state counterparts. Utah's coal mines benefit from consistent demand from nearby customers while facing little outside competition since Utah's coal-fired power plants are configured to burn Utah coal. Meanwhile, Utah's coal-fired power plants are able to limit shipping costs by purchasing from local mines and access an ample supply of a high-grade coal that enables them to run clean and efficient operations. This relationship of interdependence has proven critical to Utah's coal industry.

The physical amount of Utah coal consumed within the state has remained relatively consistent since the completion of the state's three large

coal-fired power plants (IPP, Hunter, and Huntington) in the 1970s and 1980s. However, in-state usage as a share of the state's overall coal distribution has varied dramatically over the past 30 years.

During the height of Utah's coal industry (between 1996 and 2001), a surge in exports caused in-state consumption to dip to a low of 32 percent of the state's overall coal distribution. That figure increased steadily as domestic and international demand tapered off, reaching a new high of 75 percent in 2012. The sharp rise of the percentage of Utah coal consumed within the state indicates that Utah's coal mines are becoming increasingly reliant on demand from in-state buyers. A major negative shift in demand from Utah's coal-fired power plants could prove disruptive to Utah's coal industry.

Just such a shift may be on the way. The closure of the Carbon Power Plant (scheduled to take place in 2015) and the potential conversion of the Intermountain Power Project (planned for 2025) would eliminate a combined 28 percent of in-state demand for Utah coal. Furthermore, Rocky Mountain Power is aiming to reduce its reliance on coal-fired power by 15 percent in coming years and has no plans to build additional coal-fired generating capacity in the future.

Diminished in-state demand for Utah coal may prompt the state's mine operators to pursue customers in other states and countries.



IMAGE | *George Frey*

STATESIDE

Utah has a history of selling coal to other states. In fact, before many of Utah's coal-fired plants became operational, and even during some of Utah's highest producing years, exports to other states accounted for a larger share of Utah's coal than use within the state. Though its share of total distribution fluctuates, the domestic market still plays an essential role for Utah coal as roughly one-fifth of Utah's coal is still shipped to other states. Furthermore, with the closure of the Carbon Plant set for 2015 and the potential closure of IPP's coal-fired units in 2027, the domestic market could become even more important to Utah's coal industry.

Currently, the domestic market appears to be facing considerable change. Negative press related to climate change has driven a large number of Americans to believe coal is a dirty, harmful energy source. Governmental regulations are mounting

against both mining and coal-fired power production, and some of these regulations are so costly that certain power plants are forced into early retirement because they lose their economic feasibility. Finally, natural gas production, spurred by fracking technology, has exploded across the country. This has lowered prices and prompted the construction of many new natural gas-fired power plants and increased competition with coal-fired power.

While there are other pressures affecting the domestic market, public opinion, governmental regulation, and competition from cheap natural gas are creating serious uncertainties for the future of coal.

Despite negative trends in the domestic coal market, Utah coal's clean qualities could allow it to outlast other coal in the region as remaining power plants try to meet increasingly stringent regulations. Similarly, the relatively small amount of coal Utah produces (roughly 1.6 percent of national production) means that even a few power plants that decide to burn Utah coal could make up for diminished in-state demand, thereby maintaining employment levels at Utah mines.



abroad

In addition to the uncertain futures faced by many of Utah's coal-fired power plants, a large number of US coal plants are closing or are scheduled to close due to current and impending regulations. This has led many to believe that Utah mines will have to pursue overseas buyers if the state is going to maintain its current rate of coal production.

Utah mines have slowly increased their overseas shipments in recent years. The state's international distribution is small, reaching just seven percent of Utah's total coal distribution in 2012, but it represents progress in an overseas market where demand is growing instead of falling.

In seeking buyers in the market abroad, Utah mines will face three primary challenges: (1) a global oversupply of coal that has reduced prices,

(2) lack of emissions regulations in less-developed countries, which makes Utah's coal less attractive, and (3) limited US port capacity, especially on the west coast. There are opportunities for Utah coal in spite of these obstacles, but expanding international exports will require a tremendous amount of planning and coordination.

Global Oversupply

Between 2008 and 2012, the world's coal producers mined a surplus of more than 840 million short tons of coal, an oversupply that is nearly 50 times greater than the amount of coal produced in Utah each year. The continued overproduction of coal is driving global prices down. After peaking in 2011, prices have fallen by almost 40 percent (actual dollar amounts vary by source, though

the percentage is similar across sources). When shipping costs are included, prices are so low that Utah will struggle to compete aggressively or at a substantial scale. Meanwhile, countries like Colombia and Indonesia are able to produce and sell at a lower price than US underground mines due to lower labor costs, relatively low shipping costs, and easy port access.

Marginal Benefits

The benefits of Utah's relatively clean coal are marginalized when purchased in countries without emissions standards, or in countries where scrubbers and other emissions-reducing technologies are mandatory. While power companies in these countries may prefer Utah's low-sulfur coal, they will do what is best for their profit margins and may decide to purchase higher sulfur coal at the lower price.

Port Capacity

Port capacity in the United States is an ongoing challenge for Western coal producers. Though Western mines produce significantly more coal than Eastern mines, the United States' Pacific Coast possesses just three percent of North America's coal port capacity.

Western ports are only capable of shipping a minuscule portion of the coal produced in the West, which generally leaves western mining companies little choice other than long, expensive rail trips that send the coal out of the country through Canada, Gulf Coast ports, or eastern ports.

Possibilities

Utah coal may have a few advantages that result from the current set of circumstances.

First, Utah's relatively low coal production (when compared to major producers, like Wyoming) means that a small number of committed international purchasers could import the majority of Utah's coal, allowing mining operations to maintain or even increase production.

Additionally, producing a smaller amount of coal that sells for a higher price than Wyoming's Powder River Basin coal could also allow Utah to ship a large percentage of its coal through the limited port capacity the West coast offers. However, shipping more coal than this from the West coast would require new port capacity in either California, Oregon, or Washington, which seems fairly unlikely given the current political climate. Another option would be shipping from British Columbia or Mexico. However, both entail the same problem as shipping to the Gulf and East coasts—long, costly rail trips.

Finally, the clean qualities of Utah could become more important to power companies in other countries as they begin facing additional regulations on sulfur dioxide, mercury, and particulate matter. This has started in China, where regulations are beginning to push power plants to clean up their emissions. While this does not mean that plants across the globe will seek Utah coal, it could lead to increased overseas sales to customers that are trying to drive down emissions. This could result in Utah mines maintaining production levels.

“Thermal seaborne coal markets face a combined threat of a steadily-growing supply in the largest producing regions and a leveling-off or decline in demand in consuming regions.”

— DEUTSCHE BANK —

ebb AND *flow*

Because public opinion is just that—opinion—it is subject to false data, incorrect assumptions, and a variety of other flaws. However, despite these inherent issues, public opinion often drives significant shifts in how society operates. In other words, the impact of public opinion is not diminished even if it is incorrect.

Therefore, even if climate change and other issues associated with coal use are not as drastic as some reports indicate, the public will demand action from policy makers so long as the reports sway their opinion. Consequently, the current negative sentiment toward coal—whether based in fact or not—cannot be underestimated.

As concern over the environment and air quality has grown, legislative bodies have endowed agencies with the authority to expand emissions regulations. These policies are more difficult to eliminate than they are to create, which means that the effects on coal-fired power plants accumulate as new layers of regulation are added over time. As a result, coal-fired plants across the country are finding it increasingly difficult and costly to generate the power upon which their detractors rely.

The State of Public Opinion

According to Gallup, 64 percent of all Americans favor the development of alternatives to fossil fuels. When broken down by age group, the trend is even more worrisome for coal's future: 80 percent of Americans between the ages of 18 and 34 prefer development of renewable energy and 65 percent of 35 to 54 year olds stated a preference for renewables. Only those 55 and older stated a preference for fossil fuels, and even then it was only by a margin of 2 percent.

This data paints an interesting picture for the future of the industry. As individuals in the younger age groups ascend to senior positions in both government and the private sector, there is a large number who will likely maintain their preference for renewables and operate in a manner that is consistent with this preference.

It should be noted that public opinion toward coal is not a foregone conclusion; it varies over time and can change completely with the emergence of major events. For instance, public concern over climate change climbed significantly through the mid-2000s. The onset of the financial crisis in 2008, however, caused a large percentage of the

population to shift their concern from climate change to issues posing more immediate threats. For those who were particularly affected by the economic downturn, the threat of high power bills was a greater concern than the threat of climate change.

The Future of Public Opinion

No one knows how public opinion toward coal will change—if it changes at all—in the future. However, looking back at events that have significantly altered public opinion provides a reasonable indication of what to expect if a given event takes place.

For instance, another severe economic downturn, a war, or some other major calamity is likely to drive people back to coal, the fuel source that has been most consistent and inexpensive in the past. Similarly, if public opinion suddenly turns against natural gas as a result of water contamination, severe fracking-related earthquakes, or escalated prices, public opinion of coal will likely improve. A shift of this nature would result in significantly more coal being burned in coal-fired power plants, a change that would prove beneficial to Utah's coal industry.

the **DEBATE**
great



While proponents and opponents of coal disagree about almost everything coal-related, the most consistent and heated debate surrounds the environmental impact of coal use. Conflicting reports abound, claiming either that the impact is limited or that it will be responsible for calamities that are increasingly severe and common.

The Issues

Environmental activists claim that coal mining changes topography, contaminates groundwater, and destroys habitat for both plants and wildlife. They often point to environmental disasters that have taken place at open pit mine operations where the impact is obvious. Meanwhile, pro-coal activists and coal companies use mines like Skyline Mine in Utah, where the footprint for the whole mine is limited and the wildlife and waters have not been altered, as demonstration that coal mining can be an environmentally sustainable endeavor.

Burning coal causes the emission of sulfur dioxide, nitrous oxide, mercury, carbon dioxide and other pollutants. Many of these pollutants have been correlated with negative environmental impacts, including human health issues. In order to comply with federal regulations, emissions requirements have been placed on these plants for a large number of their emissions (excluding carbon dioxide). As a result, contamination from pollutants has significantly decreased across the US. Pro-coal advocates feel that these reductions demonstrate good faith, and that the industry is continually trying to lessen its environmental and negative health impacts.

Environmental advocates, on the other hand, claim that there is still a long way to go, and that even with the reductions in emissions, the impact is far too severe for the US to continue coal's use in the future.

Carbon dioxide regulation is the latest proposed emissions regulation, and many in the industry feel the negative impact on the coal sector will prove more costly than the relative benefit the regulation provides. Meanwhile, environmentalists hail the rule as the first step toward a permanent transition away from coal. In the midst of this debate, support for regulation appears to be growing despite reductions in coal-fired power emissions.

Public Perception

Regardless of personal beliefs about the impact of emissions, or the necessity of regulations, environmental sentiments are winning public support. As a result, regulations are continuing to intensify and reduce the economic feasibility of operating coal-fired plants.

Environmental concerns are fundamentally altering the future of the industry. Proponents on both sides can point to good or bad examples of environmental stewardship, and as a result, both sides demonstrate either the success or failure of the industry in meeting environmental standards. However, according to Gallup, 64 percent of Americans favor stricter emissions regulations, and that percentage is likely to increase in coming years, as younger people have consistently expressed strong preference for alternative energy.



230

230

430

LAYER *upon* LAYER

Regulation of the coal industry started with regulation of coal mines. Early regulations dealt primarily with miner safety. Over the last 25 years, however, regulations have followed coal from the mine, into the furnace, and out of the smokestack.

Recent regulations are focused on the environmental impacts of coal-fired power generation. The most prohibitive component of these regulations is that they discourage the creation of new emissions-reducing technologies or higher efficiency rates by essentially forcing power suppliers out of the coal business.

Three levels (local, state, and federal) of governmental regulation impact Utah's coal industry.

Local Regulation

Utah's status as a coal exporter has been very important to the counties of central Utah. For decades, Utah has exported its energy—in the form of hard coal and electrical current—to several

surrounding states. Coal-fired energy exports occur primarily through the Intermountain Power Project (IPP), the Huntington Power Plant, and the Hunter Power Plant.

While the Hunter and Huntington plants connect to the broader PacifiCorp transmission grid, which serves customers across several states, IPP routes nearly all of its electricity to the Los Angeles Division of Water and Power (LADWP). This has been a profitable arrangement for Utah, but a recent decision by the Los Angeles City Council will drastically alter demand for coal within the state.

In 2013, the Los Angeles City Council voted against renewing its power purchasing agreement with IPP upon expiration in 2027. The LADWP has instead engaged in an effort to construct a new natural gas power plant on IPP's grounds, replacing the coal-fired electricity it receives from IPP with gas-fired electricity. The new plant would require only a fraction of the employees currently employed at the facility, and local leaders worry

about how this conversion could impact Millard County and the mines that currently supply the plant with coal.

State Regulation

More than half of the states in the nation (31) have instituted a Renewable Portfolio Standard (RPS), which is typically a binding goal to reduce coal reliance, reduce emissions, or increase power generation from alternative energy sources. Seven states have similar goals that are non-binding. Numbered among these seven states, Utah has a non-binding goal of increasing the share of electricity generated from renewable energy sources to 20 percent by 2020.

Nevada's RPS, for instance, requires 25 percent of the state's electricity to come from renewable sources by 2025. While local newspapers labeled Nevada's goal a "shift away from coal" and environmental groups lauded the new standard, many states have adopted RPSs that are even more stringent than Nevada's.

Nevada's decision will have impacts that extend beyond its own borders. Utah's western neighbor has traditionally been one of the top destinations for exported Utah coal, consistently purchasing over one-quarter of Utah's domestic coal exports and purchasing roughly two-fifths in 2012. It remains unclear exactly how Nevada's RPS will affect its use of Utah coal, but the the emergence

of these standards in Nevada and 30 other states signals a significant change in the domestic coal market.

Federal Regulation

Of all forms of regulation affecting the coal industry, federal regulation has the largest scope and the broadest impacts. The passage of a single federal measure can make sweeping changes that fundamentally alter the energy sector as well as the communities that rely on energy production as an economic anchor.

The EPA's new Clean Power Plan, for instance, is placing a great deal of pressure on the coal industry. The EPA expects that this rule will cause 46 to 50 gigawatts of coal-fired power generating capacity to go offline by 2030. That amount of capacity equates to roughly four and a half times the total generating portfolio of PacifiCorp, one of the largest energy providers in the West. The EPA also estimates that coal production in the United States will drop by 26 percent in response to the regulation. The impacts will likely be most profound for states that sell a majority of their coal to US plants (as most of Utah's mines do), as opposed to states with large overseas buyers.

Further regulation, which does not seem unlikely given the increased frequency of federal emissions requirements in recent years, could have similarly detrimental impacts on Utah's coal industry.



the lay of the land

Utah is rich in natural resources, but many of these resources cannot be extracted due to the reach and requirements of federally-managed lands. As the largest landholder in Utah, the federal government has a tremendous influence on the state's energy sector. Consequently, the future of the state's coal industry is closely tied to the management and use of these public lands.

Almost all of Utah's federal land is managed by four agencies: the Bureau of Land Management (BLM), the United State Forest Service (USFS), the Fish and Wildlife Service (FWS), and the National Park Service (NPS). The federal government owns and manages 66.5 percent of Utah's land, a figure that is second only to its ownership of 81.1 percent of Nevada's land. This ownership includes the extraction rights to coal, oil, gas, and other minerals on those lands.

While each of these agencies is tasked with the conservation and preservation of public land and resources, each has a slightly different mission and approaches that responsibility in a different manner. The NPS manages national parks, monuments, and recreation areas, with a focus on preservation that generally prohibits resource extraction. The BLM and USFS promote sustained

yield, multiple use management, which allows timber harvesting, grazing, mining, recreation, and other activities. The BLM also manages mineral, oil, and gas development on federal lands. These agencies control mineral resources through regulation, permits, fees, and royalties.

Federal Lands in Utah

Billions of dollars worth of coal, oil, natural gas, and other minerals lie within Utah's borders but outside of its control.

Perhaps the best example of this disconnect is the Grand Staircase-Escalante National Monument (GSENM), which was designated in 1996 by President Bill Clinton. Covering 1,880,461 acres, GSENM is the nation's largest national monument. Its boundaries encompass the majority of the Kaiparowits Plateau coal field, which contains roughly 10 billion tons of recoverable coal (nearly ten times the amount found elsewhere in the state). Although Grand Staircase-Escalante is administered by the BLM, the national monument designation has effectively eliminated any opportunity to access this coal. Only a fundamental shift in land ownership or management policy would make this coal accessible.

the

VISIBLE THREAT



Natural gas poses a significant threat to coal. This is a result of multiple factors, including the dramatic increase in natural gas production, the rapid development of natural gas power plants, and the impact of governmental regulation on the cost effectiveness of burning coal. While concerns about fracking and price variability could slow the shift toward natural gas, the US Energy Information Administration expects natural gas

to surpass coal as the de facto energy source of the United States (and potentially Utah) by the mid-2030s.

Production

Continued improvements to the fracking process since its development in the 1940s have expanded natural gas production capacity in the United States and Utah. The ability to reach known reserves of natural gas that are locked in shale reserves in an economical manner is allowing natural gas companies to provide natural gas at a continually declining price. Expectations are that this will continue as new gas fields are discovered and developed.

In 2010, Utah's natural gas production surpassed its coal production for the first time. The upward trajectory of the state's natural gas production has continued since 2010, while coal production has continued to decline. Surging production has seen natural gas prices decline, which in turn increases the profitability of natural gas power plants.

Despite the rapid growth of the natural gas industry in recent years, ongoing reports of groundwater pollution are calling the environmental benefits of natural gas (when compared to coal mining and combustion) into question. Many jurisdictions in New York State, Ohio, and Texas have voted to ban natural gas production within city limits due to perceived threats of water contamination. Meanwhile, other locales have not experienced negative side effects resulting from natural gas production, raising the question as to whether claims of water contamination are isolated



IMAGE | *US Geological Survey*

cases of poor well management, or if they should be a long-term, universal concern for gas-producing regions.

At the other end of the natural gas production cycle, fracking wastewater storage is being investigated as the cause of small earthquakes near storage sites. In Oklahoma, for instance, the number earthquakes measuring 3.0 or greater surpassed 300 between January and July of 2014 alone. This figure is astonishing when compared to the annual average of two such earthquakes observed between 1978 and 2008. Concerns exist that the increased frequency of these earthquakes could eventually lead to increased intensity, though only time, experience, and further research are likely to reveal the impact of fracking on seismic activity.

Pricing

Though extremely variable, natural gas prices in Utah have been consistently higher (per BTU, or unit of heat content) than coal prices. Between 1982 and 2012, natural gas prices ranged from \$1.62 (1991) to \$6.92 (2005) per million BTU, compared to \$0.97 (2002) and \$1.91 (2012) per million BTU for coal. These trends raise concerns about whether Utah's electricity rates would

remain among the nation's best if natural gas were to fuel a greater share of the state's base load electrical generation.

Another important consideration is the effect expanded exports would have on natural gas pricing within the United States. At present, natural gas exports are heavily regulated by the federal government, and the number of American ports exporting natural gas has been very limited. If the doors to the international market were thrown open, many experts believe the price of natural gas in the United States would experience a sharp increase. Others take issue with this view, arguing that the sheer volume of US reserves is more likely to lower global natural gas prices than increase domestic prices. In either case, the long-term pricing of natural gas is important to the future of the coal industry.

Power Generation

Power companies have reacted to the natural gas boom by expanding the natural gas segment of their power generating portfolios. In Utah, just under 2.5 gigawatts of gas-fired generating capacity was brought online between 2002 and 2014, an amount that comprises roughly

three-tenths of Utah's total electric generating portfolio. This shift is evident in the share of Utah's power generated from natural gas, which jumped from 4 percent in 1992 to 17 percent in 2012.

One of the reasons for the shift toward natural gas is that natural gas power plants burn cleaner and emit less pollutants and carbon dioxide than their coal-fired counterparts. The inherent differences between natural gas and coal as fuel sources allow natural gas plants to operate cleanly without the same level of emissions-reducing technologies required at coal plants. This ultimately reduces the capital cost of natural gas plants when compared with coal plants. These cost savings allow natural gas to compete with coal, and as emissions regulations become increasingly stringent, the economic benefits of burning natural gas are likely to grow.

What It Means

The rapid growth of natural gas production and power generation coincides with the recent decline of coal. While concerns about the environmental merits and long-term pricing of natural gas persist, the future of coal, both nationwide and within Utah, may be linked to the future of natural gas.



INFINITE *but* INTERMITTENT



IMAGE | *Owen Xu*

Renewable energy has long been heralded as the eventual solution to the world's impending energy problems. In addition to being clean, naturally occurring, and replenishable, renewable energy sources—which include solar, wind, hydro, geothermal, and biomass—are favored by the American public as well as a variety of governmental incentives that encourage renewable energy development.

Renewable Woes

Despite the positive momentum behind renewable energy, the immense promise of renewable energy

has yet to fully materialize, as efforts to harness the vast potential of renewable energy sources have fallen short of revolutionary. This fact is evident in the United States, where renewable energies accounted for just 12.1 percent of national electricity generation in 2013. In Utah, a state with tremendous solar and geothermal potential, the share of electricity generated from renewable sources in 2013 was less than 5 percent. It should be noted, however, that these percentages are on the rise.

In general, three primary obstacles are keeping renewables from capturing a greater share of the

electricity generating market: the technologies used to harness these energy sources are costly, relatively inefficient, and unable to operate in periods of intermittence. Technological advancement affecting any of these three areas could greatly enhance the competitiveness of renewable energies.

Renewables in Utah

Utah is fortunate to have an abundance of renewable energy assets. It is one of the top seven states in terms of solar capacity, has wind turbine opportunities, and possesses significant geothermal assets. Most of these opportunities exist in central and southern Utah, with a special

case to be made for solar development on Utah's large swaths of flat, open land. Many of the best locations for solar development, however, lie on federal lands, where the transaction costs of permitting a solar facility can be prohibitive. As a result, solar companies in Utah are using privately owned land to develop their solar projects.

Implications for Coal Country

Utah's coal country also happens to be fertile ground for renewable energy development. However, the region's current renewable projects are small, and most of the power is intended for California or other out-of-state markets. However, as the capacity of renewables like wind and solar

increase and the price of these power generating units decrease, opportunities for development should improve within central Utah.

Millard County has positioned itself as a regional energy hub by embracing an “all of the above approach” to energy development. The county

supports the maintenance of IPP’s coal-fired generating units while being open to the idea of a new natural gas power plant at IPP, all of this in addition to facilitating the development of additional wind and solar capacity. The merits of this approach may provide a model for other counties aiming to increase their economic opportunities.

KEY UNCERTAINTIES



IMAGE | George Frey

key UNCERTAINTIES

The future of coal in Utah seems to hinge on five key uncertainties—public opinion, governmental regulation, technology, market forces, and catastrophic events.

These five uncertainties are critical to coal's future because a major event or shift in any one of these areas could substantially alter the

future of coal, either diminishing or increasing Utah's use of coal for electric power generation.

It is nearly impossible to accurately project the future of an industry, but understanding these uncertainties will help local leaders prepare themselves, their constituents, and their communities for a variety of potential outcomes.

Public Opinion

Public opinion affects, and is affected by, other uncertainties. The “national mood” toward carbon dioxide and other airborne pollutants is a driver in the recent shift away from coal-fired power generation in the United States. Public opinion has played a pivotal role in driving companies, states, and the federal government to institute, change, and eliminate policies that directly affect the coal industry.

Today, roughly two-thirds of Americans favor development of alternatives to coal, with many supporting regulations to reduce emissions. Public opinion, however, is not a foregone conclusion. It shifts in connection with global, national, and regional events. For instance, during the 2008 economic crisis, a majority of Americans preferred policies favoring the economy over policies favoring the environment. While public opinion has since reverted to pre-2008 levels, with over half of Americans again favoring protection of the environment, future events may significantly alter public opinion on coal, thereby shaping the future of the industry.

Governmental Regulation

The political landscape surrounding coal is rife with contention. The ongoing debate has blazed across the country and is highly contested, with participants siding for or against increased emissions regulation, and some even questioning the continued use of coal as an energy source. As a result, the frequency of coal-related regulation has increased dramatically. The EPA alone has

seven separate regulations passed or currently in consideration that will specifically affect coal-fired power plants, all of this in addition to other agencies’ regulations.

Governmental regulation changes how coal mines and power plants operate, in some cases jeopardizing their economic feasibility, and therefore influences the future of the industry in Utah and across the country.

Technology

Historically, advancements in the energy sector have proven positive and consistent, but few are regarded as industry-changing events that significantly alter the nation’s energy portfolio. A number of industries have experienced minor breakthroughs, but most are still far from supplanting coal-burning facilities in terms of the amount and consistency of power they generate.

The development of fracking however, is the type of revolutionary advancement that could fundamentally affect coal utilization. Before fracking technology was developed, the supply-side limits of natural gas constrained its extraction. However, with the widespread implementation of fracking, natural gas is expected to surpass coal as the leading electricity fuel source in the country by 2035.

Market Forces

Demand is the single most important driver for Utah’s coal mines and power plants. Regardless of increased regulation and other barriers to

operation, power plants and mines will continue to operate so long as they are profitable.

With demand for coal-fired power diminishing in California, the Los Angeles Division of Water and Power (LADWP)—the Intermountain Power Project’s primary customer—will not be renewing its power purchase agreement, which is set to expire in 2027. Instead, the LADWP is working with IPP and intends to build a new natural gas plant and begin purchasing gas-fired electricity from IPP by 2025.

Catastrophic Events

A global war, enormous tidal wave or earthquake, economic collapse, extremely severe weather, or other major calamity could affect the coal market in a multitude of ways.

Disasters that are geographically specific to Utah are unlikely, and would probably be less severe than disasters occurring elsewhere. Nevertheless, disasters that occur in other states, countries, or even other industries can directly affect the coal industry in Utah.

Germany, for instance, experienced a significant return to coal-fired power after the 2011 tsunami in Japan and its impact on the Fukushima Daichi nuclear power plant. German officials decided that the threats of nuclear power generation were less attractive than the emissions problems that had caused the German government to phase out coal use in the first place. Consequently, coal consumption in Germany has been increasing consistently since the 2011 disaster.

FUTURE SCENARIOS

The purpose of the scenarios presented hereafter is to help decision makers explore a range of possible futures for Utah coal, consider how those futures might emerge, and develop strategies that are both focused and flexible.

Each scenario includes assumptions relating to the five key uncertainties, a narrative describing a plausible future of Utah coal, and regional implications.

It is unlikely that any of the scenarios will play out exactly as presented here. Instead, the value of these scenarios will materialize as elected officials and business leaders explore their personal appraisal of Utah's coal industry, examine the rationale leading to alternative futures, and decide to act.

Developing a strategic response to each of these scenarios will provide Utah's coal-producing communities the best opportunity for success in the face of any future.





coal
THRIVES

This scenario explores a future in which coal is an indispensable power source.

Assumptions

- × A greater perceived threat (e.g. water scarcity or contamination) occupies public opinion.
- × Governmental regulation remains at current levels or decreases.
- × Advancements make clean coal technologies cost effective while renewable energy technologies progress slowly.
- × Market forces are such that coal is the fuel source of lowest risk and highest return.
- × A catastrophic event raises a major concern about natural gas but has little impact on coal.

Narrative

In this future, the United States has experienced a series of unfortunate natural gas accidents. Reports of groundwater pollution and the resulting illnesses have absorbed media outlets and seized public attention, shifting the focus away from clean air. Fear of further disasters has caused federal and state regulators to place a stay on new emissions requirements in order to ensure that coal-fired plants are able to meet energy demands.

Utah's coal-fired power generating facilities and coal mines are producing at a fervent rate, propelling the state's coal industry beyond its mid-1990s pinnacle. A move away from coal is now unlikely, though there have been serious discussions about turning to nuclear energy for base-load power generation. However, heightened sensitivity about potential disasters, especially

those of a nuclear variety, stalls further nuclear development. Meanwhile, renewables have yet to close the efficiency gap and are still incapable of handling base-load generation, leaving coal as the de facto energy source of the United States and Utah.

Utah coal is being exported domestically and internationally. Other countries are willing to pay a premium for American coal because global demand has outpaced worldwide production. Utah's coal mines remain competitive in the domestic and international markets despite the large number of mines that have again become operational after years of hiatus.

Thanks to a strong pro-coal lobby in state and federal legislatures, a series of new incentives has stimulated coal-related research and development, resulting in significant technological advancement. Carbon capture and storage and other clean coal technologies have become cost effective and are being implemented nationwide, allowing coal-fired power plants to meet the standards the EPA passed before the fracking incidents. Furthermore, old coal power plants that were approaching retirement are able to remain operational, while new coal plants are being brought online to meet increased domestic energy demands.

Implications

Central Utah has benefited greatly from its continued involvement in the coal industry. Mines have reopened, communities have expanded as individuals and families have come for work, and the region has started to attract employers from a variety of economic sectors.

coal
SURVIVES

This scenario explores a future in which coal continues to be used at or near present rates.

Assumptions

- × The public stance on coal shifts from resistance to indifference in the absence of viable alternatives.
- × Governmental regulation relaxes as coal's value becomes apparent.
- × Emissions-reducing technologies progress at the same rate as renewable energy technologies.
- × Coal extraction remains profitable due to increased demand.
- × A catastrophic event slows the rapid rise of natural gas.

Narrative

In this future, sentiment toward coal remains unfavorable, but the nation now appears resigned to continued coal use in the absence of viable alternatives. The public has grown wary of natural gas due to water contamination, which has been discovered at several large fracking sites. Environmentalists and other special interest groups, concerned about both coal and natural gas use, are calling for a “renewables only” approach. Significant investment in renewable energy technologies have led to moderate improvements, though base-load power generation from renewables is still out of reach.

New emissions-reducing technologies and a cost-effective variation of carbon capture and storage have made the operation of older coal

plants feasible under the EPA's carbon dioxide regulations. Taking the continued need for coal into account, subsequent EPA regulations are tailored to match the performance levels of these clean coal technologies.

In spite of widespread energy conservation campaigns, the sustained growth in demand for electricity—both domestically and abroad—has shown little sign of stopping. Renewable energy facilities are being built in earnest, though demand still outpaces the additional output from these establishments, keeping coal relevant in the near term.

Eventually, renewable energy becomes the country's predominant power source and coal-fired power assumes a supporting role. Having tapped its vast renewable energy potential, Utah generates most of its power from solar, wind, and geothermal energy, though a few of the state's coal-fired power plants remain operational to augment power output during peak load times. These developments appear to keep coal use alive, though only marginally.

Implications

Despite modest coal-related activity, central Utah's coal-producing counties have experienced very little progress. Young people continue to move out, leaving the region's counties with an aging population and a diminished tax base. Emery County has brought in a valuable new revenue source (in the form of an oil refinery), but, in general, the region has struggled to attract new businesses and has few prospects for future growth.

coal
DIVES

*This scenario explores a future in which coal is
marginalized to the point of near obsolescence.*

Assumptions

- × Coal falls further out of favor.
- × Consistent, overwhelming governmental regulation stifles coal use.
- × Renewable energy technologies improve as a result of significant incentives and investment.
- × Coal markets collapse as natural gas thrives and renewables become more feasible.
- × Coal mining disasters sour public opinion toward coal.

Narrative

In this future, natural gas has supplanted coal as the nation's primary energy source. The prolonged surge of natural gas production and competitive prices led power companies to construct additional natural gas generating capacity, thereby limiting demand for coal. Finding it difficult to sell coal domestically, coal mining companies turned to the international market, which soon became flooded with an oversupply of coal. The glut of coal caused prices to hit rock bottom, making it increasingly difficult for mines in Utah and the majority of the United States to remain profitable.

The plight of coal was exacerbated by improvements to renewable energy technologies. Significant incentives and the resulting investment in the renewable energy sector accelerated the pace of technological advancement. Consequently,

renewables have begun accounting for larger portions of the nation's electrical output, thereby pushing coal over the precipice.

Though electricity rates have risen, there is little public outcry over paying a premium for clean energy. Public opinion is such that few would support a return to coal, especially in light of a series of natural disasters that have been blamed on climate change, a phenomena linked to the carbon dioxide output of coal-fired power plants.

These developments coincided with increasingly restrictive emissions regulations. The distaste for coal pervaded the legislative realm to such an extent that further, more restrictive regulations were passed, making it impossible for all but the newest and cleanest coal-fired power plants to remain operational.

Implications

The collapse of domestic and international steam coal markets has dealt a devastating blow to the economies of coal-producing and coal-burning counties. As Utah's coal mines and coal-fired power plants shutter their operations, businesses that relied on the coal industry (either directly or indirectly) have been forced to shut down as well. The vacant storefronts and lots lining Main Streets throughout the region make this decline readily apparent, thereby adding to the difficulty of attracting employers and residents. As the region's holdouts remain in place, the population shrinks and ages, leaving communities little tax revenue with which to provide necessary services and very little else to offer.

coal
REVIVES

*This scenario explores a future in which coal
regains viability after a substantial decline.*

Assumptions

- × Public opinion shifts entirely away from environmental concerns, reopening the door for coal use.
- × Governmental regulations are lifted.
- × Research and development investments are diverted toward other economic sectors.
- × Demand for coal increases after a sustained period of stagnation.
- × A national crisis causes a fundamental shift in the economy.

Narrative

In this future, coal makes a resurgence after a prolonged decline. The United States is involved in a protracted war, and the heightened demand for energy has overwhelmed the nation's natural gas plants (which lack storage capacity). This caused the country to turn back to coal—the inexpensive and reliable fuel source it depended on for so much of its history—and compelled the President to issue an executive order suspending emissions regulations for the duration of the war.

Utah's coal mines and coal-fired power plants have reopened and employment in central Utah has become plentiful. As part of the war effort, new industrial operations have been established in the region due to its inexpensive energy, existing vacant structures, and proximity to rail.

Having become completely occupied by the war, public attention has shifted away from environmental concerns and has focused on maintaining the strength of the economy as the war drags on. Utah's coal-producing counties have benefited from the sustained demand, and the public appears to recognize the role of coal in bolstering the state's economy.

Coal-producing regions across the country experienced the same success, and economists believe that coal use will regain a foothold in the market following the conclusion of the war.

Implications

Utah's coal-producing and coal-burning counties experienced a significant war-time boom reminiscent of earlier eras. The war effort has done wonders for much of central Utah, though questions remain about whether this progress will last only as long as the post-war recovery.

SUMMARY

in

SUMMARY

Coal has a significant history within central Utah. Beginning with a few relatively small coal mines, the industry grew to incorporate some of the larger underground mines in the United States and a fleet of coal-fired power plants. These mines and power plants have played an important role in shaping the communities of central Utah. The jobs and revenue they create have made coal one of the region's most important economic drivers.

Current public opinion trends across the country are leading to increased regulations, which is reducing the economic feasibility of many of the

state's coal mines and coal-fired power plants. At the same time, expanded natural gas production and the rise of the renewable energy sector have dramatically increased coal's competition in the electric power industry. These factors have brought coal mining and coal-fired power in Utah and in the United States into a period of uncertainty.

Understanding the key uncertainties upon which Utah's coal industry hinges and the possible scenarios to which those uncertainties may lead will help local leaders prepare for changes in the industry and the resulting impacts on their specific communities.



For more information, please visit ruralplanning.org/coalstudy.

