RESEARCH REPORT

November 2, 2020

Coal Industry Deep Dive

Warming Up For Thermal Coal

Over the course of recent years, the QUIC E&U team has focused its attention upon numerous verticals within its coverage space; for example, upstream E&P companies, midstream operators and downstream refiners and marketers. However, all of such companies have one commonality: they pertain to oil & gas, as well as derivative products such as propane.

Presently, the E&U team is content with its portfolio allocation strategy, and believes that such combines an ideal balance between upstream liquids torque and downstream/renewables hedging. Thus, the team thought that it would be interesting to take a deep dive into a commodity that has gained notoriety in recent years, yet has played an incredibly important role in getting society to where it is today: coal. More specifically, the team will be analyzing thermal coal, which is the variety that is utilized for energy generation.

To begin, a general overview of the industry will be provided. Next, the team will outline the history behind coal, and the incredibly important role it has played in fueling the industrial revolution, as well as the economy & culture of numerous communities across the world. From there, some context will be provided in terms of coal's recent decline, and the impact of various government policies upon the commodity. Last, outlines of select publicly-traded coal companies will be provided, along with the team's final conclusion as to whether or not there is still a case to be made in terms of investing in the commodity given the current conditions.

Energy & Utilities

Garrett Johnston
gjohnston@quiconline.com

Jamie Bennett
jbennett@quiconline.com

Matt Halpen
mhalpen@quiconline.com

Cole McAleese
cmcaleese@quiconline.com

Alton Loveys
aloveys@quiconline.com

Table of Contents

Overview of the Coal Industry 3

Coal – A Brief History of the Commodity 6

Recent Coal Industry Developments 9

Coal in the Financial Markets 13

Deep Dive: Peabody Energy 16

Concluding Thoughts 18

Overview of the Coal Industry

Main Use Cases

The coal industry is split into two distinct segments: thermal coal and metallurgical (coking) coal. These variations will be discussed in more detail later, but this report will largely focus on thermal coal. For the last 200 years, thermal coal has been critical in generating the heat necessary to produce electricity. Through the Industrial Revolution, coal was burned to power steam turbines that allowed for factories and train engines to function. To this day, coal is used to generate 38% of the globe's electricity, although recent years have seen the fuel in decline due to adverse environmental impacts. In the U.S., 91.8% of coal is used for the generation of electricity in coal power plants. The amount of coal used in power generation in the U.S. peaked in 2007 at 1,045.14MM short tons, dropping to 539.41MM short tons in 2019. Coal can also be converted into liquid or gaseous forms, referred to as synthetic fuels, although this remains a limited use case.

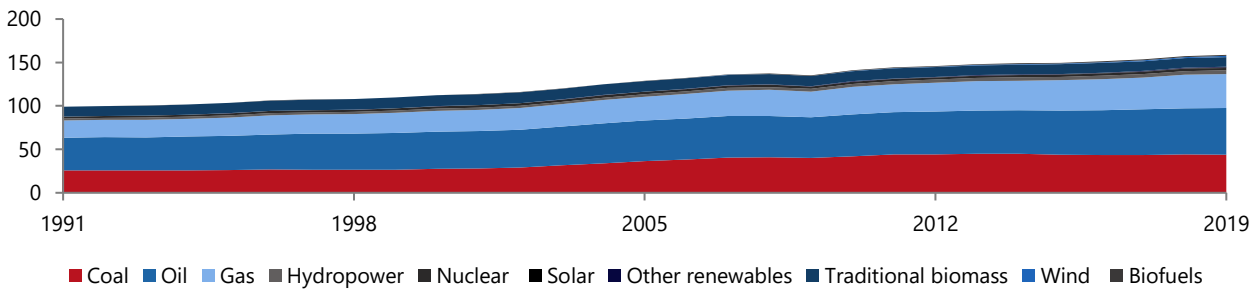
Key Geographies

Unsurprisingly, the largest coal consumer globally is China. It consumed 1,576MM short tons in 2018 for electricity production and are expected to increase their usage to 1,714MM short tons by 2024 (despite significant investment in clean energy). Beyond China, increases in coal usage can be attributed to developing nations with a need for access to cheap electricity. India, with its massive population, has a significant need for additional electrical grid coverage to rural areas. Coal is expected to see a 4.6% per year increase in use in the country through 2024. Southeast Asia is in a similar spot, with use expected to grow by 5% in the same time frame. In North America and Europe, the picture is drastically different. The U.S. has seen an increase in bountiful cheap energy due to the shale boom (and associated low natural gas prices). As such, the demand for coal and development of coal power plants has slowed to a halt. In the EU, stricter environmental regulations make coal an unaffordable source of energy, resulting in a forecasted decrease in use of 5% per year to 2024.

On the production side, China remains the largest coal producer by far with 3,693MM short tons extracted in 2019. It continues to see production expanding at a ~4% growth rate. Indonesia's production also continues to climb, growing 12.4% in 2019 to 616MM short tons. India's production has levelled out recently, although it remains the second largest producer globally. In the developed world, the U.S. saw coal production drop to 640MM short tons in 2019, which is the lowest level seen in four decades (largely thanks to the same headwinds that have decreased demand).

EXHIBIT I

Global Energy Production by Source (PWh)



Source(s): World in Data

Overview of the Coal Industry

Technology

Coal extraction largely falls into two main types: surface mining and underground mining. As its name implies, surface mining involves digging out coal deposits (known as seams) by removing any surface above (known as overburden) with explosives or massive machinery. This is effective for seams that are less than 200 feet below the surface. Strip mining, open-pit mining, and mountaintop removal mining (which are exactly what they sound like) are the three main variations of surface mining. There has been limited technological advancement over the last 30 years, with most developments being focused on reducing environmental impact.

Underground mining can be dangerous but allows for producers to tap into reserves more than 1,000 feet below the surface. Mining operations can be complicated, with various conveyor belts and ventilation systems needed to safely extract coal. New tech has served to make the mining process safer, but miners still face a constant risk of cave-ins or gaseous buildup (especially in emerging economies where regulations may not be as stringent as developed nations).

Thermal vs Metallurgical

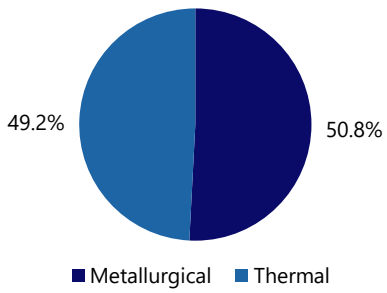
Thermal coal, as mentioned previously, is the focus of this report, as it is used in the production of electricity across the globe. It is ground into a powder before being fired to produce steam which turns turbines to create electricity in power plants or individual factories. Metallurgical or coking coal is used in the creation of steel. Coke is a hard-black rock of concentrated carbon that is created through heating in a low-oxygen environment. This rock is then mixed with ore and other additives to produce steel. This form of coal falls under the M&M team's purview, and as such, is not examined closely in this report.

Transportation

Within mining operations, either surface or underground, coal is transported by conveyor belts and some of the largest machinery on the planet. However, once the coal leaves the mine, it is most often transported by rail. ~70% of U.S. coal production is carried by rail. Unit trains, which only carry coal, can often be loaded with 10,000 – 15,000 tons of product. Trucks can also be used, although they suffer from a lack of scale when compared to rail transport. In situations where coal must travel over water, barges and large ships can be used to carry it. Pipelines can be used to transport slurry (a combination of crushed coal and water) – however, this method is not in use in the U.S. and likely will not be developed due to environmental concerns.

EXHIBIT II

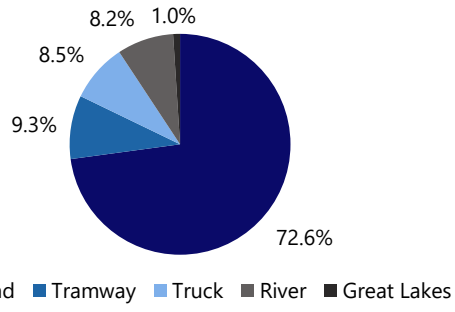
Canadian Coal Production by Type



Source(s): Coal Association of Canada

EXHIBIT III

U.S. Coal Transportation by Method



Source(s): Coal – R&D to Support National Energy Policy

Overview of the Coal Industry

Pricing

Like oil and natural gas, coal prices vary based on quality, geography and mining method. There are four main types of coal, each with a different pricing profile. Lignite, the lowest quality type, is high in moisture and crumbles easily; however, due to lower supply in the U.S., it fetched $19.86 per short ton in 2019. Subbituminous coal is the third highest quality form with 35-45% carbon. 44% of the total U.S. production was this type and it cost an average of $14.01 per short ton in 2019. The most common type in the U.S., bituminous coal, cost $58.93 per short ton in 2019 and has two to three times the heating value of lignite. The highest quality form is anthracite, which contains 86-97% carbon. It sold for $102.22 in 2019 on average, attributable to it only accounting for 1% of total U.S. production. Given the variety of use cases for these different forms, end users have vastly different costs. Electric producers paid, on average, only $38.53 per short ton in 2019, while coke producers paid $145.83 per short ton in the U.S.

Beyond the above variations, prices can also change based on extraction technique. Surface mining produces lower-priced coal than underground mining. This is largely due to differences in costs. Another cost driver is transportation, which means that some regions will see higher pricing if transport distances are further. Higher diesel prices can also play a role in increasing the price of coal, as it is the fuel used in most transportation methods.

Contract-Based Nature

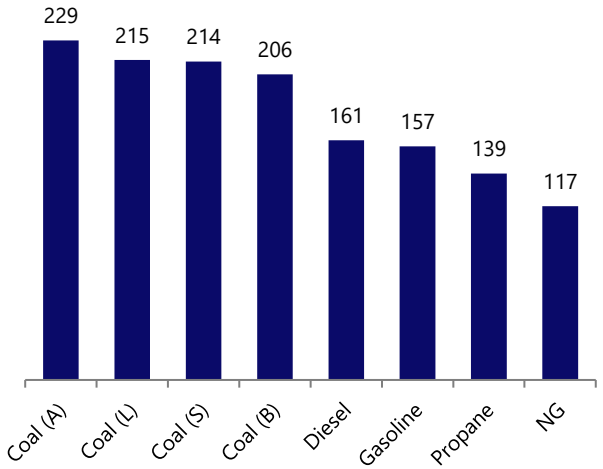
One of the most common misconceptions of the thermal coal industry is that all power plants are locked into long-term contracts for their coal supply. While many do have multiple-year contracts, 10+ year supply deals are becoming increasingly rare. Over 90% of coal purchased by volume in 2019 was using a contract that was set to expire in five-years or less, with 50% being purchased on the spot market. The traditional thinking has been that long-term contracts provide predictability and lower prices. However, recent studies have shown that while pricing is predictable, 10-20-year contracts can cost more than <10-year contracts. With the cyclical annual nature of coal prices (like natural gas prices), these contracts can lock in prices that are much higher than spot rates. Going forward, expected decreases in North American demand may make long-term contracts impossible, continuing the trend of spot-market purchases.

Environmental Impacts

Coal is notorious for its hazardous environmental impacts. The burning of coal releases chemicals like mercury, lead, SO2, NO, and other dangerous particulates that endanger both wildlife and people near the source. Once the particulates settle, they additionally pose a threat to water supplies and ecosystems due to increased acidity. Furthermore, when carbon is released through the burning process, it can contribute to climate change after being caught in the atmosphere. Continued regulation has attempted to limit the environmental impact of coal fired power plants, resulting in decreased emissions (with higher costs).

EXHIBIT IV

Pounds of CO2 Emitted per BTU



Source(s): EIA

Coal – A Brief History of the Commodity

Ancient Times

While one tends to think of coal as a commodity that has been used exclusively in modern times, archeological research indicates that coal was burned during the Bronze Age (3000 – 4000 years ago) in Wales for funerary rituals. Further, Aristotle gives mention to coal in his work *Meterologica*, and Romans in Great Britain utilized coal for heating purposes before 400AD. Such is especially true in Northumberland, which lies in close proximity to numerous coal seams. Within North America, the Hopi indigenous tribe utilized coal for heating, cooking and ceremonial purposes starting in the 1100s.

Advances in Technology Across the Ages

Early coal mining consisted of surface mining; however, in the late Middle Ages, underground mining began to be adopted. However, such was hard, dirty work and consisted of utilizing a pick to dislodge pieces of coal by hand. However, such was changed with the introduction of steam, compressed air and electricity; in 1868, the first commercially successful revolving-wheel cutter was introduced for operational use. A further development occurred in 1891, when the longwall cutter was introduced; such could begin at one side of a continuous face of coal, and cut in a line to the other side.

In the 1940s, a continuous system utilizing a "plow" was introduced by Wilhelm Loebbe in Germany; such consisted of an apparatus that was dragged across the face of the coal seam, along with a conveyor snaked just behind the plow. Such allowed the chipped-off coal to be caught and transported out of the mine in an automated fashion, thus reducing the need for labour.

History of the U.S. Coal Industry

While the Hopi indigenous tribe had been utilized coal for a number of years, the commodity was not discovered by settlers until 1673. Commercial coal mining began in the 1740s; however, it remained a rather insignificant industry until the early 1800s, as settlers preferred to use wood as an energy source.

The modern U.S. coal industry began in Virginia, as the Richmond Basin began to be mined for its vast coal deposits. While access to labour was plentiful, a weak transportation system within the U.S. South limited the potential for the commodity. On the other hand, in Pennsylvania, individuals began mining a form of high-carbon (and thus high-quality) form of coal called anthracite on an industrial scale; by the 1840s, anthracite became the standard form of energy along the U.S. seaboard. The mid-19th century saw a rapid expansion of coal across the U.S., and by 1861 20 states (mining a combined 20MM tons of anthracite) were able to lay claim to being coal producers.

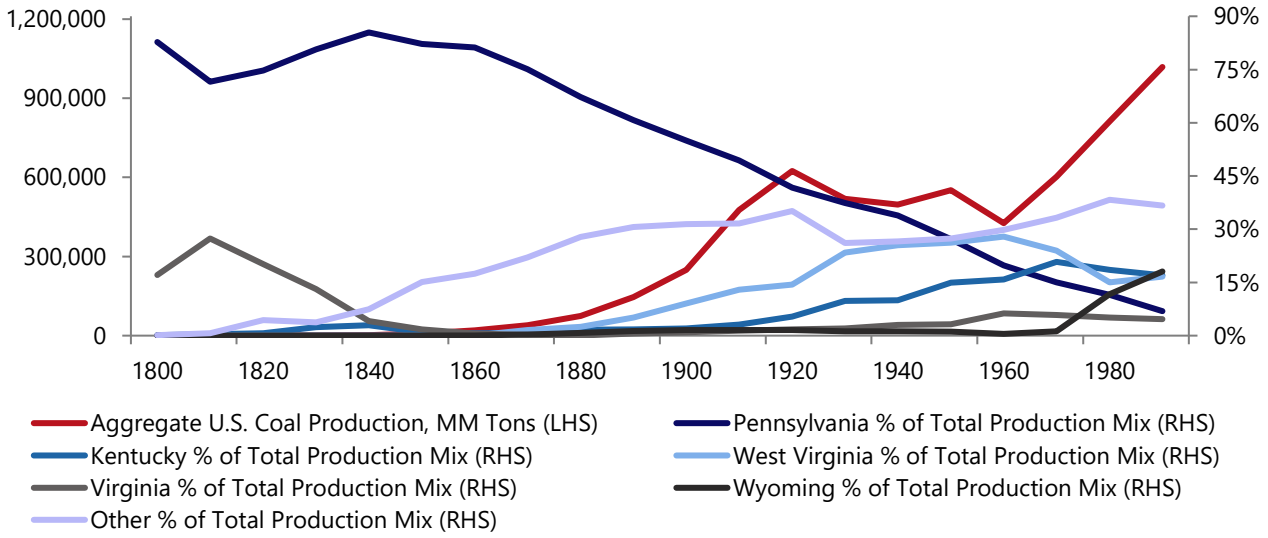
Over the course of the civil war coal prices augmented by ~50%, as the demand from the military led to a supply-demand imbalance. Such also saw the expansion of railroads to reach the nation's rapidly-expanding coal mines. Further, railroad companies began directly purchasing coalfields, and subsequently leasing them to mining companies. This arrangement allowed the vast coal mines of West Virginia to be connected to industrial end-markets. By 1880, national coal production reached 80MM tons aggregate.

Early standard within the U.S. coal industry was to pay miners by the ton (as opposed to a fixed salary); however, discontent amongst miners gave rise to labour unions taking shape. By 1903, the United Mine Workers possessed over 250,000 members.

Peak employment within the U.S. coal industry occurred in 1924, with over 860,000 miners working across the country. However, such then led to a period of steady declines until the 1960s (with the exception of during WWII), as oil and hydroelectric power began to overtake coal within the country's energy mix. While mine employment rose in the 1970s due to the 1973 energy crisis, the coal industry (as of 2016) employs just 75,000 miners. This is largely due to the heightened presence of automation within the mines, as well as competition from other energy sources.

Exhibit V

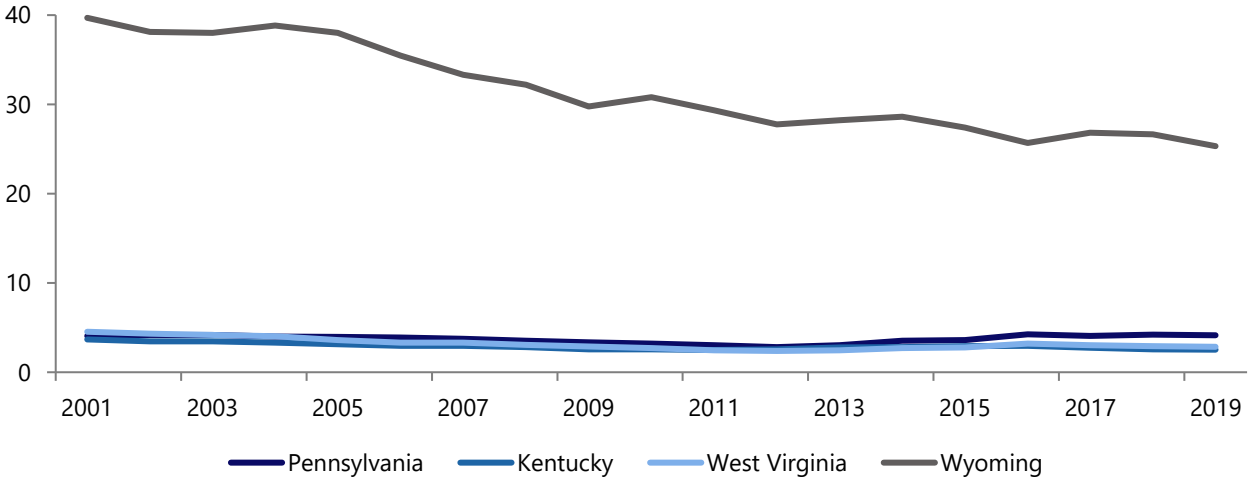
U.S. Total Coal Production Historical Data



Source(s): USGS

Exhibit VI

U.S. Regional Coal Mine Productivity (Short Tons / Labour Hour)



Source(s): EIA

Recent Coal Industry Developments

Decline of US Coal Through the 21st Century

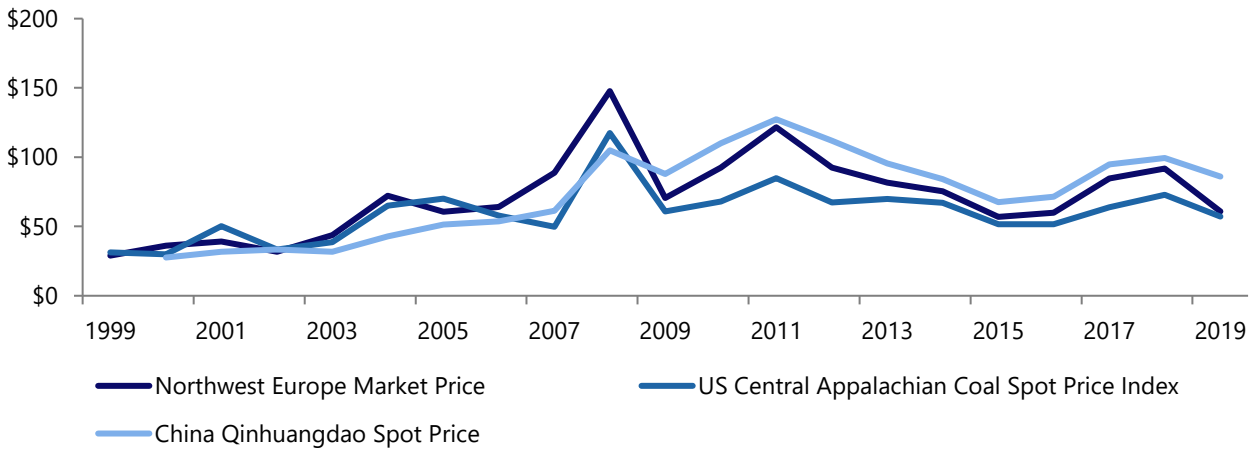
In 2010, the United States had 580 coal-fired power plants. Such provided 45% of the country's electricity, by 2018, the number of plants fell below 350 and the market share of coal dropped to 30%. Coal-fired power plants are the largest source in the United States of climate-change causing carbon emissions. The Navajo Generating Station alone emitted 15 million tons of carbon dioxide a year, equal to about 3.7 million cars driven for one year.

In Massachusetts v. EPA (2007), the Supreme Court ruled that greenhouse gases are pollutants under the provisions of the 1970 Clean Air Act, from which the EPA determined that greenhouse gas emissions endanger public health and the welfare of future generations. In response to this ruling, the Obama administration developed the "Clean Power Plan", a greenhouse gas regulatory program. This mandated time-honored tools such as energy efficiency, deployment of renewable energy technology, improvements of thermal efficiency of existing coal-fried power plants, and increased utilization of lower-emitting generating units. Overall, the Clean Power Plan worked to reduce greenhouse gas emissions from the power sector by one-third by 2030. In 2015 the Obama administration, revising standards that had not been touched since the 1980s, required industry to set deadlines for power plants to invest in state-of-the-art wastewater treatment technology to keep toxic pollution out of waterways. This regulation also required them to monitor local water quality and make more information about such results publicly available. The Obama administration estimated the regulations would stop about 1.4 billion pounds of toxic metals and other pollutants from pouring into rivers and streams and cost industry $480 million a year.

Beyond such environmental concerns, in parts of the country with deregulated electricity systems, like the Mid-Atlantic region, energy companies compete in

Exhibit VII

Historic Coal Spot Prices



Source(s): BP

Recent Coal Industry Developments

auctions to sell their electricity to the grid. A phase of cheap natural gas has caused the prices to fall sharply in recent years. This fall is a big reason that many coal and nuclear plants have become unprofitable. The majority of any form of industry recovery has also centered around metallurgical coal production and Asian demand for such, rather than thermal coal.

Pre-COVID-19 many coal-producing states were also switching to natural gas for power, in part because, in states like Pennsylvania, they produce increasing amounts of shale gas. The power-fuel mix supplying the PJM regional transmission electrical grid, which serves 13 states including Pennsylvania, West Virginia and Kentucky, went from 55 percent coal and 8 percent natural gas in 2006 to 34 percent coal and 27 percent gas in 2017.

Coal's Failed "Revitalization" Under Trump

In October 2017, EPA Administrator Scott Pruitt announced the agency's decision to repeal the Clean Power Plan stating, "the war on coal is over" and that "the past administration was using every bit of power and authority to use EPA to pick winners and losers on how we generate electricity in this country. That is wrong."

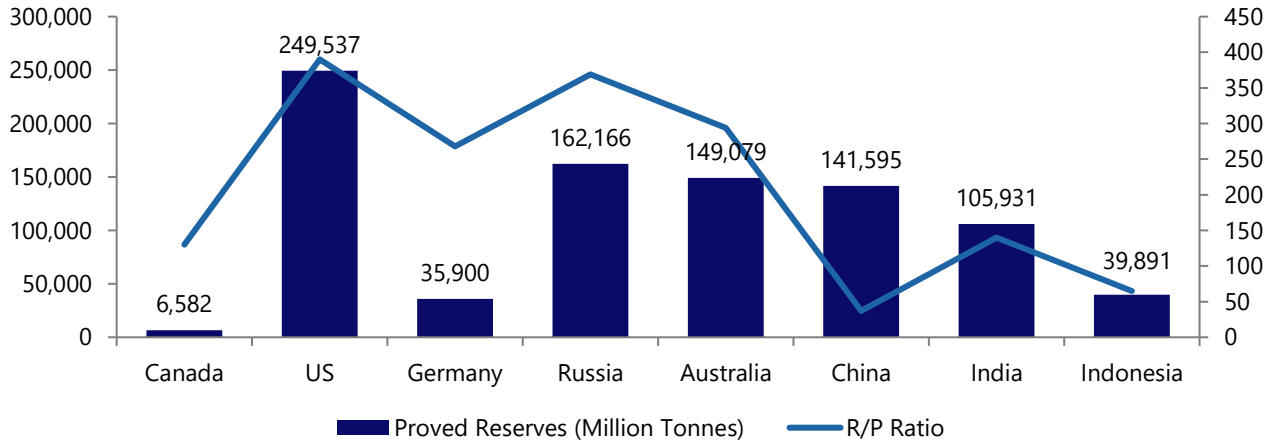
However, unlike Hoover's "War on Crime" or Reagan's "War on Drugs", coal is an economic sector. Like all economic sectors, the power industry can be affected by a variety of factors, including market trends, changes in consumer preference and public value, and implementation of regulatory actions intended to address voter concerns regarding public health, worker safety, economic competitiveness, or environmental protection. Over the past century changes in social value, market trends, and public policy have all affected the fortunes of the coal sector.

After the 2016 federal election, President Donald Trump sided with coal-industry executives and lobbyists, intervened in direct shut-down cases, and rolled back and relaxed environmental regulations.

President Trump has faced the headwinds of such market trends however, such as low natural gas prices

Exhibit VIII

Worldwide Proved Reserves and R/P Ratio by Major Producing Countries



Source(s): BP

Recent Coal Industry Developments

and the increased economic validity of solar, wind, and other renewable energy sources.

Despite earlier efforts towards revitalizing coal, President Trump's administration has failed to announce any large plans this year to help stabilize the industry.

Since President Trump was inaugurated, 145 coal-burning units at 75 power plants have been idled, removing 15 percent of the nation's coal-generated capacity, enough to power about 30 million homes. That is the fastest decline in coal-fuel capacity in any single presidential term, greater than the rate during either of President Barack Obama's terms. An additional 73 power plants have announced their intention to close additional coal-burning units this decade. An estimated 20 percent of the power generated in the United States this year is expected to come from coal, a fall from 31 percent in 2017. In part because of the coronavirus-catalyzed recession, total coal production is expected to drop this year to 511 million tons, down from 775 million tons in 2017. That 34 percent decline is the largest four-year drop in production since 1932.

Overall, coal's accelerating decline has produced one of the Trump administrations most counterintuitive outcomes. Air pollution in the United States related to power production has declined rapidly despite the administration's intensive rollback of environmental regulations. The amount of sulfur dioxide coming from power plants, which causes health complications including breathing difficulties and heart disease, dropped by nearly 30 percent nationwide in the first three years of President Trump's tenure, a faster rate of decline than the first three years of President Obama's tenure. Nitrogen oxide, another hazardous pollutant, also dropped more significantly than in President Obama's first three years.

Economic Impact on the US

In 1920, a typical miner in the United States extracted an average of four tons of bituminous coal per day. Today in the western United States, which has the largest surface mines in the nation, that figure is about 140 tons a day.

This surge in productivity meant huge declines in jobs even when coal was the dominant source of fuel for power plants, dropping from 862,000 miners in the 1920s to 135,000 by 1990, before leveling off around 50,000 nationwide during the Obama administration. That number dropped to 42,000 in April, as coronavirus shutdowns spread nationwide.

There have been many failed attempts to salvage such unemployment. In Arizona, a campaign to save the Navajo Generating Station was funded by Peabody and other mining industry players, who formed an alliance with the Navajo tribe and the United Mine Workers union to create a movement they called "Yes to N.G.S." The plan aimed to pressure the Central Arizona Project, the agency that runs the canal system providing water to the region, to continue to buy power from the plant. The group also pushed officials in Washington D.C. to enact the cost-cutting regulatory rollbacks. However, the Central Arizona Project board refused to back down, after concluding that its customers would save $14 million in 2020 alone by stopping all power purchases from the plant.

Coal Globally and Outlook:

From a global perspective, coal consumption fell by 0.6% in 2019, its fourth decline in six years, and its share in the energy mix fell to 27.0%, its lowest level in 16 years. However, unlike the US, coal consumption continued to increase in some emerging economies such as China, Indonesia, and Vietnam, with growth in India falling at its lowest since 2001. This can be contributed to the relative lack of additional resource options comparative to the US. IEEFA projected last November that renewables would fully outpace coal-fired generation on an annual basis in 2021. That likelihood persists, and the transition, in fact, is gaining speed.

Coal Industry: Timeline of Major US Changing Factors

Timeframe	Changing Factors
1920s	Congress puts forward the Mineral Leasing Act of 1920. This law changed mineral and coal-bearing land sales to leasing arrangements, making it more difficult for speculators to acquire access to resources at below market rates. Implementation of the law was enabled by topographic and mineral surveys conducted by the United States Geological Survey.
1930s	Development of reliable, efficient compression ignition (diesel) engines and electrical traction motors causes displacement of coal-fired locomotives as the key source of railway population.
1940s	During the Progressive Era, urban reformers pushed for public health and quality of life assurances in US cities, including cleaner air. Municipal efforts put forward to restrict coal-burning enterprises were largely ineffective. In partial reaction to soot from coal burning, California passed a statewide pollution control law in 1947, the first state to take such action.
1950s	Major US hubs access large quantities of natural gas via pipelines for home heating, enabled by advances in materials science alongside pipeline fabrication and inspection technologies such as mill hydrostatic testing, radiographic inspection, and electric flash welding.
1969	The Federal Coal Mine Health and Safety Act of 1969 required inspection of all coal mines and enacted monetary penalties for violations and criminal penalties for knowing and wilful violations. It enhanced safety standards and implemented new health standards, and it provided compensation for miners disabled by black lung and other respiratory diseases. The act's health provisions were enabled by occupational medicine breakthroughs and advancements.
1974	Congress passed the Solar Energy Research, Development and Demonstration Act of 1974. Under the act, the federal government created the Solar Energy Research Institute in 1977.

Coal Industry: Timeline of Major US Changing Factors

Timeframe	Changing Factors
1974 (Con't)	The institutes name later changed to the National Renewable Energy Laboratory. The facility conducts research and development programs in photovoltaics, wind power, systems integration, bioenergy, hydrogen transportation, and enhanced geothermal technologies.
1978	The Public Utility Regulatory Act (PURPA) of 1978 demanded "compulsory wheeling" or the ability of consumers to select their own supplier of electricity. PURPA highlighted consumer demands for increased power system reliability, but also enabled people to choose from among alternative sources of electrical power generation, including wind power and other renewable energy technologies. PURPA came to frutition by advances in load division and transmission control technologies.
1980	The Staggers Rail Act of 1980 significantly deregulated the US railroad industry. The passage of such led to significant reduction in rail freight rates, causing displacement of eastern coal by coal originating in the intermountain west.
1990	The Clean Air Act Amendments of 1990, passed to address the country's growing acid deposition problem, put forward a cap of 8.95 million tons of sulfur dioxide emissions for a subset of major coal-fired electric generation units. This policy was enabled in part by research and technology demonstration activities conducted under the US Department of Energy's Clean Coal Technology Demonstration Program, an industry-government partnership that helped to commercialize technologies such as flue gas reduction and selective catalytic reduction.
2016	Natural gas-fired electric power generation exceeded coal-fired generation for the first time in US history, caused in part by deployment of directional drilling, high-pressure fluid ingestion systems, and other hydraulic fracturing technologies.

Coal in the Financial Markets

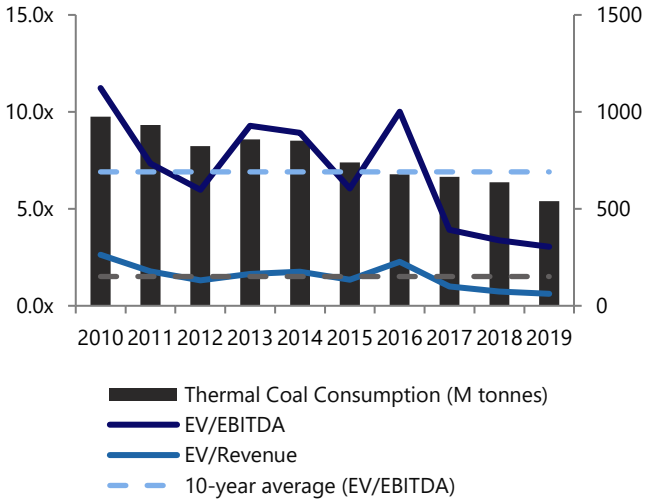
Public Market

Assessing companies within the coal sector is challenging; there are not many feasible valuation methods that consider the inherent risks of mining as well as external factors such as the price of the commodity or government regulations. The industry is unique in that it shares hurdles with both the energy and mining sectors; this makes accurate valuation complex.

10-year historical multiples see a sector average EV/EBITDA at 6.9x, whereas at 2019E coal companies traded at an average of 3.1x. EV/Sales is notably lower than the 10-year historical average of 1.5x as well. These discounted multiples suggest a potential value investment opportunity; however, being that the coal sector assumes a myriad of complications, it is necessary to review special valuation methods such as P/NAV, EV/2P and ROCE. For instance, industry leader Peabody Energy's 2019E EV/2P was 0.4x compared to a 2015E multiple of 1.0x.

Exhibit IX

Historical Coal Sector Multiples



Source(s): New York University

2019E multiples contrasted against historical numbers indicate that the coal sector may be an intelligent value investment. However, falling U.S. thermal coal consumption over the past 10 years point to a dying sector. Though the coal sector trades on attractive multiples, this may be a textbook value trap. In this case, traditional multiples are not currently a shrewd method of evaluation. Nonetheless, companies demonstrating comparatively strong special valuation multiples could be quality investments.

Private Market

Over the past few years, private equity firms have poured billions of dollars into what is seen as a dying industry by the public markets: coal. In 2019, coal accounted for over half of private equity spending on mining. One may not think of coal companies as traditional targets for leveraged buyouts. Cash flows are inconsistent given the price-taking nature of these companies and the volatility of commodity markets, operational improvements appear limited given the lengthy history and deep understanding of efficiency in this business, and profitable exit opportunities seem few and far between. However, coal business can act as significant cash cows when pricing takes a positive swing (which usually occurs in large magnitudes in the case of coal). Private equity firms attempt to forecast when these swings will occur, buy in at the right time, and spend minimally running the pre-established and already-functional mine.

This philosophy is simple, but the execution is not always easy. A large majority of these deal fail or even go bankrupt over their time horizon. KKR lost its 40% stake in Longview Power after the company went bankrupt for a second time mid-buyout, and the same happened to Macquarie Infrastructure in its acquisition of Ind-Barath Energy. Even Blackstone struggled to remain profitable over its buyout of Lightstone Generation, as the fund faced incredible ESG and political pressures after the plant's carbon emissions rose 12% over the period of Blackstone's control. Overall, the trendiness of coal private equity should not distract investors from the general sectoral decline.

Key Public Players

Arch Resources (NYSE:ARCH)

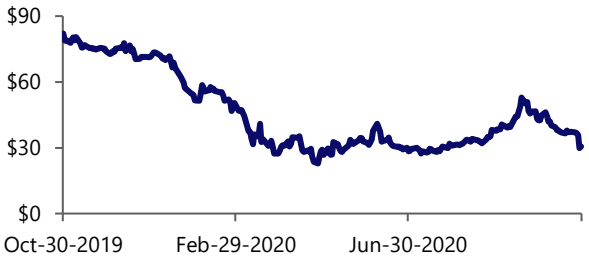
Founded in 1969, Arch Resources is the second largest coal producer in the United States. The company plays in both thermal and metallurgical mining but primarily caters to steel production and industrial end markets, and is thus technically not under E&U's coverage.

Alliance Resource Partners (NasdaqGS:ARLP)

Alliance Resource Partners is a diversified coal producer with saturated operations in the American East. The company operates seven long-life, low-cost mines that boast 1.693 billion tons of coal situated in reserves scattered across the Appalachia Region and Illinois Basin. These assets generated 40MM tons of coal, 39.3MM tons of which was sold. Unique amongst peers in a declining industry, Alliance has seen net earnings increase over the past five years. This has allowed for a continually-strong balance sheet; the company has a current ratio of 1.6x and total debt-to-assets of 0.5x. Given industry distress, Alliance's management has recently pursued consolidation via tucking in bankrupt mines in Illinois, Indiana, Kentucky, Maryland, Pennsylvania, and West Virginia, but has otherwise remained financially prudent.

Exhibit X

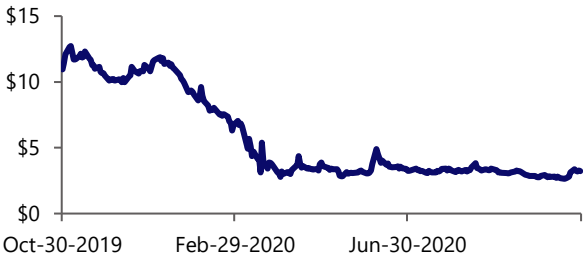
ARCH 52-Week Performance



Source(s): S&P Capital IQ

Exhibit XI

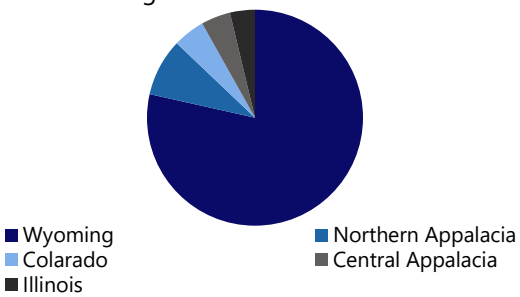
ARLP 52-Week Performance



Source(s): S&P Capital IQ

Exhibit XII

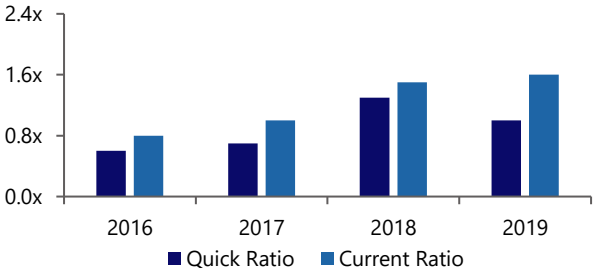
ARCH Total Assigned Reserves



Source(s): Company Filings

Exhibit XIII

ARLP Historical Liquidity Rations



Source(s): S&P Capital IQ

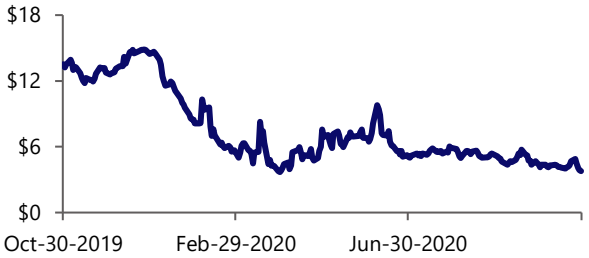
Key Public Players

NACCO Industries (NYSE:NC)

NACCO (NYSE:NC) is a public holding company for the North American Coal Corporation. Their operations consist of three major segments: coal mining, North American mining, and minerals management. NACCO has a 107-year history of mining coal and owns nine surface mines that span across five states and specialize in lignite and sub-bituminous coal operated by subsidiary NACoal. Eight out of nine of NACoal's mines are exclusive suppliers to their customers. NACCO's coal division operates under a unique business model in which they are pursuant of management fee contracts, meaning customers pay 100% of operation costs and help hedge NACoal from price volatility. NACoal has been a relative leader in the industry, accounting for 5.1% of total US coal production in 2019. Despite their strong industry establishment and unique business model, the global decline of coal demand is pressing, and NACoal is prioritizing maintenance of high ROCE.

Exhibit XIV

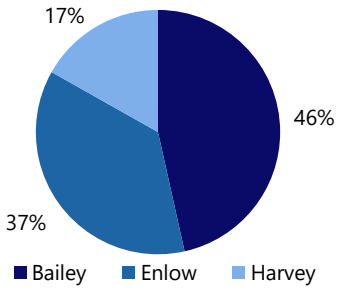
CEIX 52-Week Performance



Source(s): S&P Capital IQ

Exhibit XV

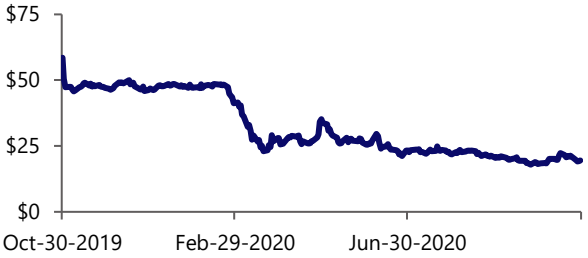
PAMC Production Breakdown by Mine



Source(s): Company Filings

Exhibit XVI

NC 52-Week Performance



Source(s): S&P Capital IQ

CONSOL Energy (NYSE:CEIX)

Consol Energy Inc. (NYSE:CEIX) primarily operates a project called the Pennsylvania Mining Complex (PAMC). This is an automated facility consisting of three underground coal mines as well as a centralized processing facility capable of processing 8,200 tonnes of coal per hour. In addition to the complex, they own a 24/7 train loadout facility and a marine terminal in Baltimore to access seaborne markets. All three of the mines produce thermal coal, and the Bailey mine alone is the second-highest producing underground coal mine in the U.S.. CONSOL also controls approximately 1.6B tons of greenfield thermal and metallurgical coal reserves in the Eastern U.S.. Looking forward, CONSOL hopes to build off the strength of PAMC; they are 95% contracted for 2020 and 43% contracted for 2021 and continue to see record production numbers. While production is unproblematic, CONSOL will look to improve liquidity and hedge against struggling capital markets and commodity prices by increasing sales through development of a new mine in Wyoming.

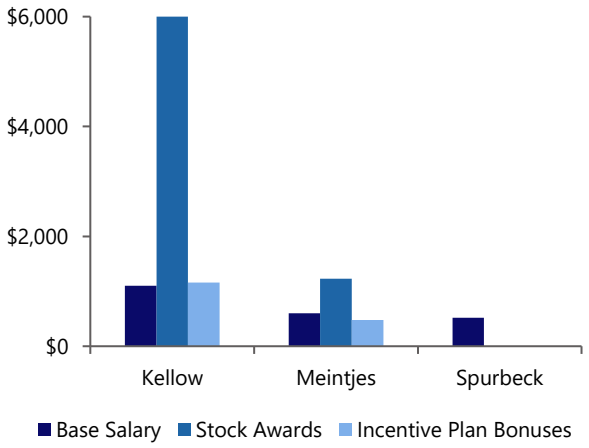
Deep Dive: Peabody Energy

General Overview

Founded in 1883 and headquartered in St. Louis, Peabody Energy (NYSE:BTU) is the largest private sector coal company in the world. Standard operations include the mining, sale, and distribution of both thermal and metallurgical coal for the respective purposes of power and steel manufacturing to more than 25 countries across six continents. Three Powder Bay River Basin surface mines in Wyoming are the company's most productive assets and comprise >60% of annual production. Uniquely, Peabody also owns 10 Seaborne Thermal and Metallurgical mines located off the North and Southeastern coasts of Australia, assets that account for 17% of production. 10% of coal is sourced from three underground and four surface mines in the American Midwest, and the company's least lucrative assets (accounting for only 7% of total production) include three mines positioned in across Arizona, New Mexico, and Colorado.

Exhibit XVII

Management Compensation ($M)



Source(s): Company Filings

Management Team

Glenn Kellow, President & COO – Kellow was promoted in 2013 and has gained extensive experience in the resource industry following studies at the South Dakota School of Mines and Technology, University of Newcastle, and Wharton School of Business.

Charles Meintjes, Executive Vice President – Meintjes was appointed to his position in 2019 and has since been responsible for sales, marketing, corporate development, IT, services, and coal generation and emissions technology.

Mark Spurbeck, Chief Financial Officer – Spurbeck was appointed in early 2020 from Senior Vice President after decades of experience in finance and accounting.

Although a large portion of management was appointed to their position relatively recently, they all have extensive experience in their respective specializations. Further, leadership's compensation aligns with shareholders' interests. The President/COO and Executive Vice President's compensation is largely tied to BTU stock and KPI-based bonus opportunities surpass 100% of base salary. Only the CFO earns a pure salary, which is non-problematic given the role.

Competitive Advantages

Being the largest coal producer in the world, Peabody Energy naturally possesses a supply side advantage in its scale. The negative correlation between production and cost of supply has allowed Peabody to disperse fixed costs and overhang across a wider array of units than competitors (decreasing cost per) and establish more profitable deals with partners. Peabody's asset positioning is also favourable; through the company's Australian platform, access to emerging markets in Southeast Asia is more predominant than that of peers. Domestically, Peabody has the largest reserves in the two fastest growing coal markets in the U.S.: the Illinois Basin and the Powder River Basin, both of which being safe regions for production. Any market recovery in the States will launch Peabody's earnings.

Deep Dive: Peabody Energy

Financials and Valuation

Due to cumbersome market conditions and a general sectoral decline, Peabody Energy has experienced inconsistent earnings throughout recent history. Over the last decade, the company incurred losses in all but 2011, 2017, and 2018, years in which earnings can be attributed to a boom period in early 2011 and briefly-reverted consumption in the mid-to-late 2010s. The company's LTM net loss was its most significant in history. Peabody's unprofitability reflects a struggling industry as opposed to fundamental flaws in the company's business model. Poor cash flow is of equal cause for concern; again with the exception of a few years ago, Peabody has been cash flow negative for the last 10 years, as many coal producers have been. The saving grace for Peabody lies in its balance sheet. The company is positioned to weather stormy market conditions for at least a few years given industry-leading liquidity, a quick ratio of 1.3x, and a current ratio of 2.0x. That said, investors should remain wary of Peabody's significantly debt-weighted capital structure, rising debt ratios, and deteriorating interest coverage to the inadequate point of 0.0x in 2019.

Historically, Peabody Energy has traded at discounted multiples to peers on the basis of EV/EBITDA, P/Book, and P/CF. While this implies undervaluation, a DCF or NAV model may suggest a non-'Buy' rating for BTU.

Notable Risks

The most obvious risk towards all coal producers is the industry's general decline. Asian markets such as India and Japan continue to hold promising demand, but the former is on track to reduce coal imports to zero and the latter is investing in becoming self-sufficient. Outside of these geographies, growth prospects are slim and most players – including Peabody – lack the ability to hurdle this obstacle and do not possess business models or assets transferable to another commodity or product post-coal's demise.

While Peabody's Australian presence was at one point advantageous for engaging in trade with China, political and economic relations between the two countries has recently been strained as the latter attempts to reduce imports and milk local production for its remaining worth.

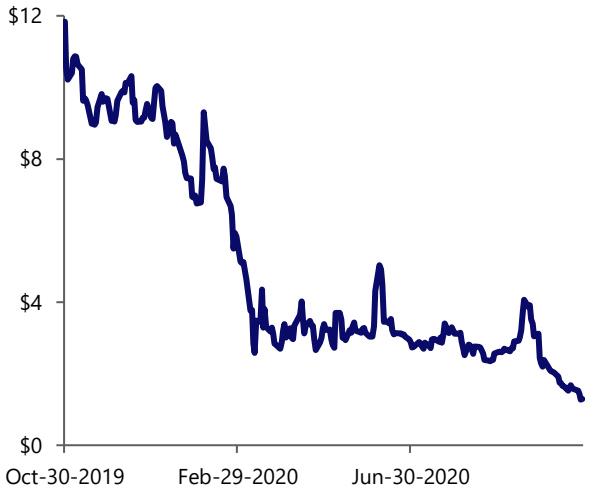
Finally, a class action lawsuit initiated over dangerous conditions in Peabody's once-flourishing North Goonyella mine in Queensland, Australia, are cause for alarm for the company. Not only was the issue a public relations nightmare, but the money investing in reopening was for nothing and Peabody incurred sunk costs at a time when every dollar counts.

Conclusion

Despite a fundamentally strong business model, Peabody Energy operates in a the rapidly-deteriorating coal market, is exposed to geo-political and legal risk, and will suffer from the macro-trend of governments attempting to stomp coal out of the energy mix. Investment is thus unattractive.

Exhibit XVIII

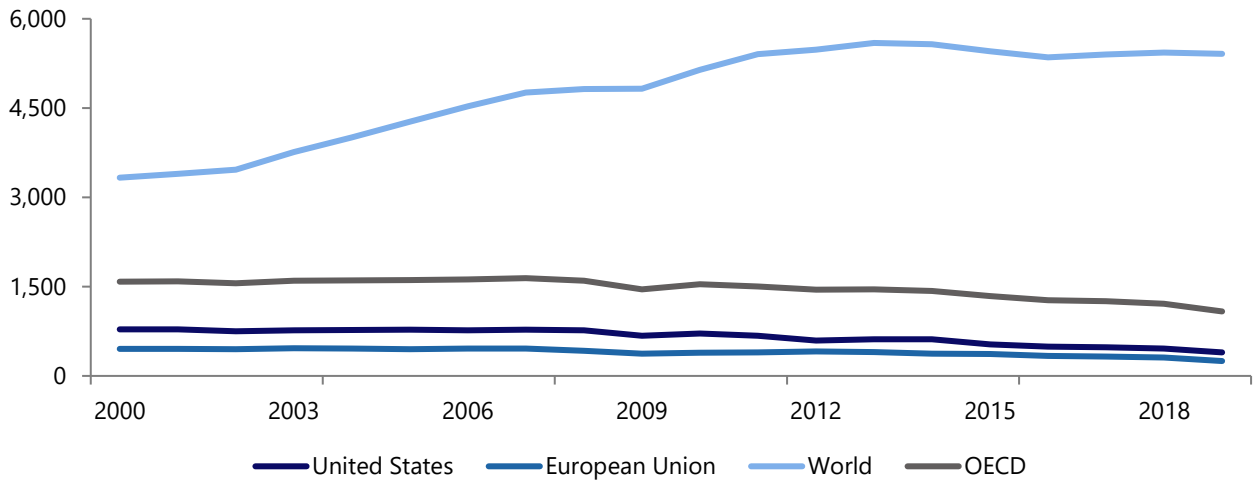
BTU 52-Week Performance



Source(s): S&P Capital IQ

Exhibit XIX

Global Coal Consumption (Mtce)



Source(s): IEA

Coal – A Final Conclusion

When one thinks of the coal industry, some similarities may be found within the once-mighty tobacco industry. Both sectors are extremely mature and facing inevitable decline in the face of increasingly-tightening government regulation across the globe. However, this is not an entirely fair comparison, as the key difference between the two relates to customer elasticity and pricing power. Cigarette consumers are notoriously inelastic, in terms of their ability to stop using the product, as well as with regard to their tolerance to price increases. Thus, although cigarette usage may be on the decline, tobacco companies can gradually hike prices and thus create a cash cow business model.

Coal demand, on the other hand, is very elastic as the commodity is forced to compete with alternative power sources such as natural gas. Within many jurisdictions, the unregulated bid-for-power model means that power distributors & customers can essentially pick which source of energy they would prefer. In the face of heightened government regulation and environmental consciousness, such often means that substitute products such as natural gas are chosen over coal. However, unlike the tobacco industry, coal producers cannot simply raise prices in order to counter falling demand – they are producing a commoditized substance, and are thus at the mercy of market dynamics.

Largely due to the presence of cheap and bountiful natural gas, paired with increased environmental awareness around coal usage, the E&U team believes that the North American thermal coal industry is no longer competitive, and is thus on the brink of destruction. That being said, there do remain some compelling opportunities for coal in overseas markets. However, as such countries continue to develop and phase out the sunk costs of pre-existing coal plants, it is likely a matter of time before such countries follow-suit with North America and Europe.

References

1. Arcadia Publishing
2. Bloomberg
3. Coal Association of Canada
4. Coal: R&D to Support National Energy Policy
5. Company Filings
6. EIA
7. Encyclopedia Britannica
8. Financial Post
9. Google Images
10. Market Watch
11. New York University
12. Private Equity Stakeholder Project
13. S&P Capital IQ
14. Seeking Alpha
15. USGS
16. World in Data